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Preface

Scarcity of documented information on hitherto done research at our university has often remained the concern of scientists. Therefore, this book of abstracts has been compiled by the Office of Research Affairs with the aim of providing researchers with quick and easy reference for planning further research as well as for teaching purposes. This book contains most of the abstracts of MSc thesis research conducted by students of the stream of School of Animal and Range Sciences from 1980 up to 2013. However, we would like to inform readers that, due to limited access to some of the graduate students' theses, we have been unable to include all of the abstracts in this first edition. We hope that the second edition will be more inclusive than this one. The order of the author names under each title indicates the student, major advisor, and co-advisors.

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I. Animal Production

1. Evaluation of Noug Meal versus Groundnut Meal as Protein Source in Calf Starter Rations

Makonnen Lema and Beyene Chichaibelu
Year: 1980

Abstract: The nutritive value of noug meal and groundnut meal both in raw and boiled form was ascertained by formulating four different dairy calf starter rations containing raw noug meal (RNM), boiled noug meal (BNM),raw groundnut meal (RGNM) and boiled groundnut meal (BGNM) as protein sources. Each starter ration was fed to six calves (three males and three females) varying in age from 8 to 12 days and body weight from 40 to 53 kilograms over a period of 84 days (12 weeks). The mean daily dry matter intake for the starter rations containing RNM, BNM, RGNM, and BGNM were found to be 2.69, 3.51 2.49 and 3.14 kg, respectively. No significant difference was observed between the mean daily dry matter intakes of the starter rations containing RNM and RGNM as the protein source. However, the mean daily dry matter intake of the ration containing BNM was significantly higher than that for RNM. Similarly the mean daily dry matter intake of BGNM was significantly higher than RGNM starter ration. There was no significant difference between the mean daily weight gains of the calves fed the starter rations containing RNM, BNM, RGNM and BGNM was 0.66, 0.68, 0.59 and 0.65 kg. No significant difference was discernible between the mean daily weight gains in the four groups of calves. Dry matter efficiency ratio for the starter rations containing RNM, BNM, RGNM and BGNM was 0.25, 0.19, 0.24 and 0.21 respectively indicating no significant difference between the dry matter efficiency ratios within the four treatments. The results obtained from the study indicated that the nutritive value of noug meal is comparable to that of groundnut meal in spite of the higher crude protein content of the starter rations supplemented with groundnut meal. Moreover, the results also revealed that boiling of raw noug meal or raw groundnut meal did not significantly improve their nutritive values while it improved palatability of starter rations and dry matter intake of calves.

2. Laboratory Evaluation and Estimation of Nutritive Value of Some Feedstuffs Produced in the Alemaya Woreda

Alemu Yami and Beyene Chichaibelu
Year: 1981

Abstract: Sixty five feeds including seventeen dry forages and roughage's; 23 pasture, range plants and forages fed green; 1 silage; 10 energy feeds; 4 formula feeds; 7 protein supplement feeds and 3 mineral supplements were carefully sampled from different sub-Agro- Ecological regions in the Alemaya woreda and taken to the Institute of Agricultural Research at Holeta for intensive laboratory evaluation . The TDDM, TDN, DE ME, NE compositions and intake of the feedstuffs was estimated by employing appropriate formulae and regression equations. The results obtained were comparable to their counterparts in the NRC feed composition tables and the results reported for similar feed stuffs by Beyene et al (1977). The overall results of the intensive laboratory evaluation and estimation of nutritive value of feed stuffs produced in the Alemaya woreda presented in tables 5 and 6 of the text conclusively show that various feed stuffs that are nutritionally acceptable and comparatively inexpensive exist in the Alemaya Woreda to support a viable livestock industry through the scientific feeding of animals.

3. Reproductive Performance of Pure Zebu Cattle and their Crosses with Temperate Breeds in Ethiopia

Azage Tegegn
Year: 1981

Abstract: A total of 2052 records for both local zebu and their crosses with temperate breeds for the period 1974 to 1979 were involved in the study. The date were taken from the Institute of Agriculture Research (IAR) cattle crossbreeding program which embodies three local zebu cattle types Boran, Horro and Barka taken as dam breeds; three temperate cattle breeds taken as sire breeds – Friesian, Jersey and simmental and four research stations- Bako, Holetta, Melkawerer and Adamitulu. The data were analyzed using the IBM system 3 computer at the Central Statistics Office (CSO). Least squares models were adopted to study number of services per conception, gestation length, age at first calving, days open till conception, calving interval and calving rate. The analyses were run on group of stations- Bako and Holetta formed the highest stations (set l) while Melka Werer and Adamitulu formed the lowland stations (set 2). Separate analyses were also conducted for the local Zebu and for the crossbred cows. Possible sources of environmental variations (station, month and year, sex of calf) genetic variations (cow breed, dam breed, sire breed); interactions among some effects and their contribution to total variation in each trait were studied. Results show that least squares means for number of services per conception was 1.74, 1.62, 1.98 and 1.74 for the highland local (HL), highland cross (HC), lowland local (LL) and lowland cross (LC) cows, respectively. Month of conception affected ($P < 0.01$ or $P < 0.05$) number of services per conception in the HL, LL and HC cows. Year of conception and station X cow breed interaction contributed to the variation ($P < 0.01$) in number of services per conception of LL cows. Body weight at conception affected ($P < 0.01$) number of services per conception of LC cows. Gestation length means were 279.8, 280.2, 281.0 and 282.2 days for HL, HC, LL, and LC cows respectively. Cow breed, year of calving and calf birth weight affected ($P < 0.01$ or $P < 0.05$) gestation length of HL cows while sire breed affected ($P < 0.01$) gestation length in both HL and LL cows. Calf birth weight had a significant ($P < 0.01$) effect in all gestation length analyses. Least squares means for age at first calving of HC and LC cows was 35.5 and 40.3 months, respectively. Station sire breed and body weight at conception affected ($P < 0.01$ or $P < 0 .05$) age at first calving in both cases. Estimates of mean values for days open till conception were 204.5, 133.8 and 250.7 days for HL, HC and LL cows, respectively. Month of calving exerted a significant effect ($p<.01$) on days open till conception of HL cows while station, year and sire breed X cow breed interaction had a significant ($P < 0.01$ or $P < 0 .05$) effect on LL cows. The mean values for calving interval were 506.8, 422.4 and 483.7 days for HL, HC and LL cows, respectively. Year of calving had a significant effect ($P < 0.01$) in calving interval of LL cows only. Least squares means for calving rate were. 37, 66, .33 and .60 calf per year per cow since conception for the HL, HC, LL and LC cows respectively. Station has a significant effect ($P < 0.01$ or $P< 0.05$) in all cases except in the LL cows. Station X cow breed interaction was significant ($P < 0.01$) in the HL cows. In general, comparisons between least squares means of most of the traits indicate that the crossbred cows had a better reproductive performance than the pure zebu cows both in the highland and lowland stations.

4. Comparative Laboratory and Animal Evaluation and Estimation of Protein Supplementation Values of Noag (*Guizotia abyssinica*) and Peanut (*Arachis hypogea*) Seed Cakes

Maaza Sahle
Year: 1981

Abstract: The nutritional values of noag and peanut seed cakes as protein supplements in layers rations were studied by formulating four treatment rations on an isonitrogenous and isocaloric basis. The four treatment rations contained; noag seed cake (T_2), peanut seed cake (T_3), a combination of noag and peanut seed cakes (T_4), fishmeal (T_5) and negative control ration containing no protein supplement (T_1). 120 white Leghorn layers which were randomly assigned in to ten groups of 12 layers each were used in this study. The five experimental rations were assigned randomly to the 10 groups of 12 layers each. T_2 and T_4 were found to be superior on egg production and feed consumption per dozen of eggs when compared to the other treatments. In terms of feed cost to produce a dozen of eggs, T2 was found to be the least cost ration as compared to the other rations. When all parameters used in this study are considered, the performances of layers receiving T3 were found to be significantly lower as compared to groups receiving T_2. It is the finding of this study that noag seedcake is superior in protein quality for egg production as compared to peanut seed cake.

5. Comparative Laboratory and Animal Evaluation and Estimation of Calcium Supplementation Values of Bone Meal, Eggshell Meal, and Limestone

Tsegaw Belay, and Beyene Chichaibelu
Year: 1981

Abstract: Experiment was conducted to evaluate the calcium content and the supplementary values of bone meal, eggshell, limestone and their combinations at 3.5% calcium levels. The laboratory analysis result of percentage calcium for bone meal, eggshell and limestone were 25.57, 33.04 and 34.70 respectively. For supplementary value evaluation one hundred and five 9 months old single comb white Leghorn laying hens were fed a basal ration without calcium supplement, (negative control) and other rations containing 10.60% eggshell meal, 10.29 limestone, 14% bone meal, 7% bone meal +5.3% eggshell meal, 5.3% eggshell + 5.2% limestone and 7% bone meal + 5.2% limestone for six twenty eight day months. Results have been presented which show that there were no statistically significant ($P<0.05$) difference in body weight gain between the negative control ration and the other rations supplemented with the different calcium sources. Egg production was significantly ($P>0.01$) higher with rations containing supplemental calcium sources than the negative control ration. Results of feed consumption, feed efficiency and economic value ratio revealed that the negative control ration and 14% bone meal supplemented ration had higher feed consumption, lower feed efficiency and lower economic value ratio than the other rations while 10.29% limestone supplemented ration had significantly ($P>.01$) higher feed efficiency ratio and economic value ratio than the others by depressing feed consumption. Egg weight, eggshell thickness and eggshell weight were significantly higher for the six treatment diets containing the different supplemental calcium source while the negative control ration gave significantly lower egg weight, shell thickness and eggshell weight than the other treatment rations. In this same study fertility, hatchability and chick weight at hatching were significantly reduced by the negative control ration than the other six rations. But the result of albumen height and Haugh unit showed no significant difference between the seven treatments rations indicating that calcium had no effect on internal egg quality.

6. Animal Evaluation of the Feeding Value of Sisal Waste (*Agave sisalana*)

Ammanuel Tukue and Beyene Chichaibelu
Year: 1982

Abstract: Laboratory and animal evaluation experimental studies were conducted with the object of determining the feeding value of sisal Waste (*Agave sisalana*). Nine feed ingredients including fresh and sun dried sisal wastes were laboratorily evaluated and the resulting analyses data were employed to formulate five treatment rations which were composed of: (1) basal ration plus 50% fresh sisal waste; (2) basal ration plus 50% sun dried sisal waste; (3) basal ration plus 25% fresh sisal waste; (4) basal ration plus 25% sun dried sisal waste, and (5) positive control ration. Each treatment contained approximately 12.51% crude protein, 1.07 Mcal /kg net energy for gain and 20.13% acid detergent fiber. Fifty borena Steers and bulls ranging in weight from 160 to 165 kg were randomly divided in to 5 groups of 10 animals, each group was further subdivided in to 2 replicates per treatment and randomly assigned to the five treatment rations and observed for 120 days. The results of the mean daily weight gains for treatment rations 1,2,3,4, and 5 were 0.44, 0.57, 0.65, 0.89 and 1.02 Kg respectively. There were highly significant differences among the treatment means (P, 0.01 and P 0.05). Treatments 5 and 4 produced significantly higher mean daily weight gains and treatment 1 produced significantly lower weight gain than treatments 3 and 2 and that treatment 3 and 2 produced significantly lower body weight gains than treatments 5 and 4, but produced significantly higher weight gains than treatment 1. Dry matter intake (Kg) and the dry matter efficiency ratio (DME) (%) were 4.48, 4.66, 4.96, 4.91 and 4.58 respectively and 9.82, 12.23, 13.10, 18.3, and 22.27 respectively. There were highly significant differences among the treatment means (P 0.01 and P 0.05). Treatments 3 and 4 attained significantly higher mean daily dry matter intake than treatment 1, 2 and 5. Treatment 5 had significantly higher % DMER than treatments 4, 3, 2 and 1 and treatment 4 had significantly lower % DMER than 5, but had significantly high % DMER than treatments 3, 2, and 1. Treatments 3 and 2 had significantly lower % DMER than 5 and 4, but had significantly higher % DMER than treatment 1. Treatment 1 had significantly lower % DMER than 5 and 4, but had significantly higher % DMER than treatment 1. Treatment 1 had significantly lower % DMER than 5, 4, 3, and 2. The results of the cost efficiency ratio (% CER) were 61.11, 85.08, 44.22, 75.42 and 56.67 respectively. These values showed highly significant treatment difference among their means ($P>0.01$ and $P<0.05$). Treatment 2 had significantly higher % CER than 4, 1 and 5, and 3; and treatment 4 has significantly lower % CER than 2, but had significantly higher % CER than treatments 2, 4, 1 and 5.

7. Pathophysiological Studies on the Infectivity of the Coccidian Parasites (*Eimerial tenella*) to the Woter Strain of Domestic Ethiopian Chickens and Single Come White Leghorn Breeds of Chickens (*Gallus domesticus*)

Tilahun Jiffar and Efrem Mamo
Year: 1982

Abstract: An investigation was conducted to compare the susceptibility of single comb white Leghorn breeds and the water strains of local chickens to E. tenella infection. Eggs of the white Leghorn breed were obtained from the Poultry Farm of the Agricultural College. Chicks of the Woter strain were obtained from eggs bought in an open market of Woter, distric in Harargie highlands. Eggs of both strains were hatched simultaneously in the College Poultry Farm. A strain of E. tenella was obtained from fecal collections of chickens transported to Addis Ababa market for sale and proper identification was made. On the 31st day of age 72 White Leghorn chickens and 84 Woter strains of local chickens were divided into two groups each and allocated to separate battery brooders. One group from each strain was orally inoculated with approximately 15 X 10^4 oocysts of E. tenella while the other group served as uninfected control. Mortality, oocyst production, percent packed cell volume, weight gain and pathological changes were used to measure the degree of susceptibility of the two strains of chickens to E. tenella infections. The mean survival rate of the woter strain and single comb White Leghorn breed was 44.8% and 81.1% respectively. Statistical analysis showed that the difference in survival was highly significant ($p<0.01$). There was no significant difference in oocyst production between the two breeds. The packed cell volume of the infected groups of the Woter strain increased significantly on the 3rd day of infection while there was no significant difference in PVC value between the infected and uninfected controls of the White Leghorn. In both breeds significant decrease in PVC of the infected groups occurred on the 6th, 10th, and 14th day post infectio. The PVC decrease was not sever ($p<0.05$) in the White Leghorn breed than in the Woter strains of chickens on the tenth day of infection. A significant mean body weight loss was observed in the two breeds on the 6th, 10th and 14th day post infection were compared to the uninfected controls. Body weight loss was significantly ($p<0.01$) lower in the Woter strain than in the White Leghorn on the 10th day of infection. The infected white leghorn gained 81.75 and the Woter strain gained 80% of the uninfected controls by the twenty eighth day post infections. Pathological comparisons showed that the Woter strain succumb earlier to E. tenella infections than the White Leghorn. During the recovery phase the reverse was found to be true.

8. Performance of Black Head Ogaden Sheep Fed Poultry Litter and Monensin

Tesfaye Ayalew and Beyene Chichaibelu
Year: 1983

Abstract: The effect of Poultry litter (PL) and monensin supplementation of sheep pen-fed native mature grass hay and or grazed native mature standing grass hay was studied for 120 days. The non-supplemented sheep consuming native mature hay significantly lost weight. Supplementation with monensin significantly reduced the weight loss. Supplementation with PL not only maintained the body weight of sheep but also promoted significant body weight gain (15 gm/ sheep/day).Supplementation of the grazing sheep by PL significantly reduced daily weight gain. Supplementation with both monensin and PL, however, significantly increased daily weight. Supplementation with monensin, although not statistically significant, slightly reduced daily weight gain of the grazing sheep. In all the carcass parameters considered penned and grazed animals that were not supplemented the showed poor performance. The Grazing animals significantly excelled the penned animals in many of the carcass parameters considered. The digestibility and nitrogen balance data indicated that sheep that were fed native mature grass hay only or supplemented with monensin only were in negative nitrogen balance when compared to animals supplemented with poultry litter. Supplementation with PL improved the condition and all supplemented animals were in positive nitrogen balance. The supplemented animals were in positive nitrogen balance. The supplementation of mature native grass hay with PL significantly increased the ration crude protein digestibility. Although not significant supplementation of the basal ration with PL increased digestibility of dry matter.

9. Laboratory Evaluation of Lime Treated Maize Cobs and Feeding Value of Lime Treated Maize Cob Based Diets

Girma Abebe and Beyene Chichaibelu
Year: 1984

Abstract: In experiment 1, untreated, water treated, lime treated and ensiled maize cob- based diets were evaluated in a laboratory study. The dry matter of lime treated and ensiled cob was lowered by about 2 .9 percentage units as compared to untreated (control). Lime treatment also caused a reduction in neutral detergent fiber (NDF) and hemi-cellulose while the ash and calcium contents were markedly increased. Water treatment of maize cobs considerably decreased in vitro dry matter digestibility (IVDMD). The IVDMD of the untreated maize cobs (control) was 63.92% while that of the water treated was 56.30%. In experiment 2, the feeding values of diet based on water and lime treated and ensiled maize cobs were investigated using 25 intact male sheep in a complete random design. The proportions of maize cobs in the diets were: 68% water treated (Diet A), 68% lime treated (Diet B), and 34 % lime treated +34% water treated (Diet C), 46% lime treated + 22% water treated (Diet D) and concentrate diet (Diet E, positive control). Total dry matter intake (G/kg w.$^{.75}$ / day) were 50.85,69.05,67.50, 66.44 and 73.90 for diets A, B, C, D and E respectively and the treatment effects were significantly different (P>. 01). However, the intake value for diets, B, C and D lacked statistical significance (P<, 05). Lime treatment significantly improved (P>0.05) the digestibility of dry matter, neutral detergent fiber and cellulose. Comparison between in vitro and in vivo dry matter digestibility revealed the existence of high positive correlation of 0.98 that was significant (P > 0. 01) perhaps indicating the ability of in vitro to give a fair prediction of in vivo digestibility of lime treated maize cobs. Total weight gain during the whole experimental period (expressed as percentage of initial weight) for animals fed diets A, B, C, D, and E were: 3.12, 31.04, 24.46, 25.40, 75.42 respectively. The figures were significantly different at (P < .01). Nevertheless, the weight gains of animals on diets B, C and D were not statistically different from each other. Average daily gain showed a similar pattern. In almost all carcass parameters considered, animals fed on diet A were found to have the lowest.

10. The Use of Tritiated Water to Estimate the Kinetics of Water in Lactating Boran Cows under Ranch Condition.

Negussie Bussa and Butter Worth
Year: 1984

Abstract: To have the major problems of cattle production in the semi-arid regions are the effect of water deprivation and low nutrient intake during the dry season. The presence of adequate water in body tissues is an essential prerequisite for normal maintenance of all living cells. Therefore, its absence brings serious complications and reduces the expected productivity of livestock. In this study an attempt was made to investigate the effect of water restriction on body water pool, water turnover and water consumption of 30 lactating Boran cows under ranch condition. Live weight(Kg),Body weight (Liters) water turn over (liters/day, liters/100 kg/day, ml/liters/day and ml/liter 0.82 /day and water consumption (liters/drink),liters/100 Kg/drink, liters/day and kiters/100 kg/day) were tested in completely randomized design. Live weight was not significantly different ($P < 0.05$) between the group. Body water of animals under daily watering rigime was significantly higher ($P < 0.01$) than three day watering regim. However there was no significant difference ($P < 0.01$) either between one and two day or two and three day watering regimes. Water turn over one day was highly significant ($P < 0.01$) from two and three day. There was no significant difference ($P < 0.01$) between two and three day. The mean turn over time and biological half – time of body water turnover of one day was highly significant ($P < 0.01$) from two and three day. However, there was no significant difference ($P < 0.01$) between two and three days. Water consumption (liter/drink) was highly significant ($P < 0.01$) between the groups. However, water consumption (liter/100 kg/drink) of one - day was highly significant ($P < 0.01$) from two three days. Water consumption (liters/day) of one-day was highly significant ($P < 0.01$) from two and three day. There was no significant difference ($P < 0.01$) between two and three day. However, water consumption (liters/100 kg/day) of all the groups was highly significant ($P < 0.01$). Water restriction markedly reduced body water, water turnover and water consumption (liters /day) of two and three day animals compared to one day animals. In general there was no significant difference between the effects of two and three-day watering regims. There was a poor agreement between water input estimated from tritiated water (TOH) turnover and water consumption measured from the trough.

11. The Nutritive Value for Sheep of Post-Harvest Sorghum Panicles Sprayed with 4% Urea, or Ensiled with Either 2% Slaked Lime or 4% Fertilizer Grade Urea

Solomon Moges
Year: 1984

Abstract: Cereal straws and other crop residues are important feed resources in this country. Among commonly grown cereals in Ethiopia is sorghum. Post-harvest sorghum panicle is a residue remaining after the sorghum heads (panicles) are threshed for seed. Attempt to improve the nutritive value of crop residue by chemical treatments has been in practice for sometimes now. The objective of chemical treatments is to increase digestibility and voluntary feed intake. In this thesis research, an experiment was conducted to compare the effectiveness of ensiling post-harvest sorghum panicles either with 4% fertilizer grade urea 2% commercial slaked lime: or spraying it with 4% fertilizer grade urea as opposed to the untreated panicle. Chemical composition, Feed intake, in vivo digestibility of the different feed fractions (DM, OM, CP, ADF, NDF, cellulose, hemi cellulose) nitrogen balance and in vitro DM digestibility of the four treatment diets were determined in a complete randomized design with 5 replicates using 20 Black Head Ogaden Sheep. Voluntary intakes of all chemical components were markedly elevated as a result of spraying the panicles with urea. Whereas ensiling with urea did not cause much change in the intake of chemical components (as compared with the control), ensiling with Ca $(OH)_2$ depressed their intake . Nitrogen intake in both urea ensiled and sprayed panicles were significantly ($P < 0.05$) higher than the Ca (OH) 2 ensiled and untreated controls. All chemical components in the urea sprayed panicles were significantly ($P < 0.05$) better digested than the other treatments. Urea ensiling non-significantly elevated DM and OM digestibility above the Ca $(OH)_2$ and control panicles. In general the digestibility of NDF, ADF, cellulose, hemicellulose and nitrogen were significantly ($P < 0.05$) better in the urea sprayed or urea ensiled panicles than the Ca $(OH)_2$ ensiled and control diets. Ca $(OH)_2$ treatment generally depressed the digestibility of all chemical components. Negative nitrogen balance was recorded for all treatments, but animals fed high nitrogen diets were in a much negative nitrogen balance. Untreated and lime ensiled panicles had significantly ($P < 0.05$) higher nitrogen retention from urea ensiled panicles. The in vitro DM digestibility were found to be lower than that in vivo and their correlation was statistically not significant.

12. Digestibility of Poultry Litter and It's Influence on the Performance of Beef Cattle

Tegene Negesse and Butter Worth
Year: 1984

Abstract: Three Experiments were conducted. In Experiment 1, the digestibility and nitrogen balance of poultry litter in sheep; in Experiment 2 and 3 the dry matter intake and weight gain, and carcass merits of steers fed poultry litter were studied. The nitrogen balance data in Experiment 1 indicated that poultry litter supplemented sheep were in positive nitrogen balance as compared to sheep fed with only hay. All the supplemented sheep were in positive nitrogen balance. The DM, OM, CP, EE and soluble carbohydrate digestibility coefficients of poultry litter and its TDN content were greater than the native grass hay. When poultry litter was reinforced with wheat bran, it further improved the digestibility of the nutrients mentioned above and the TDN content. The nitrogen in the litter is well digested and if efficiently utilized, it would be a cheap protein source for all ruminants. Under both feeding regimes in Experiment 2, the non-supplemented steers that consumed native grass standing hay produced significantly lower daily weight gain than the poultry litter supplemented group ($P < 0.05$). Steers supplemented with poultry litter + wheat bran produced higher daily weight gains (0.29 kg /head /day and 0.45 kg / head /day, under controlled and full feeding, respectively) than the negative control (0.04 and 0.06 kg/head /day) and the steers fed with poultry litter alone (0.17 and 0.40 kg/head/day). The steers in treatment 2, 3 and 4 during adlibitum feeding period consumed 2.93, 3.61 and 4.35 kg Dm per head per day. In all the carcass parameters, except in the hind quarter percent, the negative control showed poor performance. Routine observations of the steers and sheep in experiment 1 and 2 indicated that no apparent ill effects in the animals were noticed by feeding poultry litter.

13. The Mineral and Crude Protein Contents of Some Feed Stuffs Produced in Jijiga Awraja and Gursum Woreda, Eastern Ethiopia

Woldu Tekledebesai and Beyene Chichaibelu
Year: 1984

Abstract: Twenty dry forages after maturity, 86 green herbaceous forages predominantly at mature stage of growth, 44 green browse samples and also 8 forage samples at different stages of growth including their different plant parts i.e. seed heads, leaves and stems making a total of 32 samples plus 29 cereal grain and crop residue samples were harvested from Jijiga awraja and Gursum woreda. Samples were analyzes for their dry matter (some samples), ash, minerals and crude protein with the objective of surveying the status of these elements in the study area. In the four woredas within Jijiga awraja, dominant forage species were determined by the aid of a quadrat from 13 sites and were identified. One - way analysis of variance was done to see if there was Significant difference in the ash, minerals and crude protein content between dry forages, green forages and browse species; and between the dominants and mixture of less dominant forage species. Two –way analysis of variance was done to examine if there was significant difference in the ash, minerals and crude protein content of the different plant parts of the eight forages. Browse species were significantly higher ($P \leq 0.05$)) than either the dry forages or green ones in the contents of Ca, P, K, Mg, Co and CP; green forages were significantly higher ($P \leq 0.05$)than the dry forages in the contents of P,K, Zn and CP. Both dry and green forages were significantly higher ($P \leq 0.05$)than the browse samples in their concentration of Zn and Cu. Dry forages contained significantly higher ($P \leq 0.05$) Fe content than browse species ; green forages did not significantly differ from either the dry forages or browse species. There was no significant difference (P 0.05) in the contents of ash, sodium and manganese between the three groups of feed. The only significant difference ($P \leq 0.05$)observed between the dominants and mixtures of less dominant species was for K and Mg; in both cases the latter exceeded in content. Leaves had significantly higher ($P \leq 0.05$) contents of ash, Ca,P, Mn, Zn, Cu and Cp than the stems. Seed heasd were significantly higher ($P \leq 0.05$) than the stems in the contents of P, Mn , Zn ,Cu and Cp. Leaves were significantly higher ($P \leq 0.05$) in their ash, Ca, P and CP contents than the aerial (combined) parts. Seed heads were significantly higher ($P \leq 0.05$) than the aerial parts in their P and Cp contents. The aerial parts were significantly higher ($P \leq 0.05$) than the seed heads in their ash content, and were also significantly higher (P, 0.05) than the stems in their concentration of ash, P and Cp. There was no significant difference in the contents of Na, Fe and Co between the fore plant parts. P and CP deficiency in the dry and green forages and crop residues and Na deficiency in all types of feeds was encountered in this study. 25% of the dry forages, 17% of the green ones and 7% of the browse species were at toxic levels of iron; 5% of the dry and 2% of the green forages were also at toxic levels of copper and 5% of the dry forages were at toxic zinc level. It was recommended that browse species be utilized as CP and P supplements during the dry season for cattle and sheep. Na supplementation for all classes of livestock was recommended. The higher contents of minerals and crude protein obtained in the leaves suggested a better utilization of forages when they are leafy, before maturity. Attention should be paid to the few samples found at toxic level, however, the means of available feeds analyzed were below the toxic level that it seems unlikely for these samples to inhibit livestock production in the study area presently. As crop residues were generally found to be low in CP and minerals it was suggested that they be used to contribute as maintenance rations during the dry season.

14. Laboratory and Animal Evaluation of the Nutritive Values of Atella and Brewers Dried Grains Supplemented Starter - Chicks Rations

Ali Beker and Beyene Chichaibelu
Year: 1985

Abstract: In this thesis research study the nutritional values of *Atella* and Brewers dried grain supplemented grower- chicks rations were studied by formulating six treatment rations on an isonitrogenous and isocaloric basis. The treatment rations contained, 10% *Atella* + Basal ingredients (T_1) 10% Brewers grains + Basal ingredients (T_2): 15% *Atella* + Basal ingredients (T_3): 15% Brewers grains + Basal ingredients (T_4): 2.5% *Atella* + 7.5% Brewers grains +Basal ingredients (T_5) and the positive control ration (T_6). The result of the experiment showed that for all the criteria viz., mean daily dry matter in take mean daily body weight gain and dry matter efficiency ratio, there were no statistically significant differences ($P>0.01$) and ($P>0.05$) between the treatment means. This indicates that both *Atella* and Brewers dried grains can be used effectively in starter chick's ration up to a level of 15% without adverse effects on growth of chicks.

15. Protein Quality Evaluation of *Dagussa* (*Eleusin coracana*) and *Gibto* (*Lupinus albus*) and the Supplementary Value of *Gibto* When Added to *Dagussa*

Zinash Sileshi and Beyene Chichaibelu
Year: 1985

Abstract: In Experiment 1, the protein quality of *gibto* (raw, roasted and water soaked. roasted decorticated and soaked, and germinated) and *dagussa* were evaluated using rat growth, protein efficiency ratio and protein digestion coefficient methods. Row *gibto* when used as the only source of dietary protein was toxic to the experimental rats and germination did not improve the protein quality of *gibto* diet. Food preparation methods of *gibto* i.e. roasting and water soaking and roasting, decorticating and water soaking significantly improved the protein quality of the *gibto* diets as evidenced by increased rat growth, Protein efficiency ratio (PER) and protein digestion coefficient. No significant ($P > 0.01$) differences were observed in gain and PER between roasted and water soaked *gibto*, roasted decorticated and water soaked *gibto* and *dagussa* diets; however, the protein digestion coefficient of *dagussa* diet was significantly lower ($P < 0.01$) than the other two treatment diets. In experiment 2, the supplementary value of roasted and water soaked *gibto* when added to *gagussa* diet was studied using rat growth, PER and protein digestion coefficient methods. Aa 10% dietary protein level, as the percentage of *gibto* supplement of *dagussa* was increased from 8 to 16% the resulting weight gain, PER and protein digestion coefficient of the combined. Diets of *dagussa* and *gibto* inccoringly. The result of the statistical analysis showed that the supplementation of *dagussa* diets with 14% and 16% *gibto* were significantly superior on mean PER and protein digestion coefficients than the other four treatment diets. However, the supplementation of *dagusa* diet with 16% *gibto* was not able to bring about a statistically highly significant improvement on the protein quality of *dagussa* supplement with 14% *gibto* diet.

16. Evaluation of Growth and Reproductive Performance of Borana Cattle and Their Crosses with Friesian at Abrnossa, Shoa, Ethiopia

Mekonnen Hailemariam and Keno Banjaw
Year: 1987

Abstract: Date collected between 1977 and 1985 on reproductive and growth traits of Borana cattle and their crosses with Friesian, were analyzed using the least - squares procedure. The animals were maintained for beef and in-calf dairy heifers' production at the Abernossa Cattle Breeding and Improvement Ranch of the ministry of Agriculture. The result of the analysis showed that the mean number of services per conception for first pregnancy was 1.701. The difference among the breed groups was not significant but both year and season of conception had significant influence. Heifers which conceived during the small rainy and dry seasons required 0.16 and 0.21 more services respectively than those conceiving during the big rainy season. Age at first calving (AFC) averaged 31.5, 32.7, 45.2 and 46.8 months for F_1, ¾ Friesian, Borana mated to Borana hulls and artificially inseminated Borana heifers, respectively. Year of birth had a significant effect on AFC of all mating groups except on that of artificially inseminated borana heifers. Season of birth had significant effect on AFC of F_1 heifers only. The mean values for calving interval (C I) were 465, 552,525, and 487 days respectively for borana cows mated to Borana bulls, Borana cowa mated to Friesian bulls, borana cows artificially inseminated and F_1 cows artificially inseminated . Year of calving had a significant effect on C I of all cow mating groups but influence of season was significant on borana cows mated to Borana bulls and Borana cows artificially inseminated only. Parity had significant influence on CI of all Borana dams, but not on F_1 dams. The preweaning mortality rate was 4.0% and 2.9% for Borana and F_1 cross calves, respectively. Parity of dam, sex of calf and the interaction between breed group of calf and year of birth were significant. The total mortality rate up to first calving age for pure Borana cattle was estimated to be 11.5%. Based on this a cow in Borana Breeding Unit needed 2.27 calvings to produce a heifer calf that could inturn calve in the herd. This, 37 percent of the females born were required as herd replacements, and the generation interval was 6.6 years. Mean body weight of Borana, F_1 and ¾ Friesian cross calves was 25.17 Kg, 25.39 kg and 25.73 kg at birth and 157.5 kg, 176.7 kg and 179.9 kg at weaning, respectively. All factors included in the analysis and their interaction had a significant effect on both parameters with the exception of the effect of season of birth and its interaction with breed group on birth weight. Weights of Borana calves at one- two –and three years of age were 179 kg, 269 kg and 338 kg, respectively. Sex and year of birth had significant effect on weights at these three stages. Season of birth had a significant effect on the two-year weight while the effect of parity of dam was significant on the one - year weight only. Estimated heritability values of 0.32, 0.24, 0.43, 0.29 and 0.24 for birth , weaning , one-year, two-year and three-year weights of Borana cattle suggest that body weight increase of 0.11,1.1, 2.8, 3.1 and 2.4 kg per year could be achieved through selection at the respective ages. Cow productivity index of 127 kg and 122 kg of an eight – month old weaner calf per cow per year was estimated for Borana cows weaning Borana and F_1 calves, respectively. Cow productivity of all cows was significantly influenced by year of calving and parity of dam. Borana cows producing F_1 calves were more productive when calving during the small rainy season than those calving during the other seasons.

17. Nutritive Value, Dry Matter Yield And In Vitro Matter Digestibility As Affected By Cutting Interval And Fertilizer Application On Native Natural Pastures Growing On Three Soil Types At Alemaya University Of Agriculture Campus

Teshome Shenkoru and Beyene Chichaibelu and J.D. Reed
Year: 1987

Abstract: Indigenous pastures harvested at three stages of growth (30, 60,& 90 days) from fertilized and unfertilized polet on three soil types were studied for their botanical and chemical compositions , In- vitro dry matter digestibility , and dry matter yield. The study was carried out during the rainy season of 1985 (July1st –Oct.30th). Fertilizer was applied at the rate of 73-30.1, 55-11.1, and 73-11.1 N-P. Kg/ ha on Regosols, Fluvisol, and Vertisols, respectively. Samples collected from Regosols showed high level crude protein at 30-and 60 days of harvest than that of 90-day harvest. Neutral detergent fiber and acid detergent fiber significantly increased with age for Regodols. Hemicellulose content increased with age for the fertilized plots while lignin content increased with age for unfertilized plots. Cellulose, silica, magnesium, sodium and calcium remained consistent throughout the development stages. But fertilizer application increased ash, cellulose, dry matter yield, potassium and silica content of herbages. High level of potassium (K) was obtained for 30, and 60 day harvest both fertilized and unfertilized in relation to magnesium (Mg) and calcium (Ca) contents of samples, which might affect K/ Ca + Mg ratio. The dry matter yield per hectare increased with age. Samples from fluvisol showed the highest value forcrude protein at early stage of growth, while dry matter, neutral detergent and acid detergent fibers and dry matter yield were lowest. The reverse was true when plants increased with age. Lignin, IVTDDM, silica, hemicellulose, ash, calcium, phosphorus, and magnesium remained consistent throughout the growth stages. Fertilizer application increased potassium, sodium and dry matter yield of fluvisol pasture. Samples collected from Vertisol indicated that yields, and cells wall components, except lignin and silica increased significantly with age. Crude protein, ash for the fertilized plots, and in- vitro true digestibility decreased with advancing maturity, and showed sharp decline between 60 and 90 day stages of growth which was more so for the fertilized plots. Lignin, calcium, & sodium remained consistent throughout the growth stages. Fertilizer application increased in vitro digestibility, phosphorus, potassium, silica and yield of Vertisol pasture. Fertilizer increased the phosphorus content of the herbages, but the Increment was so small that cattle cannot meet their phosphorus requirements from all dates of cuts. Soil type's effect showed that pasture from Regosol ranked first in its nutritive value, which was followed by pasture, harvested from Fluvisol. The lowest nutritive value was obtained from pasture that were grown on Vertisols and this may be due to its high neutral detergent fiber, lignin and its low crude protein contents, which adversely affect nutritive value of feeds. In all soil types the majority of the samples even at 30 days of growth had high neutral detergent fiber contents (>65%). Indigenous pastures in the present study were found to have a high proportion of grasses, largely dominated Hyperrhenia spp. From the results of this study even though it is not exhaustive the author suggested that supplementation of crude protein for pasture harvested at or after 90 days, and sodium throughout the grazing period for animals will improve the productivity value of the native pasture. Phosphorus supplementation is necessary for all stages of cuts, in case of pasture from vertisols. Higher nutritive value will be gained from fertilization if the pasture are utilized at 30 days of growth. Since all the pasture are dominated by Hyperrhenia spp. t is better to utilize the pasture at early stages of growth (< 60 days), when grasses are shorter and leafier. High content of potassium was observed for 30, and 60 day cuts for Regosols pasture. Therefore, attention should be paid when dairy cows graze at early stages of growth as to avoid the danger of grass tetany.

18. Laboratory Evaluation of the Effects of Processing Method and Treatment on Chemical Composition and Invitro Digestibility of Coffee Pulp

Getachew Gebru and Beyene Chichaibelu
Year: 1987

Abstract: Experiments were conducted to study: (a) the effect of dry processing of coffee cherries and ensiling with urea on the chemical composition and In vitro digestibility of coffee pulp; and (b) the effect of variety on fiber and phenolic components. 0,40, 50 and 60 grams of urea were dissolved in liliter of water and added too dry processed coffee pulp (DPCP) (1 liter / kg of air dried DPCP) sealed in plastic bags (3 replicates and incubated for 15 and 30 days. Treatment level had a significant effect (P 0.05) on the Neutral detergent fiber (NDF), acid detergent fiber (ADF) and content of soluble phenolics. Nitrogen (N) and content of soluble phenolies showed an increase significant at 5 and 10% level of significance respectively. However urea treatment did not alter the In vitro dry matter digestibility (IVDMD). The experiment on the relationship of variety to chemical composition was studied on the wet processed pulp. 14 varieties of coffee cheery were collected from high and low altitudes in Kaff Administrative Region.

19. Evaluation of Protein Quality and Supplementary Value of Brewers Dried Yeast and Noug Seed Cake in Chick-Starter Ration

Yalemshet Wolde and Beyene Chichaibelu
Year: 1998

Abstract: In this thesis study the protein quality and supplementary values of brewers' dried yeast and noug seed cake in starter – chicks ration were evaluated at 10% crude protein level. The treatment rations were: T_1, basal diet + 100 % of the protein from noug seed cake; T_2, basal diet + 100% of the protein from brewers dried yeast; T3' basal diet + 75% of the protein from brewers dried yeast +25% of the protein from noug seed cake; T_4, basal diet +50 % of the protein from brewers dried yeast + 50% of the protein from noug seed cake; T_5 basal diet + 75% of the protein from noug seed cake + 25% of the protein from brewers dried yeast, and T_6 basal diet + 100% of the protein from casein (Positive control) . Two hundred-forty day old white leghorn chicks with mean body weight of 45 grams were randomly divided in to six groups of 40 chicks each and further sub- divided in to two replicates of 20 chicks each. The six replicated groups of chicks were randomly assigned to the six treatment rations and fed ad libitum for a period of 6 weeks. The data generated as dry matter intake, protein intake, body weight gain and protein efficiency ratio was subjected to analysis of variance which indicated the existence of highly significant differences among treatment means. Brewers dried yeast and noug seed cake were similar in feed intake, protein intake and protein efficiency ratio when used as sole protein sources in each treatment diets of starter chicks. But they were different in body weight gain, that is, noug seed cake fed chicks having higher body weight gain than brewers dried yeast fed chicks. The supplementation of brewers dried yeast with 25% noug seed cake protein significantly improved feed intake, protein intake and body weight gain but had no significant effect on protein efficiency ratio. While increasing the noug seed cake protein to 50% significantly improved feed intake, protein intake, body weight gain and protein efficiency ratio of brewers dried yeast. Whereas the supplementation of noug seed cake with 25% and 50% of brewers dried yeast proteins had no significant effect on feed intake and protein intake but had significantly improved body weight gain and protein efficiency ratio of noug seed cake. The results of this study, therefore, infer that the supplementation of noug seed cake with 25% and 50% of brewers dried yeast proteins improves the protein quality of noug seed cake than when either one is used alone.

20. Evaluation of the Nutritive and Supplementary Value of Brewers Dried Grains in Layer –Poultry Ration

Adnan Beker and Beyene Chichaibelu
Year: 1988

Abstract: Three hundred white leghorn pullets, 3 months in lay, were randomly divided and sub-divided in to 6 groups of 50 layers and twelve sub-groups of 25 layers each. They were randomly housed in twelve pens and assigned to the six treatments rations of this experiment. Experimental rations containing 0, 5,10,15,20 and 25% brewers dried grains were formulated and offered ad libitum for six 28 day periods. Productive characteristics including egg production, feed consumption, feed efficiency, egg weight, egg quality, fertility and hatchability were studied. Statistical analysis of the results showed that there were no significant differences ($P>0.05$) in all the productive characteristics considered. However, there was a statistically highly significant difference ($p<0.01$) in the economic value expressed as egg sale to feed cost ratio. The highest level of BDG (25%) gave the highest ratio (2.61) indicative of its being the least cost ration.

21. The Nutritive and Supplementary Value of Malt Barley by- Product in Chick - Starter Diet

Eyob Haile and Beyene Chichaibelu
Year: 1989

Abstract: Six iso – nitrogenous and isocaloric chick – starter rations containing 0,5,10,15,20 and 25% malt barley by- products were formulated and fed ad-labium for a period of 10 weeks to 360 one -week old chicks that were randomly divided in to 12 replicates of 30 chicks each housed in 12 pens equipped with heaters, feeders and waterers. The result of the feeding trial showed that the supplementation of chick – starter ration with malt barley by- product up to 25% level of the total diet did not significantly affect the mean dry matter intake and body weight gain of the growing chicks. But the supplementation of chick – starter ration with 20 and 25% malt barley by-product significantly reduced the feed efficiency of the chicks as evidenced by the increasing values of the dry matter intake to body weight gain ratios. But When the over-all results for the parameters studies were considered, they indicated that the inclusion of up to 25% malt barley by-product in chick – starter ration was not actually too high to challenge the ability of the chicks to compensate for the effects of dietary dilutions. Thus, the chicks that were fed chick- starter rations supplemented with 20 and 25% malt barley by- products were able to maintain their caloric intake by compensatory increase in feed intake and thereby attained mean body weight gain equivalent to the chicks fed diets without malt barley by product. Furthermore, when the slight increase in feed intake that has resulted in decrease feed efficiency with diets containing higher levels of malt barley by-product (20-25%) is incorporated in to the calculation of the economic value of using such diets for growing chicks, the result of this study would appear to support the recommendation that malt barley by- product is an economical feedstuff in diets of growing chicks up to a level of 25% of the total diet, especially where and when the cost of malt barley by- product is cheap as compared to other scarce concentrate feeds needed in poultry feeding.

22. Evaluation of the Nutritive and Supplementary Values of Noug Seed Meal (Guizotic Abyssinic) In Commercial Broiler Chicks Ration

Amha Kassahun and Beyene Chichaibelu
Year: 1990

Abstract: The effects of feeding different levels of Noug Seed Meal (NSM) on the performance of broiler chicks were studied. The eight treatment rations containing 0% NSM (i.e., control or T_1),10% NSM (T_2), 20% NSM (T_3), 30% NSM (T_4), 40% NSM (T_5), 50% NSM (T_6), 57% NSM(T_7),and 65% NSM (T_8) respectively. These studies contained approximately 23.26+ 0.62% CP and 3.17+ 0.05 ME for broiler starter and 21.23 + 1.35% CP and 3.02+ 0.15 ME for broiler finisher chicks. Hubbard F_2 commercial broiler chicks were used. Sixty three chicks per treatment were replicated and randomly assigned to the eight treatment rations. They were fed for four weeks each on starter and finisher broiler rations in experiment 1 and 2 respectively. At the termination of the study, the broilers were killed for carcass evaluation. The results showed the neutral detergent fiber content of NSM at levels specified in the study had no significant effect on cell wall digestibility. However, levels of NSM above 40% significantly ($P < 0.01$) increased the mean daily dry matter intake and percent mortality but significantly ($P < 0.01$) decreased the mean daily body weight gains and dry matter efficiency rations respectively. However, NSM levels up to 40% improved the mean daily body weight gains and dry matter efficiency rations as well as reduced the mean dry matter intake and percent mortality significantly ($P<0.01$). NSM supplementations exceeding levels of 40% significantly ($P < 0.01$) reduced mean dressed body weight, and mean percent carcass and carcass and neck yields. NSM supplementations exceeding 40% highly and significantly ($P<0.01$)increased the mean total giblets, liver and gizzard yields respectively where as any of the NSM supplementation levels tested, had no significant effects ($P > 0.05$) on mean percent neck and heart yields. Similarly, NSM supplementation above 40% highly significantly ($P < 0.01$) increased or widened the mean dry matter conversion ratio to dressed body weight and decreased the mean revenue per feed cost generated from marketing live and dressed broilers. In general, therefore, the results of this study have indicated that NSM can be used effectively in commercial broiler starter and broiler finisher chicken rations up to 40% level without adversely affecting the growth performance of broiler chicks.

23. The Mineral Composition and Effect of Bole Local Natural Lick Supplementation on Feed Intake, Digestibility and Weight Gain of Black Head Ogaden Sheep

Fikre Abera, Beyene Chichaibelu and Bekele Sisay
Year: 1990

Abstract: Experiments were conducted to determine the mineral composition of local natural links obtained from three regions Ambo (highland), shashemene (Rift valley) and Jijiga (lowland) of Ethiopia where they are widely used. Subsequent to the mineral composition determination, two experiments were conducted with lambs to study the effects of the Ambo local natural link on concentrate intake, weight gain, D. M. and O.M. digestibility and fecal mineral concentration. In experiment 1 a completely randomized design feeding trial of 98 days durations using 55 whether lambs divided in to five groups of eleven weather each were grazed pasture (4.94% C.P, 1.46% EE, 73.88NDF, 54.44% ADF, 5.55% Lignin and 11.32% ash) for six hours followed by ad'libitum supplementation of concentrate' diet (14.72% CP, 3.44% EE, 22.52% ADF,40.64% NDF, 6.08% Lignin and 5.68% ash) to which 0,3,6,9, and 12% (DM intake of the sheep) the Ambo local natural lick was added. In Experiment 2 twenty five wether lambs were stall fed ad'libitum for 6 hours with hay (4.31%CP ,1.48% EE,70.04%NDF,53.49% ADF, 5.15% lignin and 10.40% ash) followed by ad'libitum supplementation of the previously described concentrate diet. The feeding and digestibility trials were not done for the other two natural licks. Result of the chemical analysis of the three licks revealed that all the three natural licks were alkaline to pH tests ranging from 7.86 to 9.48 and from 7.05 to 9.33 in distilled and Kcl solutions respectively. The licks were found to be too low in p (0.3- 24 PPM) and other macro elements to be used as macro elements supplements but appeared to be adequate in some microelements, notably Fe, Mn, Zn and Cu. Variability in the content of mineral elements was evident in the natural licks analyzed. The addition of natural licks to the basal concentrate diet at the rates of 0,3,6,9, and 12% of the DM intake of sheep significantly increased the ash, NDF (by interfering with the filtration of the sample) and mineral (Na, Mn, Fe, Cu and Zn) contents of the basal concentrate diet. The mean concentrate DM intake of the feeding trial period were 526.5, 411.0, 383.3, 353.6 and 331.5 g dry matter per day for the 0,3,6,9 and 12% natural lick supplemented concentrate diets respectively. The natural lick supplementation significantly reduced the mean daily concentrate DM intakes as compared to the control. The mean daily rates of gains were 92.8, 75.6, 71.9, 65.4 and 55.7 g for the treatments supplemented with 0,3,6,9 and 12% natural lick respectively. Supplementation of natural lick decreased the mean daily rate of gain of the supplemented groups as compared to the sheep fed without the natural lick. The digestibility trial conducted during the last ten days of feeding experiment was carried out by confining the sheep in individual metabolism crates. The sheep were ad'libitum fed for six hours daily with hay mowed from the same grazing area followed by the feeding of the basal concentrate diets supplemented with the natural lick at the same rate as used in the feeding trial. During the digestibility experiment the mean daily hay and concentrate DM intakes of the five groups of sheep were 110.41, 148.8, 156.6, 193.6, 244.3 for hay and 690.4, 616.2, 632.2,560, 465, 2 g DM .for the 0,3,6,9, and 12% local natural lick supplemented groups of sheep respectively. The natural lick supplemented groups had significantly increased mean daily hay DM intakes and decreased mean daily concentrate DM intake as compared to the control group. The forage intakes which of course were not known during the grazing trial were revealed during the digestibility trial which indicated the preference of the animals to compensate for the decreased concentrate intake by increased hay DM intakes and thus were able to maintain their mean total daily DM intakes which were not significantly affected by treatments. The mean daily DM digestibility were 63.6, 62.2, 61.5, 58.8 and 55.3% for the 0,3,6,9 and 12% supplementation respectively. Supplementation decreased the DM digestibility but slightly increased the OM digestibility at highest level of supplementation which was attributed to the dilution effect. The supplementation of natural lick significantly increased the fecal DM, fecal ash and fecal minerals (Na, Fe, and Mn) and decreased the fecal minerals (N, k and Cu) and brought no change on fecal Ca, Mg, P and Zn. It is therefore concluded that the supplementation of Bole natural lick at levels 3% and above appears to be above the optimum biological function as verified by the feeding, digestibility trials and fecal mineral analysis.

24. On- Farm Study of the Reproductive and Growth Performance of the Menz Sheep in Debre Brehan –Ethiopia

Niftalem Dicissa, Keno Banjaw and Goshu Mekonnen
Year: 1990

Abstract: The present study was conducted in the Baso and Worena district of the Northern Showa Region and is located some 10 Kilometers waste of the town of Debre Brehan. Eighty of the Menz Sheep, involving 3468 animals, were randomly selected from 4 peasant associations found in the Region. They were individually identified and monitored fortnightly. Reproductive performance covering and years 1985 through 1989 and growth performance, off take and mortality rates and causes of death during March, 1988 up to February, 1989 as well as sheep production constraints were assessed. The overall mean age at first lambing of the sheep was 512:35 days and was significantly ($p>0.05$) affected by season of birth and individual flock. Lambing interval was 395 14 days which was significantly ($p<0.05$) affected by the year and season of lambing and individual flock. Lambs were born throughout the year with peak births occurring the months of March/ April and November/ December. Lambing rate was 147% with 1.02 lambs per ewe per lambing. This trait was significantly ($p<0.05$) affected by the flock factor only. Annul reproduction rate was 1.10 lambs per ewe per year and was significantly ($p>0.05$) affected by the year and season of lambing as well as flock and number of lambing. The birth and per-weaning weights at 1, 2, 3, 4, and 5, months of age were 2.4, 4.4, 6.6, 8.3, 10.1, 11.7 kg respectively. At the age of 6, 9, 12, 15, 18, 21, 24, and 36 months as well as postpartum mean body weights of the sheep were 12.5, 14.5, 16.4, 21.7, 23.6, 24.8, 24.8, 27.3 and 21.9 kg respectively. Among the factors studied the year and season of birth, sex, flock, postpartum dam weight, and status of the attendant had significant effects on body weights at specified ages of the animals. The overall flock mortality rate was 21.0% and the mean survival rates at 30, 60, and 90 days of age were 91, 77, and 70% respectively. 30.3% of the total death were due to predators and accidents. These causes of death were more important in lambs of up to 12 months of age than in animals above this age. While predators and accidents caused more damage during the dry than the wet period, diseases did so during the wet than the dry period. The annual off take rate was 33.1% of which 75.3% comprised young animals of up 12 month of age. IN the present study, base line information on the reproduction and growth performances of the menz sheep was obtained and certain production constraints were identified. In this context, season as a reflection of environmental of individual farmer management abilities were recognized as important factors of major influence. The scope for farther research work is indicated in order to develop appropriate improvement packages for the future.

25. The Study of the Nutritive and Supplementary Value of Different Levels of Brewers Dried Grains in Starter Chicks Rations

Diriba Debar and Beyene Chichaibelu
Year: 1991

Abstract: The study was conducted at the Alemaya University of Agriculture using 360 unsexed day old white leghorn chicks of approximately equal initial body weight. The 360 chicks were randomly divided into 6 groups of 60 chicks each and were further subdivided in to two replicates of 30 chicks each. Each group of chicks was assigned at random to the twelve brooding pens followed by random assignment to the 6 treatment ration containing 0% (T_1), 25% (T_2), 30% (T_3), 35%(T_4), 40 %(T_5) and 45% (T_6) brewers dried grains. The chicks were vaccinated against New Castle Disease and feed and water were offered ad libitum. Left over feed and refusals (orts) were collected every other day and chicks body weight were taken and feed consumption data were summarized every 7 days. The experiment was started when the chicks were one day old and lasted for a period of 8 consecutive weeks. The criteria used to measure the treatment effects in this study were mean daily weight gain, Mean daily feed intake feed efficiency and chick sale (Birr) to feed cost (Birr) ratio of the treatment rations. Treatment means of daily weight gain as well as means of daily feed consumption of the treatment chicks were statistically significantly different ($P < 0.05$). Growth rate and feed intake were generally depressed. The effect was progressively significant with increasing levels of BDG in the ration. No statistically significant differences (P >. 05) were observed among treatment in feed efficiency ratios of the 6 groups of the experimental chicks. Regarding chick sale (Birr) to feed cost (Birr) ratio, a criterion used to determine lowest cost ration, statistical analysis revealed highly significant differences ($P < 0.01$) among the treatment means . Hence, T6, (45% BDG), with the highest ratio (4.68) indicating the highest return (Birr) from the sale of chicks, was found to be lowest cost ration. Regarding the means for daily weight gain, feed efficiency ratio and feed intake, no statistical significant difference (P>0, 05) between T_2, a ration containing 25% BDG and that of T_1, control ration, was observed indicating that the inclusion of up to 25% brewers dried grains into chick starter rations did not significantly affect the performance of starter chicks 0-8 weeks of age.

26. Effects of Watering Frequency on Water Budget, Feed Intake, Nutrient Utilization, Body Weight Change and Subsequent Survival of Black Head Ogaden Sheep

Zewdu Sisay and Beyene Chichaibelu
Year: 1991

Abstract: The lowlands of Ethiopia, covering approximately 55% of the total land area, carry about 10-15% of the human and 30% of the livestock population of the country. Although the areas present several constraints for livestock production, in the over whelming majority of the cases it is lack and poor distribution of water that is operating behind the scene as the chief limiting factor. However, no effort has been made to assess how livestock in these marginal areas respond to limited water intake, and on the potential benefits of watering frequency with respect to water economy and productivity. The objective of this study was, therefore, to investigate the effects of long –term intermittent water deprivation on water intake, economy, and balance, feed intake and nutrient utilization, body weight change and subsequent survival of black head Ogaden sheep. The study was carried out at jijiga sheep breeding ranch (MSFD) during the second dry season (April to august) of 1989 using 56 weaned male Black head Ogaden sheep (16.42 ± 1.00 Kg; 6.4 ± 0.90 month). The experimental animals were divided in to eight uniform groups and randomly assigned in a completely randomized design (CRD) arrangement to one of the following watering treatments: daily ad labium (T1, control), once daily (T2), once every two days (T3), once every three days (T4), once every four days (T5), once every five days (T6), once every six days (T7) and once every seven days (T8). Throughout the study, which consisted of a 90-days feeding trial (Expt. I) and two 7-days digestion and balance trials (Expt. II), the sheep were housed in individual metabolism cages and fed according to NRC (1975) standard. The results indicated that in both experiments water deprivation produced an overall negative or positive change in almost all parameters considered. In experiment I, watering treatment had a highly significant ($P<0.01$) effect on water intake, water economy, feed intake and body weight. The mean water intake at each drinking occasion in T1, T2, T3, T4, T5, T6, T7and T8 , respectively, was 1519, 1377, 2806, 3016, 2962, 3009, 3133 and 2968 ml, whereas the corresponding mean daily water intake was 1519,1377,1403,1005,740,602,522 and 424 ml. Compared with the control sheep in T2, T3, T4, T5, T6, T7 and T8 conserved 14.15 (9.32%), 11.57 (7.62%), 51.34 (33.80%), 77.84 (51.25%), 91.68(60.37%), 99.68 (65.63%) and 109.50(72.09%) liters of water per 100 sheep which could water an additional of 11,9,53,109,157,193 and 265 sheep, respectively. The mean dry matter intake in the eight treatment groups, respectively, was 704.98, 698.26, 671.00, 599.74, 495.66, 445.83, 400.93 and 336.88 g/day. At the end of the feeding trial the mean final body weights, respectively, were 22.50, 22.29, 22.25, 19.64, 17.07, 16.14, 15.00 and 12.08 kg. These body weights, when compared with the respective initial body weights, represented a gain ($p<0.01$) in T1 (37.41%), T2 (35.62%), T3 (35.77%) and T4 (19.62%), a mere maintenance ($P > 0.05$) in T5 (3.64%), T6 (-2.27%) and T7 (- 9, 73%) and a loss of body weight ($P < 0.01$) in T8 (-26.45%). During the course of the study four sheep died, one from each of T1, T3, T7,and T8. The sheep from T1 and T3 died of pneumonia and those from T7 and T8 due to severe water deprivation after losing 50% of their initial body weight. In experiment II, watering treatment also affected dry matter, organic matter, acid detergent fiber ($P < 0.01$) and neutral detergent fiber ($P < 0.05$) intakes. The apparent digestibility coefficient of these nutrients increased as watering interval was increased up to four days and again declined with further water deprivation. Significant ($P < 0.05$) treatment effect, however, was observed only on dry matter and organic matter digestibility coefficients. The results on nitrogen utilization indicated that the reduction in feed intake in water deprived sheep led to a reduction intake ($P <0.05$) and excretion of nitrogen through faeces ($P < 0.01$) and urine ($P < 0.05$). In addition, while there was no effect of watering treatment ($P > 0.05$) on facel nitrogen content, the concentration in the urine increased ($P <0.05$) with water deprivation. Nevertheless, watering treatment had no significant ($P >0.05$) effect on digestibility and retention of nitrogen. The result on water balance showed that there was a decline ($P <0.01$) in total water turnover and, consequently, in water intakes and losses as the interval between watering was increased. In the control group (T1), total water turnover, water intake from drinking, feed and metabolism were 1863.00, 1561.33, 87.67 and 214.00 ml/ day respectively, whereas in T8, the corresponding values were 634.00, 475.33, 41.00 and 117.67 ml/day. Compared with mean daily output of 892.00 ml via evaporation, 659.33 ml through urine and 311.67 ml in the faeces of T1 sheep, sheep in T8 lost 362.67, 215.00 and 56.33 ml through these routes, respectively. In addition, the moisture content in the faeces was significantly ($P<0.01$) reduced by water deprivation (51.69% moisture in T1 vs. 27.46% in T8). From the results obtained under the conditions of this experiment, it is concluded that water can be given up to once every three days for optimum production, waters saving and nutrient utilization, and at most once in six days for survival, but watering interval of more than six days is critical and not recommended. Care is, however, needed in extrapolating these observations to other ages, breeds and classes of sheep, species of livestock, climatic and dietary conditions.

27. Effect of Frequency of Clipping and Nitrogen Fertilization on Dry Matter Yield, Nutrient Composition and In Vitro Digestibility of Four Improved Grasses under Irrigated Conditions

Aschalew Tsegahun, Beyene Chichaibelu, Derick Thomas and Asnakew Weldeab
Year: 1992

Abstract: An experiment was conducted to study the effect of four harvesting interval (2, 4, 6 and 8 weeks) and two levels of fertilizer (0, 500 kg N ha^{-1} / annum) on some agronomic characters, nutrient composition and In vitro dry matter digestibility (IVDMD) of four cultivated grasses (Chloris gayana, Panicum maximum, Panicum cloratum, Cenchrus ciliaris) produced under irrigation at Melkawerer research Center in the Middle Awash Valley. Fertilizer rates didn't bring about any significant differences on the parameters studied, except that of DM yield in P. maximum, weed population and ADF ash value. C. gayana and C. ciliaris not only produced high dry matter yield (28.7 and 26.9 tons ha^{-1} per year respectively) but also suppressed the weed population (17.5 and 10.4 % respectively) as compared to the two Panicum species. An increase in dry matter yield is also observed as the harvesting interval increased from 2 weeks to 8 weeks interval. In terms of leaf to stem ratio a wider ratio was recorded for C. gayana followed by P. coloratm and P. maximum. There was no significant variation in crude protein and lignin contents and in IVDMD among the species studied. However, higher values of neutral and acid detergent fibers (70.44 and 41.58 % respectively) were observed in C. gayana while the lowest was from P .coloratum (63.58 and 37.01 %) respectively. Higher levels of crude protein (15.1%) and IVDMD (65.0%) occurred at 2- weeks clipping intervals than the 6 and 8 weeks clipping. NDF, ADF and lignin increased significantly with age. On the other hand ADF- Ash and total ash contents decreased with maturity.

28. Productive Performances of Adel and Blackhead Somali Sheep under Irrigated Conditions at Melka Werer

Beniam Akalu, Erich Bruns and Kano Banjaw
Year: 1992

Abstract: A breeding program was initiated under irrigated conditions at MWRC of the IAR to improve the body weights of Ethiopian Adal and BHS sheep by selection based on PWADG and later on 6- month weight. The ewe and lamb data collected over 12 and 8 years, for the Adal and BHS flocks, respectively, were used to study five lamp traits: birth weaning, 6- month and yearling weights and PWDAG and to investigate the effects of year, sire within year, sex and age of dam on the traits of both breeds. Moreover, estimates of h^2 and genetic and phenotypic correlations were made for the traits and between two traits by paternal half- sibs method, besides the investigation of the effects of year, sex, age of dam and birth weight on weaning and yearling mortalities for the Adal lambs. The results indicated that year, sire within year, sex and age of dam significantly affected all lamp traits, except that age of dam effect was only significant on birth and weaning weights and sire within year was not significant on all BHS lamb traits. Year X sex interaction affected significantly all traits except birth weight in the Adal sheep, and only birth and yearling weights of BHS lambs, while the significance of sex X age was only for birth and yearling weights for BHS and Adal lambs, respectively. The h^2 estimates were 0.12 (0.05) at birth and 0.35 (0.06) at yearling. The genetic and phenotypic correlations between any two traits were high and positive, with the exception of the correlations between BWADG and the other traits. Weaning and yearling lamb mortalities are highly affected ($P < 0.01$) by year, sex and birth weight, with the exception of sex effect on weaning mortality. Age of dam was not significant on either mortalities. It can be recommended that taking the yearling weight as the selection criterion is the most effective way for increasing body weight in comparison with other traits considered in this study.

29. Assessment of Feed Resource Base and Performance of Crossbred Dairy Cows Distributed To Smallholder in the Selale Dairy Development Project Area

Gashaw Ged, Tuomo Varvikko and Beyene Chichaibelu
Year: 1992

Abstract: The highlands of Ethiopia have favorable climate both for crop and livestock production. The largest proportion (70-85%) of the human and livestock population of the country reside in the highland. It is generally believed that inadequate total feed supply, low feed quality and seasonality are the major constraints facing dairy development in these areas. Information on the quantity and quality of on-farm available feed resources in relation to the number and type of livestock and their nutrient requirements is the basis for the development of appropriate feeding system. However such information is scarce in Ethiopia. To this end, This study was designed with a major objective of generating base line information which could assist in the development of appropriate feeding system for crossbred dairy cows, through the assessment of the quantity, quality and seasonality of locally available feed resource and their allocation in relation to the present level of production and nutrient requirements of crossbred dairy cows for optimum productive and reproductive performances. The study was carried out in Debre Libanos, Selale and Jarso Abote Awrajas of northern Shewa administrative region on 28 randomly selected smallholder dairy farms. The type and quantity of available feed resources in relation to their allocation for the various classes of livestock per farm and performance of crossbred dairy cows were assessed based on data collected from the selected farms. Nutritive values of available feed resources were estimated from their chemical composition data using the summative system and regression equations. Similarly regression equations were also used for the estimation of nutrient requirements of crossbred dairy cows. With mean farm size of 2.6 ha and estimated livestock population of 10.6 TLU the total quantity of dry matter per smallholder dairy farm was found to be 7066 kg per year. The total annual metabolizable energy (ME) and digestible crude protein (DCP) supplied by the estimated DM was calculated to be 71969 MJ and 227 kg respectively. Of the total available feed resource 2466 kg DM, 2529 MJ ME and 107 kg DCP were supplied for crossbred dairy cows (1.8 TLU) per farm. Mean total lactation milk yield lactation length, days open till conception and calving interval estimated in this study were 1635 kg, 327 days, 187 days and 464 days, respectively. Based on the present level of feeding the cows were supplied with 5.6 kg DM, 57.7 MJ ME and 243.1 g DCP per day through stall feeding both for maintenance and milk production is 5.6 kg 4% FCM and these were 63. 86 and 78% of their daily requirement for these nutrients. Laboratory results of the feed resources available for crossbred dairy cows indicate that these feeds were low in apparent digestibility (AD) and were able to supply an AD which is a little bit higher than maintenance requirement of the cows. That is, the qualities of the feeds have limited the crossbred dairy cows to express their genetic potential. However ,the present result suggest that on- farm digestibility trials should be carried out to arrive at this conclusion and for the development of appropriate feeding system for crossbred dairy cows based on locally available feed resources.

30. Characterization (Phenotypic) of Indigenous Goats and Goat Husbandry Practices in East and South- Eastern Ethiopia

Alemayehu Reda, Keno Banjaw and Bernark Rey
Year: 1993

Abstract: A macro level characterization of the indigenous goat population and goat husbandry practices using initial survey method was conducted in the East and South- Eastern Ethiopia between March and December 1990. The main objectives were classification, description and identification of the goat population and description of the goat husbandry practice s in the area. Using stratified random sampling (ethnic by altitude) a total of 10, 504 goats and 2742 households were surveyed. Cluster analysis by the average linkage and key identification methods for classification and identification of data from twenty goat populations were conducted. Descriptive statistics for data from households interview was made to characterize the goat husbandry practices. Only adult female and adult male and female goat populations above three permanent incisors were used both for classification and identification, respectively. Using principal components analysis twenty three (out of the total forty two) characters having the highest weight and loading were selected and used for classification. Only six characters showing the highest frequency distribution and weight were selected and used to construct identification key. Using the Eucldiean distance measure of dissimilarity, the phenotypic distance between the twenty adult female goat populations was computed. And the dissimilarity coefficients were summarized as a diagram. The resulting cluster analysis revealed patterns in the data difficult to recognize in the matrices of dissimilarity coefficients with the cophenetic correlation value (rcs) of 0.8816. The geographical position and environment of each adult female goat populations were different. To provide comprehensive understanding of the phenotypic characters, distribution and relationship among the twenty populations; they are classified and described according to the following six types: 1. the Long drooping – eared large- sized Somali; 2. the Short prick – eared small- sized Somali; 3. the small- medium sized Issa (Somali); 4 the small sized Afar; 5 the medium –sized Hararge Oromo highland; and 6 the medium – large sized Arsi-Bale Oromo goat. The goat husbandry practices are described and characterized within the context of the livestock production sub- systems of the Hararge, Arsi- Bale and the transhumant highlands and pastoral and agro- pastoral lowlands areas of the survey.

31. Effect of Cutting Date on Botanical Composition and Nutritive Value of Native Pasture in the Central Ethiopian Highlands

Kidane Gebremeskel, T. Varvikko and Alemu Yami
Year: 1993

Abstract: A study on the effect of cutting date on biomass production, botanical and feeding value of native grass hay was conducted in northern Shoa-central highlands of Ethiopia. The experiment was conducted in a nested design, considering three randomly selected farm in each of three awrajas with randomized four cutting treatment at 20 days interval that were cross - classified within the farms. Delay in Cutting date had a significant depressing effect ($P< 0.001$) on crude protein and phosphorus content, nylon bag rumen degradability, and in vitro digestibility of dry matter. There was a significant increase in the neutral detergent fibre, hemicellulose, and calcium contents ($P<0.05$) and that of lignin, (P,0.001) Dry matter yield was not however, affected by advancing age. The proportion of grass to legume was high. This proportion increased with delay in cutting dates. It was observed that a delay in the cutting time of native hay markedly reduced its feeding value harvesting (early October) would be the best to improve animal productivity through provision of better quality feed.

32. Performance of Crossbred Calves Fed *Teff* (Eragrostis Tef) Straw Supplemented With Graded Levels of Cowpea (Vigna Unguiculata) and Dolichos Lablab (Lablab Purpureus) Hay

Abule Ebro, Umunna and Alemu Yami
Year: 1994

Abstract: A series of trials were conducted to investigate the effect of supplementing abasal diet of *Teff* **(***Eragrostis Tef*f straw with graded levels of either cowpea (*Vigna unguiculata* or lablab (Lablab Purpureus) hay fed at 0.5, 1 and 1.5 % of the body weight on performance of crossbred (Friesian X Boran) calves with the aim of development a feeding strategy to be used for growing calves. In the growth trial (experiment I), 56 calves of both sexes (42 females and 14 males) were blocked based on age and sex and assigned to one of the dietary treatments consisting of ad- libitum *teff* straw alone (control) or supplemented with three graded levels (0.5, 1, and 1.5% of the body weight of the calves) of either cowpea or lablab hay. The calves were fed individually and the experiment lasted 111 days. The supplement type X level interaction was not significant ($p>0.05$) for the intakes of *teff* straw, total dry matter (DM), organic matter (OM), nitrogen (N), average daily gain and feed efficiency (FE). On the other hand, supplementation of *teff* straw increased ($P < 0.001$) all the variables mentioned. Increasing the levels of the supplements reduced ($P < 0.001$) the intake of *teff* straw whereas, the intakes of other nutrients, average daily gain and FE were increased ($P<0.001$). No difference ($P>0.05$) was observed between calves supplemented with either cowpea or lablab hay except where calves supplemented with cowpea hay had a higher intakes of *teff* straw and N ($W^{0.75}$) ($P < 0.01$) than those supplemented with lablab hay. The highest DM intake of teff straw was obtained at 0.5 % level of the supplements. In experiment II, a metabolism trial (6 days) was conducted using male calves from experiment I and another 16 male calves from the farm stock. The supplement type X level interaction was not significant ($P>0.05$) for the intakes of *teff* straw, total DM, OM, N neutral detergent fibre (NDF) and for the digestibility of DM, OM, N and NDF. Moreover, Faecal-N, urinary N- retention, gross energy intake, faecal energy, energy digestibility, urinary energy and the excretion of allantoin , uric acid, total purine derivative, creatinine , purine derivative of microbial origin (MICPD) and the amount of microbial – N supplied were not significantly ($P<0.05$) affected by supplement type X level interaction. The supplements did not differ ($P > 0.05$) in their effect on most of the variables except that calves supplemented with cowpea hay had a higher ($P < 0.05$) intake of N and allantoin excretion than calves supplemented with lablab hay. Increasing the levels of the supplements increased the intakes of total DM and OM ($P < 0.01$), N ($P<0.001$), DOM ($P<0.05$), the digestibility of N ($P < 0.001$), DOM ($P < 0.05$), the digestibility of N $P<0.001$),the output of faecal ($P < 0.01$) and urinary – N ($P < 0.001$),the amount of N-retained ($P<0.001$) the intakes of gross and digestible energy ($P < 0.01$) and urinary energy output ($P < 0.001$). Moreover, the excretion of allantoin, total purine derivative, MICPD and the amount of microbial – N supplied ($P < 0.01$) and uric acid ($P < 0.001$) increased in response to increase level of the supplements. However increasing the level of supplementation did not have effect ($p>0.05$) on intakes of *teff* straw and NDF, the digestibility of DM, OM and NDF, faecal energy output, energy digestibility and on the excretion of creatinine. In experiment III, three female calves from each of the dietary treatment in the growth trial were used to determine rumen ammonia concentration (RAC). Supplement type X level interaction, supplement type and increasing the levels of the supplements did not have effect ($P > 0.05$) on RAC. However, RAC increased ($P < 0.01$) in response to supplementation. A rate of passage trial (Experiment IV) was conducted using 4 calves chosen from each of the different group in the growth trial. The supplement type X level interaction, level and type of supplement had no effect ($P > 0 .05$) on fractional rate of passage from the rumen (K_1), caecum and proximal colon (K_2), mean retention time (MRT) and transit time (TT). Both supplements increased ($P<0.05$) the fractional rate of passage from the rumen and decreased ($P < 0.01$) the mean retention time of mordanted *teff* straw. In experiment V, a degradability trial using three ruminally fistulaed crossbred cows was carried out to determine the degradation characteristics of *teff* straw, cowpea hay and lablab hay in a completely randomized design. The legume supplements did not differ ($P > 0.05$) in zero time intercept (a value), the insoluble but slowly fermentable (b value) and in the rate of degradation (c value) of DM, OM and N, but differed in potential degradability (a + b) of DM and OM ($P < 0.001$) and N ($P < 0.05$). DM and OM in *teff* straw were degraded at a slower ($P < 0.001$) rate than for either of the legumes, but the potential degradability (a + b) was higher than the potential degradability of cowpea hay ($P < 0.05$). In conclusion cow pea and lablab hay had similar effects on calf performance indicating the possibility of using either of the two legumes as a supplement. Moreover, supplementation at 0.5% of the body weight seems optimum with respect to *teff* straw utilization.

33. Effect of Growth and Body Weight Dynamics on Reproductive Performance of Horro Ewes at Bako Research Center, Ethiopia

Solomon Abegaz, C.J. Thwaites and Goshu Mekonnen
Year: 1994

Abstract: Conception and lambing performance of Horro ewes in a total of 2555 mating and 2476 parturition records were analysis for effects of early life growth performance of ewes as indicated by birth, weaning, and yearling weights; and body weight, its gain and estimated condition in the period about mating. Productive performance of single and twin lambing ewes as measured by number and weight of lambs weaned per ewe lambing, and weight of lamb weaned per kilo gram body metabolic weight of lambing ewes was also analyzed. Effects of early life growth parameters on type of lambing were found to be significant but with a low level of coefficient of determination. No significant effect of weaning weight was observed. Condition estimates based on expressing body weight after maturity as a proportion of weight at about maturity yielded correlation ranging from 0.42 to 0.50 (weight at about 2 years) with actual condition scores. Conception rate of ewes was found to be highly significantly affected by weight at mating but neither estimated condition score nor weight gain in the period prior to mating showed significant effect. The overall least squares mean for conception rate was very high, amounting to 0.89+ .008. In the analysis drastic reduction in conception was observed with decrease in mating weight below the mean, indicating lower weights are detrimental to high levels of conception. Of all body weight, weight gain, and estimated body condition score variations at different times about mating, mating weight, weight gain in the month after mating; weight at one month after mating and estimated condition at mating had significant effects on the variation in litter size. Overall analysis to associate the different variables with individual ewes litter size showed that there was a very low coefficient of determination except for the relatively higher value (R^2=0.23) in the analysis where weights at mating and one month after mating were included along with weight gain and estimated condition score variables. This indicates that predictive equations derived from this analysis are of limited value. On the other hand, grouping of ewes on the basis of mating weight resulted in a very high coefficient of determination (R^2 = 0.75). Twin lambing was found to increase significantly the number of lambs weaned, weight of lamb weaned per ewe, per kilogram body weight of ewe and per kilo gram metabolic weight of ewe lambing. The results of this study suggest that except for weight and condition at mating, and weight gain in the month after mating, the other factors did not make a great contribution in determining litter size. Increasing litter size increases productivity (output of lamb weaned) when coupled with lamb survival, and efficient production (weight of lamb weaned per ewe metabolic weight) can be best obtained by having multiple births in ewes of the smallest possible body weight.

34. Characterization of Indigenous Goat Types of Eritrea, Northern and Western Ethiopia

Nigatu Alemayhu and Verma
Year: 1994

Abstract: Characterization is important in genetic resources conservation and utilization, but information about indigenous livestock types are available .In the present study data of 229 goats were collected by a rapid survey method to characterize goats of Eritrea, Northern a western Ethiopia. Multivariate analyses were employed in the classification and tracing the ancestry of the indigenous goat. Eleven goat types are identified and three ancestral lines are traced. The identified goat types are described according to FAO (1988) standard descriptor lists. Management practices and the performances of these goat types are also assessed Highland of Ethiopia is found as a center of origin for most goat types identified in survey area. The primary base for diversity of the 11 goat types are agro- climatic .As result body size and others qualitative characters are significantly affected by climatic factors a place where the particular goat type has adapted. Human selection breeding also contributes for the phenotypic variation of goat types. Large value of standard deviations in some of the measured variables for each goat type may indicate the still existing potential genotype diversity. This could make the study region as the gene pool of the goat genotypes. Flock size demographic structures and management problems are more related to the purpose of goat keeping and to the general farming systems.

35. The Effect of Supplementation and Differential Work Stress on Feed Intake, Body Weight Change and Carcass Characteristics of Zebu Oxen in the Ethiopian Highlands

Tesfaye Woldemichael, Osuji, and Alemu Yami
Year: 1994

Abstract: Feed shortage in dry seasons leads to poor physical condition in draught oxen in most of sub-Saharan Africa. Improving their diet during the preceding dry season is usually recommended. However, various research reports have not been consistent in the evaluation of supplementary feeding and it may not be economical since draught oxen work for short period in a year. One strategy to solve such a problem is to diversify the use of oxen by treating them as work/meat animal. However, the effect of work on the ability of oxen to fuel work activity is unknown. Therefore, in this study, the effect of supplementation and differential work stress on feed intake, body weight changes and carcass characteristics of zebu oxen were examined. To this effect, 54 oxen were allocated to three levels of supplementation (fattening period) for 145 days .At the end of fattening period, six oxen from each treatment group were slaughtered. The remaining 36 oxen were then subjected to three graded levels of work for 24 days and finally slaughtered. During the fattening period supplementation had a significant effect ($P < 0.01$) on *teff* straw, total dry matter (DMI) and organic matter intakes. DMI increased with increased level of supplementation. Also supplementation had a significant effect ($P < 0.001$) on average body weight gain. The values were 68,459 and 477 g/day for low, medium and high levels of supplementation respectively. The slaughter data also indicates that supplementation significantly ($P < 0.001$) affected slaughter weight, empty body weight, hot carcass weight and fat composition of carcass. However, supplementation had no effect ($P > 0.05$) on dressing percentage, lean meat and bone weight of carcass. During the work period, dry matter intake declined, whereas body weight loss increased significantly ($P < 0.01$) as the work level increased. No significant interaction between work and feeding level were observed. The slaughter dada for the work period indicated that there was a general trend towards a decreased in empty body weight ($P < 0.05$), slaughter weight ($P < 0.05$) and fat weight ($P < 0.05$) of carcass with increasing work level; implying that work has negative impact on meat yield (fat), feed utilization and body weight gain. In general, the above result indicate that little supplementation of draught oxen prior and during the work period is better choice and the use of fattened animals for draught purpose may not be economical since body weight loss is much higher in fat than thinner animals. However, future investigation should test the effect of work on subsequent recovery following cessation of work.

36. Effect of Work and Energy Supplementation on Postpartum Estrous Cycle Length and Ovarian Activity in Crossbred Dairy Cows Used For Draught

Esubalew Abate, E. Zerbini, and Alemu Yami
Year: 1994

Abstract: The present study was carried out to investigate the effect of work and energy supplementation on the postpartum estrous cycle length and ovarian activity of crossbred dairy cows used for draught. Twenty crossbred dairy cows were assigned to two dietary feeding regimes (i.e. diet 1 = 9 MJ ME/kg dry matter; diet 2 = 10 MJ ME /kg dry matter). The cows on both diets started to work after their second regular estrus, and they were not bred until they showed the fourth estrus. Cows on diet 2 had significantly higher ($P < 001$) mean dry matter (DM) intake during the working and non-working periods compared to cows on diet 1. Cows on diet 1 increased DM intake during the working period by increasing hay intake. Body weight change and body conditions were similar for cows on both diets. Mean fat corrected milk yield was about one kg/day greater for cows on diet 2 compared to cows on diet 1 during both the resting and working period. However, this difference was significant ($P < 0.05$) only during the first part of the working period (E2-E3). Cows on diet 2 were in relatively better body condition, and gained more weight during the latter part of the working period (E3-E4). Postpartum first ovulation, first estrus and conception postpartum occurred 239 and 163, 250 and 180, and 343 and 275 days for cows on diet 1 compared to cows on diet 2, respectively. However, the differences observed were not significant ($P > 0.05$). Increasing energy supplementation reduced the postpartum anestrous period, but did not decrease the frequency of ovulations without estrus during work. This phenomenon is related to work stress, which perhaps induced an increased activity of the central nervous system opioid peptides which have a negative impact on the release of Gn RH and /or LH. The effect of work per se on the reproductive performance of crossbred dairy cows seems to decrease as they adapt to work.

37. The Effect of Some Locally Available Litter Materials on the Performance of Commercial Broiler Chicks

Berhanu Damte, Teketel Forsido and Alemu Yami
Year: 1995

Abstract: An experiment was conducted to determine the effect of different types of floor litter materials on the performance of broiler chicks. It consisted of five treatment groups, each of which contained 90 mixed day old Hubbard F_1 commercial broiler chicks of approximately equal initial body weight and sex ratio. Each of the experimental pens was covered with one of five litter materials at a depth of 10 cm. The litters tested were sawdust as a control, *teff* straw, wheat straw and coffee hull and ground corncobs. The results showed that litter type had no significant ($P > 0.05$) effect on feed consumption, body weight gain and percent mortality during the starter (1-4 weeks of age) and finisher (5-8 weeks of age) phases, but significantly ($P < 0.05$) affected feed conversion ratio for both periods. Regardless of the relatively lower numerical values of the means for feed conversion ratio, chicks placed on *teff* straw, wheat straw, ground corn cob and coffee hull showed better conversion ratio than the sawdust control during the starter phase. However, feed conversion was the poorest in those placed on the *teff* straw during the finisher phase. In this study, the eight week moisture content of all litter treatments were between 17.5 to 20% which was considered to be dry. Litter materials were highly significantly ($P < 0.01$) different in mean percent litter caked. The highest percent of caking was observed on coffee hull litter. The litter type also had a highly significant ($P < 0.01$) effect on the severity of breast blister and broiler sale to litter cost ratio. Coffee hull had the highest value for breast blister index while wheat straw had the highest broiler sale to litter cost ratio indicating the lowest cost litter. In general the results of this study show that ground corn cobs, *teff* and wheat straw are the most suitable litter materials to grow broiler chicks for the period of 1 - 4 or 5 - 8 weeks of age based on broiler performance, litter condition, litter cost and breast blister severity. Such materials are most recommendable in an area where the by products are adequately available and produced broilers are sold in live or dressed. On the other hand, coffee hull can be used as alternative liter material in an area where the by-product is found in large quantity provided the produced broilers are sold in live.

38. Evaluation of Nutritive Values of Herbaceous Legumes, Browse Species and Oilseed Cakes Using Chemical Analysis, In Vitro Digestibility and Nylon Bag Technique

Seyoum Bediye, N.N. Umunna, Alemu Yami and I.V. Nsahlai
Year: 1995

Abstract: Nutritive values of various protein sources were evaluated at IAR (Holetta) Animal Nutrition Lab in a series of experiments using chemical analysis, in vitro digestibility and nylon bag techniques with the aim to develop data base on nutritional characteristics of the feeds. This study characterized chemical composition and in vitro digestibility of 19 herbaceous legumes and 21 browses sampled from research fields of IAR at Holetta, Bako and Adamitulu and 10 oilseed cakes sampled from food processing centers and small scale mills around Addis Ababa. Site specific comparisons were made to detect differences in chemical composition and IVOMD at genera, species and accession level where applicable. Inter- relationship of chemical constituents and In vitro digestibility of the feeds were also examined using correlation and multiple regression analyses. Herbaceous legumes had crude protein (CP) content of 12-26%, neutral detergent fiber (NDF) of 37-54%, lignin content of 7-11% and in vitro organic matter digestibility (IVOMD) of 53-74%. At Holetta, Vicia had higher ($P < 0.001$) CP than either Trifolium, Medicago or Lotus. Lotus had higher ($P < 0.01$) IVOMD than Medicago, Trifolium and Vicia. At Bako, Macrotyloma had lower ($P < 0.001$) CP than Stylosanthes, Macroptilium, Labalab or Desmodium. Labalab had the highest IVOMD followed by Stylosanthes, Macrotyloma, Macroptilum and Desodium. Within genus interspecific variations of Vicia, Trifolium , Medicago, Stylosanthes and Centrosema were significant ($P < 0.05$) in chemical compositions (CP, NDF, cellulose, lignin) and IVOMD. Vicia dasycarpa had higher ($P < 0.05$) CP and IVOMD than either V. villosa, V atropurpurea or V. sativa T. tembense had higher ($P < 0.01$) CP than either T. rueppellianum , T . pratense or T. repence. T. repense had the highest IVOMD followed by T. tembense, T. pratense and T. rueppelllanum M. sative and M. polymorpha had similar ($P>0.05$) CP, cellulose, lignin, IVOMD but varied significantly ($P < 0.05$) in NDF. Stylosanthes hamata cv verano had higher ($P < 0.05$) CP and IVOMD than S. quianensis cv cook. Within the Centrosema genus, C. pascorum had higher ($P <0.01$) CP and IVOMD than C. plumeri.. Browse species had CP content of 18-30%, NDF of 20-64%, lignin of 4-12% and IVOMD of 40-74%. Within location genera differences in chemical composition and IVOMD were significant ($P < 0.05$). At Bako, Sesbania had higher CP ($P < 0.05$) and IVOMD ($P < 0.001$) than Cajanus, leucania or Gliricidia. At Adamitulu, Sesbania had lower ($P <0.05$) NDF, CWC and higher ($P<0.001$) IVOMD than Cajanus. The species of Leucaena varied significantly ($P < 0.05$) in NDF, cell wall constituents (CWC) and IVOMD. L. leucocephala had the highest CP and IVOMD. Oilseed cakes had EE content of 5-13%, CP of 27-57%, NDF of 17-65% and IVOMD of 58 to 75%. The six genera of oilseed cakes varied significantly ($P < 0.001$) in EE, CP, NDF, cellulose, lignin and IVOMD. Sunflower cake had higher ($P < 0.001$) EE than peanut cake, noug cake, flax cake, mustared cake and cottonseed cake. Peanut cake had higher ($P < 0.01$) IVOMD than noug cake, flax cake, mustard cake, cottonseed cake and sunflower cake. This study compares five mathematical models in describing ruminal degradability profiles of DM, OM, N and NDF of 18 herbaceous legumes, 18 browse species and 6 oilseed cakes incubated in six ruminally cannulated steers for 2, 4, 8,12,16,24,36,48,72,96, and 120 h. Regression analysis, residual behavior and consistencies in parameter estimates were used as criterion for comparison of the models. The conventional exponential model was the best in describing DM, OM and N disappearances while the exponential decay model with undegradable fraction was the best in describing NDF residue left at each incubation time. This study characterized ruminal degradability, potential post ruminal nitrogen digestibility (PPRND) and nutrient release synchrony indices of the above feeds. Site specific comparisons were made to detect differences in ruminal degradability characteristics at genera, species and accession level where applicable. Herbaceous legumes had nitrogen (N) solubility of 28- 72%, fractional rate of degradation (c) of 0.0425-0.1000/h, potential degradability (PD) of 87-99% and effective (ED) of 65-90%. The differences between genera within a location were significant ($P < 0.05$) in all degradability parameters of N. At Holetta, Lotus had the highest soluble fraction followed by

Vicia, Medicago and Trifolium. Medicago had faster rate of degradation than Lotus, Trifolium and Vicia. Vicia had the highest PD and ED. At Bako, Microptilium had the highest solubility followed by stylosanbthes, Lablab and Disodium. Labalab had faster ($P < 0.01$) rate of degradation than either Stylosanthes , Macroptilim or Desmodium Macroptilium had the highest ED followed by Stylosanthes, Labalab and Demodium . Nutrient release synchrony indices varied from 0.75- 2.00 and 1.00-2.50 for soluble nutrients and insoluble slowly degrading nutrients respectively. Estimates of PPRND of herbaceous legumes ranged from 0-16%. With respect to N disappearance of browse, the soluble fraction ranged from 20 to 50%, the rate of degradation from 0.0425 to 0.1000/ha, PD from 87 to 99% and ED from 56 to 90%. The differences between genera within a location were significant ($P < 0.01$) in all degradability parameters of N. At Bako, Gliricidia had higher ($P < 0.01$) solubility than Cajanus or Leucaena . Sesbania had the highest ED followed by Gliricidia, Cajanus and leucaena . At Adamitulu, Sesbania had higher solubility, fractional rate of degradation and ED than Cajanus. The species of leucaena varied significantly ($P < 0.001$) in all degradability parameters of N. L. Pallida had the highest solubility followed by L. revolute, L. Leucocephala and L. leucocephala* L. diversifolia. L leucocephala had higher ($P < 0.001$) ED than the other species of Leuecaena. Oilseed cakes had soluble fraction of 27-71%, fractional rate of degradation of 0.0496-0.1220/h, PD of 91-99% and ED of 59-95% for nitrogen disappearance. The genera of oilseed cakes varied significantly ($P < 0.001$) in all degradability parameters of N. Mustared cake had higher ($P < 0.001$) soluble fraction than noug cake, flax cake, peanut cake and cottonseed cake . Sunflower cake had the fastest rate of degradation followed by mustard cake, peanut cake, noug cake, cottonseed cake and flax cake. Flax cake had the lowest PD and ED than the other genera of oilseed cakes. In conclusion, the various protein sources had medium to high nutritive value based on chemical composition and IVOMD. Ruminal degradability profiles of DM, OM and N of local protein sources are better described by the conventional model while fiber degradability is better described by the exponential decay model. Most of the feeds evaluated in this study were extensively degraded in the rumen and they can be used as sources of RDN. Among the feeds evaluated, Desmodium, Leucaeana, Chamacytisus , flax cake and sunflower cake can be used as sources of by- pass N.

39. The Effects of Stovers of Sorghum Varieties and Protein Sources on Intake, Digestibility and Live Weight Gain in Cattle

Temesgen Walelign, Unnuna and Alemu Yami
Year: 1995

Abstract: For Experiments were conducted with cattle to investigate the effects of Stover's of sorghum varieties and protein sources on voluntary intake and body weight gain (Experiments 1), apparent digestibility and nitrogen (N) balance (Experiment 2) and degradability of basal stovers, morphological fractions and protein supplementation (Experiment 3). Experiment 4 characterized the in vitro gas production of the above foodstuffs. Experiments one, two and three were undertaken according to a randomised complete block design with 2 X 2 factorial experiment. Two breeds of cattle (zebu (bos indicus) and Zebu X Friesian crosses), two varieties of sorghum {Seredo, bird resistant (BR) and Dinkmash, non-bird resistact (NBR)} and two protein sources [Cottonseed cake (CSC) and Nougseed Gizotia abyssinica) cake (NSC)} were used in this study . There were four treatment diets: NBR+ NSC (Treatment 1), BR+NSC (Treatment 2), and NBR+ CSC (Treatment and BE+ CSC (Treatment 4). In experiment 1, forty zebu and crossbred (79 (SD=4) exotic) calves of about 14 (SD=2) month old and 98 (SD=13) kg average starved body weight were fed sorghum stovers ad libitum supplemented with either CSC or CSC (similar level of crude protein). The experimental period lasted 65 days. Intakes of stover were not affected ($P > .0.05$) by either stover or stover x supplement interaction. Calves supplemented with NSC had lower ($P < 0.001$) intakes of DM, OM, N and NDF than those supplemented with CSC. Growth rates were significantly affected by stover) $P < 0.05$), supplement ($P < 0.001$) and stover x supplement ($P < 0.05$). The BR variety supplemented with CSC had lower growth rate than the NBR variety supplemented with CSC. Similarly NSC had lower growth rate than CSC. In experiment 2, digestibility and N- balance were studies with 16 male calves by total collection. Apparent digestibility of dry matter (DM), organic matter (OM) and N of the composite diets were not affected ($P > 0.05$) by supplement or by supplement x stover interaction. Stover, had significant effects on digestibility of DM ($P < 0.01$) and OM ($P < 0.05$) and digestibility of NDF was significantly ($P < 0.01$) higher for CSC than for NSC supplemented diets. Similarly N- retention was higher ($P < 0.05$) for CSC than for NSC supplemented diets. Rumen ammonia levels (mg/ 100 ml) ranged from 14.59 to 23.03, the lower ($P<0.001$) values being associated with CSC supplemented diets. In experiment 3, eight mature rumen fistulated cattle (zebu and zebu x friesian) were used for nylon beg degradation studies. There were two feeding and eight incubation periods. Degradability parameters were not affected ($P > 0.05$) by stover x supplement, stovers x fration and fraction x supplement interactions. The effects of stovers on readily soluble fraction (a), rate constant (c) of degradation of DM and OM, and the effects of supplement on the degradability of DM from stovers were similar ($P > 0.05$). Fraction had no significant effect ($P > 0.05$) on potential extent of DM degradation. The NBR variety showed higher ($P < 0.001$) potential degradability of DM and OM than the BE variety. Potential degradability of OM was significantly ($P < 0.05$) higher for CSC than for NSC. Leaves had higher ($P < 0.001$) readily soluble fraction and shorter lag time of DM and OM degradation than stems and sheaths. The stem fractions had higher ($P < 0.001$) potential extent of OM degradation than leaves and sheaths. Longer lag time ($P < 0.01$) of DM and OM degradation was observed for sheaths from BR than from NBR variety. The effects of stover and stover x supplement on degradability parameters of CSC and NSC were similar ($P > 0.05$). Although not significant, rate constant tended to be higher while lag time was consistently shorter for NSC than for CSC. NSC showed significantly ($P<0.01$) higher readily soluble fraction but lower ($P<0.001$) potential degradability of DM, OM and N than CSC. In experiment 4, in vitro gas production was determined by incubating feedstuff samples with rumen inocula. There were eight incubation periods. Stover x fraction interaction had no effect ($P > 0.05$) on the volume and absolute gas production. The effects of stovers on rate of gas production were also similar ($P > 0.05$). BR variety had significantly ($P < 0.001$) lower volume and absolute initial gas production. However, stems from NBR variety had the highest while sheaths from BR variety yielded the lowest ($P < 0.001$) volume of gas production. Rate constant of gas production was the highest ($P < 0.001$) for leaves. NSC and CSC were similar in absolute initial gas production. NSC had higher rate constant but lower volume of gas production ($P < 0.001$).Feed intake, live weight gain, NDF digestibility, N – retention and feed conversion efficiency were significantly higher for CSC than for NSC. Apparent DM and OM digestibility, average daily gain as well as feed conversion efficiency were higher for NBR than BR sorghum stover based diets. It was concluded that BR and NBR sorghum stovers differed in their nutritional values when fed to calves either with CSC or NSC, while the two supplements differed in their protein quality. Soluble phenolics may account for the nutritional differences between the two sorghum varieties.

40. Productivity of Some Annual Sesbania (*Sesbania scopoli*) Species under Two Cutting Management on Two Soil Types

Solomon Mengistu
Year: 1996

Abstract: Sesbania species are leguminous plant resources highly valued for their multiple uses, including fodder, fuel wood, pulpwood, Construction, live – fence, shade for other crops, and improvement of soil fertility. The majority of sesania species are annuals. Some of these annuals have shown great potential as short- term green manure and fodder crop for uses in integrated crop and livestock farming systems. In this study, four sesbania species, including S. macrantha, S. rostrata, S. quadrata and S. sesbania were evaluated for adaptability, dry matter yield, and nitrogen fixing potential under two soil types. S. macrantha was found to be well adapted to the light soil producing higher yields of total dry matter (9.1 t/ha), leaf (2.8 t/ha), stem (wood) (6.3 t/ha) and total nitrogen (151 kg/ha), in 105 days, than the rest of the species. On the heavy soil, however, it performed so poorly that its yields were generally twice lower than that on the light soil. S. Quadrate summed to be well adapted to the heavy soil as indicated in its higher total by matter yield (5.5 t/ha) than any of the species tested with it on the have soil. The least DM yield was recorded for S. restart that is assumed to be due to failure of nodulation. Cutting twice over the 105 days growth period generally caused drastic reductionbs in DM yield, but enhanced leaf- to- ratio and total N yield. The nutritional composition of the species was fund to be within an acceptable range of livestock requirement, the values dosing generally high and more or less equivalent to that recorded for S. sesban. N content was high, exceeding 4% and IVDMD was also high with values in excess of 70% for most of the species. S. macrantha and S. sesban nodulated profusely without inoculation from the native Rhizobia inm the soil. S. quadrata nodulated only with inoculation while S. rostrata totally failed to nodulate. In general, S. macrantha was found superior in overall performance and seems promising as a high quality fodder and as a source of biological nitrogen fertilizer particularly for light- textured soils of the medium- altitude highland areas.

41. Supplementary and Feeding Value of Rapeseed Meal (RSM) and Brewer's Dried Yeast (BDY) in Broiler Rations

Amsalu Asfaw, Alemu Yami and Solomon Moges
Year: 1997

Abstract: Two different experiments were undertaken to investigate the level of inclusion of rapeseed meal (RSM) and to determine whether or not RSM and brewery dried yeast (BDY) proteins supplement one another and improve the combined protein quality of the broiler starter (trial one) and finisher (trial two) rations on the biological performance of chicks. In experiment one, trial one chicks were fed diets containing 0, 5,10,15,20 and 25% RSM. Increasing the dietary level of RSM significantly increased body weight gain, dry matter efficiency ratio (DMER), reduced mortality ($P < 0.05$) and reduced intake to gain ratio (I: G), without significantly altering dry matter intake. In trial two increasing the dietary proportion of RSM significantly increased feed intake, body weight gain and DMER. This was accompanied by a significant decreased in I: G and feed cost per kg live weight gain. The result of the first experiment revealed that RSM can be included up to 25% in both broiler starter and finisher diets without adversely affecting performance. In experiment two, trial one of the percent CP provided by each diet, almost half of the CP (10%) was provided by one or a combination of RSM & BDY and a commercial broiler ration was used as a control. The first trial showed that the feed intake, body weight gain, DMER and I:G of chicks fed on the experimental rations were significantly greater than the chicks fed on the commercial broiler ration. Chicks fed 26.45% RSM and combination of 13.23% RSM and 9.87% BDY increased dry matter intake, live body weight gains, DMER and intake to gain ratio more than the others. No significant differences in body weight gain were observed between female and male chicks. There were no significant differences in apparent N digestibility for chicks fed the dietary treatments. The result of this experiment revealed that commercial broiler ration formulated by ELPFPE, for both starter and finisher phase, adversely affect chicks performance at starter phase. In trial two chicks receiving RSM at 26.45% alone showed the highest dry matter intake, body weight gain and monetary returns, although not significantly different from the commercial broiler ration. Male birds' shows better body weight gain than female birds. Birds fed on ration containing 19.84% RSM and 4.93% BDY had better performance than other RSM & BDY combinations.

42. Testing Various Dietary Metabolizable Energy (ME) and Crude Protein (CP) Combination for Optimum Broiler Production

Ashenafi Mengistu and Alemu Yami
Year: 1997

Abstract: Two 4 X 4 factorial experiments in a completely randomized design using four dietary levels of energy (2600, 2700, 2800 and 2900 kcal ME/kg) and four of protein (18, 20, 22 and 24 percent CP) were conducted at the Debre Zeit Agricultural Research Center to study the effects of combinations of different levels of dietary energy and protein on the efficiency of broiler performance and select low- cost ration(s) for optimum broiler production under the practical Ethiopian conditions. The experiments were the starter phase or experiment 1(from day one to day 28) and the finisher phase or experiment 2 (from day 29 to day 56 of age of chicks). A total of 2560 (1280 for each phase) commercial Hubbard broiler chicks were used. Each of the 16 dietary treatments was replicated in four pens of 20 birds. The 1280 chicks used in the finisher phase (experiment 2) were taken from a group of chicks reared (from day one to day 28 of age) on the diet with the best energy and protein combination (2800 kcal ME/kg, 24 percent CP) selected after the first phase. Treatment differences were statistically measured by considering dry matter intake (DMI), body weight gain (BWG), dry matter efficiency ratio (BWG/DMI), calorie consumption per gain (energy potency), protein consumption per gain (protein potency) and feed cost per gain during both experiments, and dressed carcass weight (DCW), dressing percentage, dry matter conversion ratio (total DMI/ DCW), abdominal fat weight , abdominal fat percent and abdominal – fat –free carcass weight in the finisher phase only which were determined after slaughtering two randomly selected birds from each replicate at the end of the finisher phase. Best performances with optimum feed cost per gain were obtained with the starter diet of 2800 Kcal ME/ kg and 24 percent CP, and with the finisher of 2900 Kcal ME /Kg and 24 percent CP which give E/P rations of about 117 and 121 respectively. In conclusion, to feed a medium - energy and high - protein starter diet and to increase the concentration of dietary energy thereafter up to a level of economic optimum, in relation to the magnitude of return to be expected from that energy level, is reached is a recommendable strategy for efficient commercial broiler production under the existing Ethiopian conditions.

43. Draught Performances of F1 Crossbred Dairy Cows and Local Oxen under Small Holder Farm Management Conditions

Mengistu Alemayehu and Alemu Yami
Year: 1997

Abstract: Draught animals are the main integrative links between crop and livestock production systems in the highlands of Ethiopia. The highlands comprise only 40% of the country's total land area but carry 79% of livestock heads and higher population densities with a resultant consequence of continuous pressure on the arable land and feed resources. There is, therefore, a strong need for intensification of the farming systems in the region to cope with the limited farm resources. Hence, the use of dairy cows for dual purpose of milk production and draught is one possible option for alleviating the existing problem and would allow for better use of the limited feed resources. The present study was conceived to investigate the on-farm draught capacity of F_1 crossbred dairy cows and compare their draught ability with that of local oxen. Thirty-six F_1 crossbred dairy cows distributed to 18 farmers of three categories of defined resource endowment (resource-poor, medium – income and resource –rich farmer status groups). Thirty-six local oxen were also randomly selected from another 18 farmers of three resource endowment categories. Crossbred cows and local oxen exerted similar horizontal draught force, which averaged 736 N but sustained it at different level of pull. Resource endowment of farmers significantly influenced draught force output of the animals required for ploughing the nitosol soil type of the Holetta area, Ethiopia. Working speed, draught power and work out puts of crossbred cows were higher than that of local oxen. These results could be attributed to cows' larger body size and moderate stress of tractive bull. As a result, Crossbred cows worked at 0.16 m/s faster speed than local oxen and generated 107 W more power. Area ploughed and total energy expended by crossbred cows over one hour period was significantly larger than that of local oxen. However, local oxen required 12% more metabolizable energy per Kg $W^{0.75}$ compared to that of crossbred cows for ploughing one m^2 area of land. This indicates that crossbred cows appeared to utilize metabolizable energy more efficiently for ploughing activity. This study has revealed that dairy cows have promising potential to perform all types of ploughing activities and can complement or substitute oxen for this purpose.

44. Assessment of Nutritive Value and Consumer Preference for Some Varieties of Cheeses Made From Goat Milk

Workineh Abebe, Fekadu Beyen and Mekonnen H/Mariam
Year: 1997

Abstract: The thesis has four components: the rapid survey part: the experimental parts I, II and the synthesis of all the three parts. The survey was conducted in three woredas of Eastern Hararghe (Gursum, Komolch and Wobera) to identify the potentials and constraints of goat's milk production, processing and utilization. Cluster analysis was used to classify respondents in to four groups based on their natural relationship by taking livestock possession as a delineating variable The respondents fell in to clusters 1, 2, 3, and 4 and the respective clusters had 28.8, 51, 5, 13, 6 and 6.1% of the respondents. Respondents from all cluster groups reported utilization of goat milk with no cultural prejudice. However, processing goat milk in to cheese and butter was not common. More than 90% of the respondents reported lack of processing technology as a main constraint. Gross composition of goat milk from local Somali and their, F_1 crosses with Anglo Nubian breeds from late lactation were evaluated at ILRI Debre Zeit Station with the aim to assess the variation in composition of local and crossbred goat milk and to compare the result with Boran cow milk. Mean Fat, CP, SNF, TS and Ash contents, acidity and PH of Somali goat milk were 7.85, 5.51, 10.69, 18.35, 1.15, 0.28 and 6.61 respectively and for that of F_1 crossbreds were 6.48, 4.28, 8.90, 15,47, 1.10, 0.25 and 6.55 respectively. CP, SNF, TS, and lactic acid content of Somali goat milk were significantly greater ($P < 0.05$) than for F_1 crossbred goats. However, the observed mean values for the major chemical components of milk from these two breeds of goats were higher than that of Boran cow milk. The buffering capacity of the milk from the three sources (Somali goat, F1 cross breed goat and Boran cow milk) were evaluated by gradual addition of 1 ml of 0.5 N HCL up to 5 ml. The PH of Somali goat milk was significantly ($P < 0.05$) greater than the other types of milk for all titration beyond 2 ml. After the 3 ml titration, Boran cow milk showed the lowest PH and F1 crossbred goat milk showed the second lowest PH value. Three types of cheese (Ayib, Feta and Domiati) were made from five sources of milk (Somali goat ,F1 crossbred goat , boran cow, Somali goat and Boran cow 1:1 milk blend and F1 cross bred goat and Boran cow 1:1 blended) , and Chemical composition of the cheese samples were determined. No significant difference ($P<0.05$) was observed between the cheese from the two goat breeds in moisture, CP, Fat, SNF and ash contents of Ayib and Domiati cheese. However, Feta cheese, made from Somali goat milk showed significantly greater ($P < 0.05$) CP and SNF contents. In general, among the various types of cheese made of goat's milk, and goat and cow 1:1 blended milk Ayib had the highest moisture content and Domiati had highest CP, SNF and ash whereas Feta had the highest fat content. Consumer preference test was conducted at Gursum on the three cheese types (Ayib, Feat and Domiati) made from the stated five sources of milk. With the aim to assess the acceptability of the cheeses. Appearance, smell, taste, texture and overall acceptance of the products were rated on a 1 to 5 scale. Where by 1 stood for poor and 5 for excellent. The data was statistically analyzed using Friedman chi-square tests and mean separation was done using a set of sign tests. It was observed that acceptability of the three cheese types (Ayib, Feta and Domiati) made from the milk of two goat breeds were indistinguishable from that made from cow milk. However, cheese samples from F1 crossbred goats and Boran cow 1:1 blended milk had the highest ($P < 0.05$) acceptability rating which differed from the rest of the cheese samples for all cheese types. Goat's milk production and utilization of processed goat's milk products needs more research attention for efficient use of the available resources for better livelihood of the resource poor farmers.

45. Chemical Composition, Microbiological Properties and Keeping Quality of Raw and Pasteurized Goat's Milk

Eyassu Seifu and Fekaku Beyene
Year: 1998

Abstract: The study was conducted at Awassa College of Agriculture (ACA), southern Ethiopia. Milk samples for the experiment were obtained from Somali does between September and December, 1996 from the College goat Farm. The milk obtained from the does was bulked and transported in a sterile container to the College Dairy Laboratory. Upon arrival at the dairy laboratory, the temperature and pH of the milk samples were measured and the samples were held under cold storage (4 ^{0}C) unit the commencement of the subsequent experiments. The parameters studied were chemical composition, microbial count (total plate, coliform, lactic acid bacteria, yeast and mould, and thermoduric bacteria count), assessment of microflora and sensory evaluation of the milk. Standard methods were used for the chemical composition, microbial count, and evaluation of the microflora. For the sensory evaluation a panel of five trained judges participated in the trial. The average gross composition and standard deviation of Somali goat' s milk during a lactation period of 17 weeks were CP 6.2±0.339; fat 7.76 ± 1.88; water 79.7 ± 2.5; NPN 0.193±0.036; TS 20.3± 2.57; SNF 12.9 ± 0.847; ash 0.88±0.018, pH 6.67± 0.063; and soluble acidity 0.185± 0.008.

46. Performance of Somali Goats Supplemented With Different Proportions of Groundnut Cake and Wheat Bran

Getenet Berhanu, Alemu Yami and Mekonnen H/Mariam
Year: 1998

Abstract: The performance of late pregnant (15 weeks) and lactating (for 13 weeks) does supplemented with different combinations of Groundnut cake and wheat bran was studied on 25 somali does mated to Anglo- Nubian bucks. In addition, the performance of their kids before and after weaning was also assessed. The study was carried out in three consecutive experiments that were before kidding, after kidding and after weaning .The combinations of the supplements were 0:100, 25:75, 50:50, 75:25 and 100:0 groundnut cake to wheat bran ratio. The supplements were offered at the rate of 350 g and 400 g during late pregnancy and lactation, respectively. Pregnant does that were supplemented with 75:25 and 100:0 Groundnut cake to wheat bran ratio had significantly ($P < 0.05$) higher dry matter intake (DMI). Weight gain of does was significantly ($P < 0.05$) higher for 75:25 than does in other treatments and ($P < 0.05$) weight. This combination also resulted in significantly ($P < 0.01$) higher dry matter intake (DMI) and ($P < 0.05$} weight gain of kids; milk yield of does and weaning weight of kids in the post kidding period. The post – weaning weight gain of kids whose dams were supplemented with 75:25 groundnut cake to wheat bran ratio was also significantly ($P < 0.05$) higher than kids of in other treatments. Udder size (both before and after kidding), birth weight and days required to return to estrus observed after weaning were not affected by treatment. Among milk composition traits only protein content was influenced significantly. Does those supplemented with 100:0 groundnut cake to wheat bran ratio had higher protein content than the other groups. No kid mortality was recorded for the 75:25 Groundnut cake to wheat bran ratio. Based on the result obtained higher inclusion of groundnut cake (protein source) at 75 and 100% in the supplement improved most of the performance of late pregnant and lactating Somali goats. Kids from these does also attained higher average weight gain before and after weaning than the rest.

47. Milk Production Persistency and Composition of Pastorally Managed Camels in Eastern Ethiopia

Kebebew Tuffa, Daniel Keftasa and R. Baars
Year: 1998

Abstract: Thirty lactations of camels belonging to one herd having 100 animals were monitored during 19 months from March, 1996 to September 1997 in the Errer valley, eastern Ethiopia to examine the milk production and persistency characteristics of camels under natural environments. The effect of season of calving, parity groups and calf death on milk production traits (lactation length, daily, peak, monthly and total lactation milk yield, persistency, days open and calving interval) were analyzed using the General Linear Model (GLM) procedure. Lactation curves were drawn for different calving season and parity groups of camel cows. The least square means of the daily, peak and lactation yield were 7.5, 11.5 and 2104 liters, respectively. The average lactation monthly milk yield was 229 liters. The lactation length was 282 days. The persistency indices, calculated were 120 and 89% for P1 and P2, respectively. The least square means of day's open and calving interval were 199 and 573 days, respectively. All parameters were significantly affected by the season of calving except persistency expressed in p1 and monthly milk yield. The maximum daily and lactation yield were observed during the third and fourth lactation. Camels, whose calves died, had a significantly higher yield than camels whose calves surviving to weaning. The lactation curves had a typical shape, although less pronounced for camels that calved during the long dry season. Camels that calved in the long wet season and old camels showed the lowest persistencies. For milk composition studies, milk samples from 41 camel cows of different age, stage of lactation, lactation number during the wet and dry season were analyzed for fat, protein, casein TS and SNF. The least square means were 3.9, 2.9, 2.3,13 and 9 percent for fat, protein, casein, TS and SNF, respectively. The effect of season was highly significant for Fat and SNF, but not for the other components. During the dry season, milk fat percentage was lower than the fat percentage of the wet season. The protein and casein were not significant affected by all factors considered. Lactation number significantly affected TS. Camels in eastern Ethiopia have high milk yield, long lactation length and high persistency which are the good indication of the fact that camels are good dairy animals in arid and semi-arid areas. In hot dry season camels secret highly diluted milk with low fat content, a unique diet of dry season for their calves and human. The results of this study lead to many recommendations for future camel research and improvements in the country.

48. Evaluation of Pepper Spent as an Egg Yolk Coloring Agent in the Diet of White Leghorn Layers

Solomon Tefera and Alemu Yami
Year: 1998

Abstract: In this study the egg pigmenting properties of pepper spent were evaluated when used in the experimental rations at 0, 1,2,3,4, and 5%. A total of two hundred and forty white leghorn layers were divided at random into six groups of 40 layers and each group further subdivided into two replicates of 20 layers. Then they were randomly housed in twelve pens and assigned to one of the six treatment rations. Data was collected on egg yolk color intensity measured in terms of Roche color fan scale and potassium dichromate solutions. Data for consumer preference score was taken on raw, boiled and fried egg samples. Egg production, feed consumption, feed conversion efficiency, fertility hatchability albumen quality, egg shell quality, egg weight and economic considerations were also monitored. Results indicated that there were statistically highly significant differences ($P < 0.01$) in the Roche color fan and potassium dichromate reading values. The highest value for the Roche color fan scale (8.63) and potassium dichromate grade (8.09) were attained at 5% pepper spent inclusion. The lowest values of 5.06 for Roche color fan and 4.96 for potassium dichromate were obtained from 0% (control diet). There was significant difference ($P < 0.05$) in consumer preference scores for boiled egg samples with the highest value of 3.51 being attained at 5% On the other hand, addition of pepper spent did not significantly affect ($P > 0.05$) consumer preference scores of raw and fried eggs with the rate observed between good and very good for raw and good for all fried egg samples. Non–significant differences ($P > 0.05$) in egg production, feed consumption, and feed conversion efficiency, fertility of eggs, hatchability, albumen quality, egg shell thickness and egg weight were noted among the pepper spent levels.

49. Characterization of Camel Husbandry Practices and Camel Milk and Meat Utilization in Jijiga and Shinile Zones Somali Region

Tezera Getahun, Mekonnen H/Mariam and Belay Kassa
Year: 1998

Abstract: Camel husbandry and camel milk and meat utilization were studied in Jijiga and Shinile zones of Somali Region in 1996. The main objectives were to describe the camel husbandry practices and camel milk and meat utilization in the study area. Eighty- four households were interviewed formally from these zones using questionnaires. In addition, records on body measurements of 226 camels of different sex and age groups were taken. Herd demography, information on reproductive performance, herd management, feeding and watering, disease and health problems, livestock holdings, milk and meat production as well as consumption and processing and marketing were collected. The calves, immature and adult camels in family herd were on average accounted for 17%, 21.1 %, and 61.2 % in Jijiga (n=53), 1867 heads); and 15.7 %, 26.1 % and 58.2 % in Shinile (n=31, 704 heads). The percentage of total females in herd and females of breeding age (out of total females) were 75.4 % and 68.7 %; and 74.8 % and 66% in Jijiga and Shinile , respectively. Two traditional camel types were identified namely: the Agoweiyn and the Ayuune. The chest girth and estimated body weight for female and male Agoweiyn and Ayuune 'type' were 1.96 m± 0.10, 427 kg± 62.18 (n=91), and 2.04 m± 0.14, 486± 81.25 (n=55); and 1.59 m ± 0.11, 326 kg ± 62.91 (n=31), and 1.93 m± 0.11, 384 kg± 80.76(n=18_), respectively. The percentage of interviewed householders who had at least one breeding bull, fix age at first mating, and bred camels in wet season were 83%, 61.2 % and 69.8 % in Jijiga; and 83.9 %,67.7 %, and 61.3 % in Shinile, respectively. Age at first mating, productive life span for female and male in years, and potential offspring per dam's life time were 4.7, 6.2, 23.1, 9.3, and 11.6 in Jijiga; and 4.4, 6.5 and 22.4, 9.7, and 11.6 in Shinile respectively. The calculated fertility rate in mixed herd were 3.91 (n=106) and 3.47 (n=60) in Jijiga and Shinile, respectively. Out of all calves born alive, 67.6 % (n=414) and 76.4 % (n=20 8) were in herd in Jijiga and Shinile during the survey, respectively. The percent of offspring left the herd due to death were 69.4 % (n=134) and 53.1 % (n=49) of which death due to disease and predators accounted for 68.8 % and 29%; and 61.5 % and 34.6% in Jijiga and Shinile respectively. Abortion and still birth rate were 8.1 % and 4.2 % in Jijiga, and 11.1 % and 4.2 % in Shinile. Calves mortality (less than two years) were accounted for 48% (n=93) and 34.6% (n=26) of total death in Jijiga and shinile, respectively. The major camel production constraints were disease, feed shortage, and predators. The average family size, camel hers size, TLU per household, and TLU per capita were 10.6, 35.2, 50.1, and 5.2 in Jijiga ; and 9.8, 22.7, 40.5, and 4.3 in Shinile , respectively. The percent of polygamous households were 45.3 % and 22.6 % in Jijiga and shinile, respectively. The households having camels plus three other livestock species were 47.2 % and 41.9 % in Jijiga and Shinile, respectively. The mean of lactating camels per herd, lactation off take, and lactation length were 16.6 %, 2009 kg (range 1050-3150 kg), 15 months (range 12-18) in Jijiga; and 11.6 %, 1244 kg (range 600-2000 kg) and 13 months (range 12-17 months) in Shinile, respectively. The percent of households who consumed all the camel milk they produced during the wet and dry season were 24.5 % and 39.6 % in Jijiga; and 97.8 % and 100 % in Shinile, respectively. In the same line, the percent of households who sold at least one – third of the milk they produced during dry season were 60.4 % and 0% in Jijiga and Shinile, respectively. No product of camel milk was identified in both zones but 58.8 % of households in Jijiga and 74.2 % in Shinile practiced purposeful milk souring. The per capita camel meat consumption for both sites was 19.9 kg for the year 1996. Of the total camels slaughtered, 88% were due to disease and cultural ceremonies. It is concluded that the camel husbandry practices characterized by target oriented selection and controlled breeding practices, better reproductive status, risk averting management strategy, high degree of livestock diversification, and high milk and meat production potentials for future development interventions.

50. Survey of Cactus Utilization in Ganta- Afeshum Wereda, Eastern Tigray and Evaluation of Cactus as Feed and Water Source for Sheep

Hailay Hadgu
Year: 1998

Abstract: A survey was conducted in Ganta –afesum wereda to generate information on the traditional utilization of cactus as animal feed. According to the information collected, there is only private ownership of cactus land, the cactus land, the cactus land is found around the garden (backyard) and 100 % of the Farmers indicated that it is either planted by themselves or their relatives and 56% of the Farmers in the area have land ranging from 0. 01-0.02 ha and 26% possess cactus land ranging from 0.02-0.04 ha. The survey result also indicated the existence of two verities, namely spiny and spineless cactus but the spiny variety is the dominant one. Farmers' generally prepares cactus mainly for cattle. Ninety six percent of the Farmers use burning to remove the spines because it demands less labor and time. The survey result also revealed that bloating and diarrhea are the major problems encountered with feeding cactus and the main reason for the problems is excess intake of cactus. An experiment was conducted to evaluate the method of processing and form of offer, which are commonly practiced by the Farmers. Statistical analysis of the data showed no significant difference ($P > 0.05$) between burning and scraping. Nevertheless, burning had an advantage over scraping, since removal of the spines by burning demands less time and labor. Similarly, chopping had an advantage over whole cactus because it causes minimum water as well as dry matter loss, avoids great wastage as result of contamination with soil and it also avoids the consumption of some extraneous and harmful materials together with the feed. In an experiment conducted with the objective of assessing drinking water sparing ability of cactus, no significant difference ($P > 0.05$) in dry matter intake of cactus was observed between sheep that were subjected to daily ad-lib watering, watering every four days and watering every eight days plus cactus, supplementation. However, the mean straw dry matter intake on the watering day, dry matter intake per kilogram of body weight and dry matter intake per kilogram of metabolic body weight showed a significant increase ($P < 0.05$) between treatments. The least significance difference test of the absolute dry matter intake (DMIg/day) revealed no significant difference ($P > 0.05$) among sheep on watering daily ad lib plus no cactus, watering daily ad-lib plus cactus, watering every four days plus cactus and watering every eight days plus cactus and among those that were watered every four days and every eight days without cactus, supply. Besides these the dry matter intake of the cactus groups (T_2, T_4 and T_6) and the non-cactus groups (T_1, T3 and T_5) were also compared and the dry matter intake of the cactus supplemented group was found to be higher ($P<0.05$). Similarly, the mean water intake at watering and the relative water intake (ml/DMIg, ml/kgw. and ml/kgw $^{0.75}$) were analyzed and a significant difference ($p<0.05$) was found between the treatments. In all cases, mean comparison showed that T_5, T3 and T1 (Watering every eight, four and daily without cactus, respectively) were consumed significantly higher amount of water ($P<0.05$) from the rest, and from each other. No significance difference was observed among T_4 and T_6 (watering every eight days plus cactus, respectively). In all cases water intake increased in line with duration of water deprivation. Body weight showed non-significant difference between treatments as a whole ($P > 0.05$). Similar results were obtained between the cactus group and the control group, within the cactus group and within the non-cactus group. But when the cactus and the non-cactus group were compared the cactus group had significantly higher body weight than the non-cactus groups. In conclusion, cactus supplementation has got a good potential of prolonging drinking water requirement and also it has significant effect in increasing dry matter intake of straw and body weight gain.

51. The Effect of Feed Restriction of Varied Severity at Different Developmental Stages on the Performance of Broiler Chicks

Mengistu Urge and Alemu Yami
Year: 1998

Abstract: The performance of broiler chicks subjected to various severity of feed restriction during starter and finisher phases was studied at the Debre-Zeit Agricultural Research Center. The different feed restriction levels employed were T1 (0%, control, ad labitum fed: T2 (5% restriction): T3 (10%: T4 (15%): T5 (20%): and T6 (25%) for both phases. Feed restriction was based on the previous day's feed intake of the ad labium fed birds. Feed intake (FI) of the experimental chicks was measured daily. Body weight (BW) was measured weekly, at the start and end of the restriction period. Feed conversion ratios (FCR) were calculated from feed intake and body weight gain (BWG) on a pen basis. At the end of the trials (1.5 kg body weight), two broilers per replicate were killed to determine abdominal fat weight (AFW), abdominal fat percent (AFP), dressed carcass weight (DCW) and dressing percentage (DP). Moralities were recorded as they occurred and expressed as percentage of number of birds in a pen at the end of each experiment .The economic benefits in terms of partial budgeting were calculated as differences between the sale of broilers and production cost incurred during the experimental periods. In trial of feed restriction during the starter phase (8 to 17 days of age), broilers subjected to 5%, 10% and 15% feed restriction reached market weight earlier than the control and T5 and T6 The number of days required to reach market weight for the different treatments were 68,66, 67,67, 69, and 71 for T1, T2, T3, T4, T5, and T6, respectively .T2 (5% restriction) consumed significantly ($P < 0.01$) lower amount of feed up to the market weight as compared to the control and the other restricted treatment groups. Broiler feed restricted at the levels above 5% had statistically similar amount of overall feed intakes with the control and among themselves. The average daily weight gain (ADWG) of birds on the 5% restriction was significantly ($P < 0.001$) higher than the control and T5 and T6. T5 and T6 had lower average daily weight gain compared to the control and the other restricted treatments. DCW, DP, FCR and percent mortality were not significantly ($P > 0.05$) affected by the different levels of restriction. Feed restricted treatments accumulated significantly lower amount of abdominal fat when considered as absolute weight ($P > 0.001$), and percentage of slaughter weight ($P < 0.01$), compared to the control. The highest net benefit was obtained from T2 (5% restriction) followed by T3 (10%) and T4 (15%) restriction groups. Broiler feed restricted during the finisher phase (33-42 days of age) reached market weight latter than the control. Days required to reach market weight for the different treatments were 68, 69, 70, 71, and 72 for T1, T2, T3, T4, T5, and T6 respectively. The amount of feed consumed to attain market weight, FCR, DCW, DP, and percent mortality were not significantly ($P > 0.05$) different among treatment groups. The ADWG of the control treatment was significantly ($P < 0.001$) higher than the restricted treatments. Except T5 and T6 which were not different from each other, average daily gain of the restricted treatment groups significantly decreased with increasing level of feed restriction. Significantly ($P < 0.001$) lower amount of abdominal fat weight was observed in the restricted treatments compared to the control. T1 accumulated significantly higher amount of abdominal fat percent compared to the restricted treatment. Among the restricted treatments, T2 had significantly ($P < 0.001$) higher abdominal fat percent than T3, T4, T5 and T6 Better net economic benefit was obtained from broilers fed ad labitum throughout the experimental period as compared to the restricted treatments. Comparing phase I and II on FI, FCR, DCW, DP, AFW, AFP, and percent mortality showed no significant ($p>0.05$) differences between broilers feed restricted at both ages. Broiler chicks feed restricted during starter phase to 5, 10, 15 and 20% level had significantly ($P < 0.001$) higher ADWG than broilers feed restricted during the finisher phase to the same level.

52. Qualities of Cow Milk and the Effect Lactoperoxidase System on Preservation of Milk at Arsi, Ethiopia

Taye Tolemariam, Robert Baars and Fekakdu Beyene
Year: 1998

Abstract: Raw milk samples from crossbred dairy cows were collected from 20 private farmers in a 50 km radius from Asela, two milk collection centers and Asela livestock (state) farm during January, February, and March, 1998, for chemical analyses (protein fat, total solids, ash, and othiocyanate contents), acidity and resazurin tests; while in addition to acidity and resazurin tests, total bacterial count and coliform count were made during March and April 1998. Lactoperoxidase in the milk was activated by the addition of somium thiocyanate as a source of thiocyanate ion and sodium percarbonate as a source of hydrogenperoxide. Then, the effect on keeping qualities of the milk after three and seven hours of treatment were analyzed and compared with that of cooling preservation and traditional method of milk transport. The mean percentage of total solids, protein, fat, ash and solids not – fat were 14.3 ± 0.25, 3.48± 0.06, 3.76 ± 0.17, 0.72, ±and 10.4±0.60, respectively, while the natural thiocyanate in the milk had a mean of 8.3± 0.90 ppm. The mean actual percentage of titerable acidity of milk handled by traditional method, cooling, and preservation by LPS for three and seven hours were 0.38± 0.04, 0.30± 0.04, 0.33 ± 0.04 and 0.40±0.05, repectively: while the actual values for resazurin test were 1.32± 0.50, 2.50 ± 0.65, 1.77 ± 0.63 and 1.67± 0.86, respectively. On the other hand, the mean milk coliform counts in this study were 2.14 X 10^6 ± 0.22, 1.62 X 10^6 ± 0.13, 1.58 X 10^6 ± 0.16 and 3.63 X 10^6 ± 0.26 colony forming units (cfu) / ml in milk transported by traditional, cooling, LPS treatment for 3 and 7 hours, respectively: while the corresponding mean values of total bacterial counts were 6.2 X 10^8 ± 0.15, 5.2 X 10^8 ± 0.17 and 5.9 X 10^8 ± 0.18 cfu/ ml respectively. LPS treatment for three hours was more effective in milk preservation than the traditional method of handling, but failed to do so after seven hours of storage as depicted by acidity, resazurin and coliform counts. The milk collected from Asela livestock farm and Sagure stations had better qualities as shown by most of the bacteriological analyses made, while those stations having the milk collection centers showed poor keeping quality as compared to the rest of stations. The potential of the area around Arsi to expand dairy with improved genotypes is well appreciated, but should be supported by quality assessments of the milk, particularly in area where milk collection centers are increasing because the collection centers showed poorer hygienic standard than the private farm and the state farm.

53. Productivity, Reproductivity and Health Monitoring Study on Camel Heard at Errer Valley, Ethiopia

Zeleke Mekuruaw, Bekele Tafesse and B.P. Hegde
Year: 1998

Abstract: Productivity, reproductively and health aspect of camel (*Camelus dromedarius*) kept under pastoral management condition at Error valley, Ethiopia were monitored for a year (October 1997-September 1998). Milk off take, weight gain, herd growth rate, animal offtake and mortality were assessed. Reproductive potential of the camels such as annual calving percentage, service per conception, interval between birth and conception and abortion were looked into. The prevalence and seasonal dynamics of trypanosomiasis, mang mites, strongyle parasites and ticks were identified. Serological test against brucellosis was also undertaken. The outbreaks of some other diseases were visually assessed. Milk offtake was significantly higher ($P < 0.01$) during wet season (3.12 liters) than during dry season (1.49 liters). Significantly higher ($P < 0.01$) milk offtake was also recorded from camels of parities 1-4 (3.03 liters) than camels of parities 5 and above (1.58 liters). Female immature camels (1-4 years old) showed significantly higher ($P<0.01$) daily weight gain (59.40 grams) than males of the same age (33.24 grams). Furthermore, significantly higher ($P < 0.01$) daily weight gain (63.12 grams) was recorded from camels of 1-3 years old than camels of 3-4 years old (29.52 grams). Likewise, significantly higher ($P < 0.05$) daily weight gain (50.68 grams) was observed during wet season than during dry season (41.96 grams). The annual commercial animal offtake and herd growth rate of the monitored camels were 4.47% and 8.91% respectively. The mortality rate of calves below one year was higher than those of immature and adults. Most of the mating and calving of camels were during rainy months of the year. The annual calving of the herd was 42.72%. Trypanosomiasis, mange mite lesions, strongyle parasite and ticks were prevalent throughout the year, however, their prevalence rates were higher during rainy months than during dry months of the study period. The trypanosome species identified was trypanosoma evansi. Its minimum and maximum point prevalence rate was 5.41% and 20.59% respectively. Similarly, the point prevalence rate of mange mite infection also varied from 4.67% (during dry month) to 21.70 % (during rainy month). The highest strongyle eggs per gram of faeces (1036.05Ý0.65) and highest point prevalence rates (85.71%) were observed in October (rainy month) whereas the least eggs per gram of faeces (358.83 Ý 0.62) and least point prevalence rates (61.54%) were recorded in April (dry month). From 15284 ticks collected, 11 tick species were identified. Of these, Rhipicephalus pulchellus (87.36%), Amblyomma gemma (4.10%), Hyalomma dromedarii (3.87%) and Amblyomma variegatum (3.21%) were the most abundantly found tick species on monitored camels. The highest tick load per camel (105.34 Ý 0.55) was observed in August (rainy month) whereas the least (27.81 Ý 0.54) was in December (end of rainy month). The prevalence of brucellosis was very low (1.67%). An outbreak of camel pox and a new respiratory disease were encountered during the monitoring period.

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55. Evaluation of Reproductive and Growth Performance of Fogera Cattle and Their F1 Friesian Crosses at Metekel Ranch, Ethiopia

Addisu Bitew, B.P. Hegde and Berhan Tamir
Year: 1999

Abstract: The study deals with the Fogera cattle and their F1 Friesian crosses at Metekel cattle Breeding and Improvement Ranch. It is based on data collected between 1989 and 1998 and evaluated their reproductive and growth performance. Age at first calving varied significantly ($P < 0.01$) in relation to breed group and year of birth while season of birth had no significant effect .Age at first calving averaged 47.61±0.77 and 40.46± 0.93 months for Fogera (n=74) and F1 heifers (n= 69), respectively. Calving interval of Fogera cows was significantly affected by year and season of calving and parity of dam. Cows that calved in the long rainy season had shorter calving interval. The average calving interval of Fogera cows was 559.0± 12.74 days (n=653). The average gestation length of Fogera cows (n=583) was 281.4 ±0.92 days. The effects of sire breed, year and season of calving were significant unlike the sex of calf and the parity of dam. Cows mated to pure Fogera bulls carried their calves for 5.4 days longer than those cows artificially inseminated with Friesian semen. The preweaning mortality rates unit eight months of age were 5.12± 1.4% and 3.75± 1.5% for fogera (n=848) and F1 calves (n= 375) respectively. Calves born to first calvers had significantly highest preweaning mortality rate (7.5%) compared to other calves. The mean body weights of Fogera and F1 calves were 22.45 + 0.17 kg (n=882) and 24.92± 0.37 kg (n=372) at birth and 114.2± 1.9 kg (n=398) and 130.5± 2.3 kg (n=214) at weaning, respectively. All the factors tested had significant effect on both the parameters with the exception of effect of the sex of calf on weaning weight. The average body weight of Fogera and F1 calves were 146.8± 3.5 kg and 153.3±3.8 kg at one year and 188.9 ±5.0 kg and 214.1 ± 5.2 kg at two years of age, respectively. At one year of age, only year of birth and not breed group and at two years of age, both breed group and year of birth had significant effects. The slow post weaning growth rate, seasonal mating system and environmental variations are the main factors for low reproductive performance of Fogera and their half herds with Friesian

56. Range Condition and Traditional Grazing Management in Borana, Ethiopia

Ayana Angassa and Robert Baars
Year: 1999

Abstract: In this study, rangeland composition, current range condition and traditional grazing management systems practiced in Borana rangeland were investigated. For the investigation of the rangeland composition, plant materials from eighteen different transect were collected and identified. In each transect fifteen 0.5 X 0.5 m quadrants were sampled by cutting in a zigzag pattern along the transect at an interval of 100 m. The current range condition was assessed in seven representative grazing areas. To know the traditional grazing management systems practiced in Borana, representative pastoralists (n=96) were interviewed in their respective zones. A total of 41 grasses, four legumes, three sedges and 28 tree and / or shrub species were identified. Grasses such as Bthriochloa radicans, Cenchrus ciliaris, chrysopogon aucheri, Aristide adscensionis, Heteropogon contortus and panicum coloratum were dominant and/ or common grasses in the Topland area (1650-2000 m above sea level) of the Borana range. Aristida adscensionis, Bothriochloa radicans, Cenchrus ciliaris, Chrysopogon aucheri, Leptothium senegalensis and panicum coloratum commonly occurred in the Medium altitude (1500-1650m above sea level) area. In the Bottomland (1250- 1500 m above sea level) area Aristida adscensionis, Cenchrus ciliaris, Chrysopogo aucheri, Panicum maximum and pennisetum stramineum dominated and/ or common. In general, grasses of good palatability were found in a large proportion of the Topland and Bottomland areas. The proportion of legumes in all of the gangland areas studied was very low. There was a significant difference for grass species composition of the open sample sites as compared to the encroached sample sites. The average score of basal cover was significantly different between the encroached and non-encroached sample sites. No significant differences were observed between the encroached and non-encroached sample sites for the number of seedlings and age distribution of grasses. The soil condition of all transects was generally good showing a significant difference between the encroached and open sample sites. For total score, the majority of the ratings per sample site fell in to the category 'good'. There was s significant difference between the encroached and non-encroached sample sites. The average score was 33.8 for non-encroached sample sites and 28.3 points for the encroached sample sites. However, it was concluded that the current condition of Borana rangeland was generally good. In most of the areas studied, the Borana model of grazing management followed rotational grazing systems. In this way the grasses in the previous grazed area will get time to recover until the animals grazed the other portions living the rangelands in good condition. Decision about the use of grazing area, especially the range lands to be reserved for the dry season, was taken jointly by the Ollas or Dheda council .The grazing management system was mainly based on the division of cattle in to wara- herd (the lactating cows and their calves) and fora- herd (composed of males, non- milking cows, pregnant animals and the young stock).

57. Effects of Breed and Protein Supplementation on Development of Resistance to Gastrointestinal Parasites in Sheep

Aynalem Haile, Alemu Yami and J.E. Rege
Year: 1999

Abstract: The effects of breed and dietary protein supplementation on the development of resistance to endoparasites was examined in artificially infected lambs. The experimental design involved 2 breeds (Menz and Horro), 2 infection treatments (Infected vs. Non- infected) and 3 dietary protein treatments using 152 lambs assigned to the 12 treatment combinations, with an average of about 13 animals per cell. Diets were formulated to be isocaloric but with varying protein and /or nitrogen sources. The nutritional control group of lambs were maintained on a basal diet of hay offered ad libitum, whereas, the second and third nutrition treatments consisted, in addition to the basal diet, of supplements of molasses – urea blocks (MUB) and cotton seed cake (CSC), respectively. Infection treatment involved repeated infection and drenching on three phases separated by periods of two weeks (between primary and secondary) and six weeks (between secondary and tertiary) during which lambs were free of worms. In the first two infections, the 'infected' group of lambs were exposed to an experimental infection of 1000 L_3 (third stage larvae) of Haemonchus contortus given orally three times a week for 3 weeks. On tertiary infection however, mixed infection of Haemonchus Contortus, Longystrongylus elongata and trichostrongylus colubriformis involving a dose rate of 500 L_3 was given three times a week for 12 weeks. During the course of the study, infected lambs gained less weight and had lower ($P < 0.01$) paked red cell volumes (higher levels of anaemia) than non- infected counterparts. Lambs on the basal diet gained less ($P < 0.01$) weight in the first two infections, had lower ($P < 0.01$) packed red cell volumes, higher ($P < 0.01$) faecal egg counts in the primary infection, and greater (but not significant, $P > 0.05$) worm burdens, than lambs supplemented with CSC. Infected lambs had lower ($P < 0.01$) total plasma protein and albumin concentrations than non-infected lambs. Plasma protein concentration were significantly higher ($P < 0.05$) in lambs on CSC compared to those on the basal diet and MUB in the first two infections. However, during the tertiary infection no differences were found. Albumin concentrations were significantly greater ($P < 0.01$) in CSC supplemented lambs than those on the basal diet and MUB. Breed differences found in this study are too preliminary for any definitive conclusions to be made. Interactions among the main effects (breed, infection and nutrition) for the parameters considered were in most cases not significant and hence were not of great biological importance. It was concluded that improved dietary protein supplementation either from CSC or MUB would substantially reduce lamb production losses attributable to infection in ether the Menz or Horro breed.

58. Between and Within Breed Variations in Feed Intake and Fat Deposition and Genetic Association of these with Some Production Traits in Menz and Horro Sheep

Ewnetu Ermias, E.J. Rege and Alemu Yami
Year: 1999

Abstract: A total of 457 male menz (n=303) and Horro (n=154) sheep born over eight consecutive day-and wet seasons from October 1992 to July 1996 at ILRI's Debre Brehan Research station were used to: 1) determine between –breed difference and within –breed variations in feed intake and fat deposition, 2) estimate the genetic association of feed intake and fat with average daily weight gain (ADG), efficiency of feed utilization (EFU), carcass weight, lean yield and dressing percent and, 3) establish and evaluate equations for predicting total body fat from live animal body measurement. The sheep were fed ad libitum for about three-and –half months, during which concentrate supplement and hay intake, ADG, EFU, and the various live animal measurements were recorded. They were slaughtered at average age of 510(±22) days, when the weight of hot and cold carcass, carcass lean, reticulo - rumen, individual principal fat depots and total body fat were determined. Live weight during ad libitum feeding was not different ($P > 0.05$) between the two breeds, but the horro was significantly ($P < 0.01$) taller and longer. Tail was longer ($P < 0.01$), but narrower ($P < 0.01$) at the base in the Horro compared to the Menz. Average daily intake of concentrate supplement did not significantly ($P > 0.05$) differ between the two breeds. However, the Horro exhibited significantly ($P < 0.01$) higher hay DM intake (hay DMI) and total DM intake (Tot DMI), the sum of average daily concentrate and hay DM intake. Apparent feed DM digestibility was lower ($P < 0.01$) in the Horro, while ADG and EFU were similar ($P > 0.05$) in the two breeds. Pre- slaughter live weight (PSW) and carcass weight did not significantly ($P > 0.05$) differ between the two breeds. Dissected carcass lean weight also similar ($P > 0.05$) in the two breeds, but dissected carcass fat weight was significantly ($P < 0.01$) higher in the Menz, and carcass bone weight was significantly higher ($P < 0.01$) in the Horro. Except tail and rump fat weight which was not significantly ($P > 0.05$) different between the two breeds, abdominal fat , subcutaneous and intramuscular fat ,testicular fat, kidney fat ,and total body fat determined by both dissection and ether-extraction were significantly ($P < 0.01$)heavier in the Menz. Heritability estimate from individual animal model for Tot DMI was 0.03±0.14. Heritability estimates for most of the individual fat depot and total dissected body fat ranged from moderate to high (0.36 to 0.91). Genetic association involving HayDMI and TotDMI were positive with carcass weight and carcass dissected lean, but non-significant with ADG, EFU and dressing percent. Correlations involving total body fat were non-significant with these production traits. Heritability estimates for pre-slaughter weight (PSW),tail thickness (TT),tail inner length (TIL) and tail volume(TV) measured on live animal were significant and ranged from moderate to high (0.37 to 0.54 with standard errors ranging from 0.15-0.18). Genetic correlation of these tail measurement with tail and rump fat weight were high correlation of tail circumference (TC), TIL, and TT with EFU were significant and positive while correlation involving ADG was significant (and positive) with PSW, TIL, TT and TC. The dissected and ether –extracted total body fat could be fairly estimated from multiple regression equation comprising simple live animal body measurement with acceptable precision (R-squared =0.67 and 0.68).The equation were not significantly ($P > 0.05$) biased by breed, birth type, dam parity and lamb season of birth. However, heritability's of, and genetic correlation involving predicted total body fat were non-significant due to large standard errors. It was suggested that the propensity to fatness in the Menz may be genetic attribute that enable this breed adapt to the characteristics variation in quality and quantity of feed in the environment in which the breed has evolved. High feed intake in the horro may be a mechanism, which enables the breed deposit fat, in favorable seasons, for use in period of stress. It was suggested that both feed intake and fat deposition should be improved through selection within a breed. Preferably, the energy reserve of the animal could be genetically improved through direct selection for the live animal TC, TIL, TT and TV, selection for TC, TIL and TT should also improve ADG, and EFU.

59. Assessment of the Feed Resource Base and the Performance of Draught Oxen of the Traditional Fattening Practice of Smallholder Farmers in the Eastern Hararghe Highlands

Fekadu Abate and Alemu Yami
Year: 1999

Abstract: The objective of the study was to generate quantitative information on the feed resource base and the performance of the traditional draught oxen fattened by Hararghe smallholder farmers. Considering the information of the reconnaissance survey result the study was conducted at Alemaya and its surrounding area within about 20 Kilometers' radius taking Alemaya town as a reference point. The study was conducted on 115 randomly selected farmers currently involved in the fattening practice. The participating farmers were classified into groups according to their resource base and their experience of the fattening practice using the Participatory Rural Appraisal Approach. The animals used in the study were also categorized in to groups according to their age, place of origin and their body size. The major animal performance parameters analyzed were feed consumption, initial live weight, final live weight daily live weight gain, condition score and days on feed and the effect of season. Data were analyzed by employing the general linear model with covariant using Minitab statistical package. According to the study result, the eastern Hararghe small holder farmers' traditional draught oxen fattening are strategic utilization of the seasonally available feed supply. The fattening practice generally is carried out by the intensive feeding the available feed supply to young oxen they are using for draught power until the animal grow and attain high live weight for sale. The common feed types used for fattening are almost entirely obtained from the crop husbandry practice. Thinning (54.27%; leaf strip (10.02%) and part of maize and sorghum plants (7.06%) are the major feeds offered to the fattening animal during the main and the early dry seasons. Weeds (7.23%), leave tops of sweet potato (5.66%) and small quantity of common salts and locally available mineral likes are used to the supplement the major feeds types already mentioned. Maize stover (26%), dry sorghum leaf strip (25%) and some native grass hay (26%) are the common feed types offered to the animal as a store feed during the dry season and the small rainy season. In some cases these feeds are supplements with wheat bran (14%) and weeds (9.5%)., Analysis of the chemical composition and estimates of the nutrient quality of the common feeds offered to the fattening animals during the main and the early dry seasons consisted on the average 11.63 ±1.63% CP, 70.3±1.68 % IVDMD, 51.39 ±6.85% NDF and 11.56± 1.79 % CP, 64.80±1.88% IVDMD, 53.74± 6.25% NDF respectively. The corresponding nutrient values of the feeds used during the dry season consisted on the average 5.36± 1.99 % CP, 61.54 ±5.4% IVDMD and 58.78±7.66% NDF. Through one cropping season intensive feeding a well finished bull of grade 8.0 ± 0.07 and 365±7.84 kg of live weight were obtained from a very lean animal of 4.4±0.07 and initial live weight of 269.96 kg. In addition to the quality and quantity of feed, the use of a very young, castrated of lowlands origin that is very closer to the Ogaden type in their body conformation and the different feeding strategy adopted to efficiently utilize the seasonally available feed to a desirable product, a high grade bull of higher slaughter weight at the end of one round fattening cycle. Thus, the different feeding strategies adopted by smallholder farmers are rational in their livestock feeding management. The fattening practice plays a great role in diversifying and increasing the farmers total farm production and income. It forms a typical intensification of animal production that assures economic stability and sustainability to the whole production.

60. Reproductive and Productive Performance of Friesian Boran crossbred Cattle at Cheffa State Farm, Wollo, Ethiopia

Gebeyehu Goshu and B.P. Hegde
Year: 1999

Abstract: The records of 602 graded friesian X Boran cows maintained during the year from 1976 to 1997 at Cheffa state farm, Ethiopia were analyzed to compare some of the reproduction and milk yield production traits and to interpret the effect of the levels of inheritance (1/2, 3/4, 7/8 and ≥15/16 Friesian), parity (1 to 9^{+}), season (short rainy, long rainy and dry) and year (20). The overall age at first calving (n=505) was 36.0±0.3 months and ranged from 32.9±0.6 for ½ breeds to 37.7 ± 1.1 months for 15/16 and above grades. It was significantly affected by all the factors. Calving interval of 417.7 ± 4.7, 431.0±5.7, 457.9± 13.1 and 477± 25.0 days were obtained for 1/2,3/4,7/8 and ≥15/16 groups , respectively with overall mean of 450.2±3.8 days (n=1644). The season had no significant effect on calving interval. The farm average for lactation length (n= 2049) and total yield (n=2049) were 287.6±1.5 days and 3019±24 kg, respectively and both were influenced by breed group, parity and year. The estimated for 1/2,3/4,7/8 and ≥15/16 breed groups were 284.4±2.2, 288.4 ± 2.2, 270.0 ± 4.8 and 280.0±6.7 days; and , 2978± 39.9, 3043± 35.1, 2780± 63.7 and 2924±105 kg, respectively . Per day milk yield for the lactation length (n=2049) and intercalving period (n=1644) were 10.3 ± 0.06 and 7.6±0.7, respectively. The non-significant differences in per day lactation yield among breed groups became significant when they were compared for per day milk yield of intercalving period per sec. The overall percentage for abortion and calf mortality were 17.6± 0.01 and 29.9± 0.02%, respectively. The latter two higher grades significantly had higher rates of abortions and calf mortality. Thus considering all the traits and prevailing environment, it is conducive not to go beyond 75% of Friesian inheritance in this location.

61. Study on the Production Systems of Indigenous and Improved Poultry in the Rural Areas of North Wollo

Leulseged Yosef and Alemu Yami
Year: 1999

Abstract: Survey of the poultry production system and monitoring of selected farms was conducted on various localities (Peasant Associations), which found in three altitudes- Highland, mid altitudes, and Lowlands. Number of birds per household was found to vary based on altitude and season. A lot of factors were identified as causes for the variation among these disease, predators and shortage of feeds were the main ones. Incidence and magnitude of diseases, frequency of festive days, distance from the market and price at any given time were found to affect disposal of poultry and poultry products. Price of chicken significantly ($P < 0.01$) varied based on market places sex and age group of bird. Price of eggs also shows significant ($P < 0.01$) difference between markets and between genotypes (local and exotics). In addition to their economic use, chicken holds an important place as sacrificial animal in the rural households. A supplementation experiment on Rhode Island Red (RIR) chicken was also conducted. The experiment considered was supplementation of maize and Noug seed cake at four levels in the three altitudes. There was significant ($P < 0.05$) difference in the number of eggs produced among the three altitudes and among the treatments. The highest productivity was in the lowlands and by birds on the Noug seed cake+ maize supplement respectively. Percent mortality also significantly ($P < 0.01$) differed based on altitude. The highest was recorded in the lowlands.

62. A Study on Livestock Production Systems, Feed Resources and Feed Allocation Practices in Three Peasant Associations of the Awassa Woreda, Southern Ethiopia

Yitay Alemayehu, Azage Tegegn and Mohammed Yusuf
Year: 1999

Abstract: A diagnostic survey in the livestock area was conducted in three peasant associations of the Awassa Woreda, southern Ethiopia for the period of one year (from June 1997 up to May 1998). The objectives of the study were 1) to study the livestock production systems 2) to assess the quantity and quality of feeds available to livestock 3) to assess the allocation of available feed resources to different species and classes of animals. During the survey period the annual rainfall distribution was about 1239 mm and mean daily temperature was 20.45 ^{0}C. The highest and the lowest rainfall amounts were 157.5 mm in October and 24 mm in December. During the study period showed a great variation in temperature and rainfall distribution was observed than the previous years, probably due to EI Nino effect. In the selection of 3 representative peasant associations purposive sampling technique was used using map and altimeter with the intention of getting of those having different latitudinal ranges and fair accessible. While random sampling method was used in the selected of 30 Farmers per peasant association (total 90 Farmers) by giving equal chance to be selected of those having variable production condition. The land use pattern was development by measuring the area under different crops, trees or private grazing lands. Then overall land area occupied by the 90 respondents was about 125 ha with a mean per farmer of 1.3 ha. It was only about 16.6 ha available as private grazing lands. However most of the grazing lands were owned communally. Major crops with relatively higher potential in yielding better DM residues were identified from the land use pattern and those crops which covered more than 4% of the total farm land were assumed to provide relatively more DM residues. Hence, maize stover, wheat straw, barley straw and enset pseudostem and leaves were found to be major crop residues (total 496.3 t DM per year). On the other hand the relative abundance and canopy covered by different trees/ shrubs were determined by belt transect (for extensive grazing lands) and strip methods (for hedge plants). Vernonia amygdalina (27.3%), Euphorbia (26.4%) and Acacia albida (15.3%) were found major tree/ shrub plants. However, only V.amygdalina and A. albida were the most palatable and relatively dominant plants. Based on the amount of the rainfall distribution, the year was divided in to three seasons as low (December- May), medium (June-August) and high (September- November) rainy seasons. The chemical composition and nutritional values of the major feed resources were determined. Samples were analyzed for their DM, ash, CP, ADF, lignin, Ca, P and IVDMD percentages on dry matter bases. ME was estimated from IVDMD values (ME in MJ = 0.17* IVDMD % -2.0). Samples of grazing pastures, A albida and V. amygdalina were collected throughout the year bulked by season and feed types and sub- samples taken for laboratory analysis. There were great variations in chemical composition and nutritional values between the different available feed resources in the Woreda. Significant variations were observed in DM and CP contents ($P < 0.05$) and ($P < 0.01$) in ash, ADF, lignin, Ca and P composition due to species variation. However, seasonal effect was significant in ADF ($P < 0.05$) and lignin ($P < 0.01$) contents. On the other hand, enset pseudo stems and leaves had relatively better feeding values in terms of ME contents than other crop residues, grazing pastures A. albida and V. amygdalina species. The livestock biomass held by the 90 respondents was estimated at 419 TLU. The TLU figure was higher for cows (148) followed by oxen (104.5) .The total feed DM available to all livestock was estimated at 611.4 t per year while the requirement was 909 t DM. Similarly, the DP requirement was estimated to be 31.7 ton DM bases while the supply was 25.5 ton DM bases. These results showed that the available feeds were short by 33 and 20 % of the energy and protein requirements of livestock, respectively. Therefore, both energy and protein were the major limiting factors for livestock productivity. The average feed DM available each month of the 3

seasons was calculated from their corresponding seasonal availability. About 36.4, 55.5 and 67.5 DM were estimated to be available per month of the low, medium and high rainy seasons, respectively. The overall feed potential was relatively higher during the high rainy season and least during the long low rainy season. A. albida and V. amygdalina were found to supply about 24.7 t DM per year and could serve as emergency feed during the long low rainy season. However, from laboratory analysis the nutritional value of these fodder trees (IVDMD) was very low (37.8%) and might be due to the presence of high concentrations of anti- nutritional factors in their leaves. The role of these fodder trees as feed is expected to be minimal, and further studies are required to enhance their utilization. The livestock management system was predominantly traditional .All classes and species of animal were herded together on communal grazing lands. Most of the time, the animals are fed in group, except some supplements like concentrates and noug cake. The allocation of feeds based on the level of production was limited but a certain degree of prioritization for cows (when they were milked) followed by work – oxen (during the cultivation period or from February to March) was observed. This indicates that the Farmers main objective of livestock raising is for milk production followed by draught power. Generally, poor animal nutrition coupled with traditional management condition has resulted in livestock production to remain at its ebb stage. Therefore, the quantity and quality of feeds in the area should be developed through production of forage plants as well as the poor livestock management practices especially group feeding of all animals together should be avoided. Additionally, credit facilities to promote and development investment in the livestock sector shall be put in to practice by governmental and/ or non-governmental organizations.

63. Impact of Feed Resources on Productive and Reproductive Performance of Dairy Cows in the Urban and Peri-Urban Dairy Production System in the Addis Ababa Milk Shed and Evaluation of Non-Conventional Feed Resources Using Sheep

Yoseph Mekasha and Azage Tegegne
Year: 1999

Abstract: The impact of feed resources on productive and reproductive performance of dairy cows was studied in the urban and peri-urban dairy production systems of the Addis Ababa milk shed. Two studies were conducted. The first part covered extensive assessment and in- depth on-farm monitoring of the feed resources, productive and reproductive performance of dairy cows, while the second part dealt with laboratory and reproductive performance of dairy cows, while the second part dealt with laboratory and animal evaluation of non- conventional feed resources. The study was conducted on private urban and peri – urban dairy production system of the Addis Ababa milk shed. Intra- urban, large peri –urban and urban of secondary town farms represented by Addis Ababa, Sebeta and Kaliti and Debre zeit were considered. A total of 41 farms (15 intra- urban, 6 large peri- urban and 20 secondary town) were randomly selected. The number of cows, heifers, calves and bulls across all farms was 541, 279,235 and 34, respectively. Milk samples were collected and progesterone concentrations determined to assess postpartum ovarian functions. Cross –sectional survey was conducted across the 41 dairy farms to assess feed resource availability and reproductive performance of dairy cows. In-depth on-farm monitoring was conducted in 17 selected dairy farms (5 intra- urban, 6 large peri- urban 20 secondary town farms). Data were collected on feed intake, heart girth measurements, body condition score, milk yield and milk composition, milk sampling for progesterone assay, behavioral oestrus manifestations, mating and calving. Laboratory and animal evaluation of non- conventional feed resources was undertaken in two stages. In stage I representative non- conventional feed resources was undertaken in two stages. In stage I representative non- conventional feed samples were collected from the farming system and evaluated in vitro following standard procedures. Based on the result of stage I coupled with their potential availability and wider use, feeds were evaluated in vivo using 30 male rams in stage II. Results of the study indicated that grass hay formed the entire basal diet of large peri- urban dairy farms. Home mixed concentrates of various compositions were also used as supplement in these production sub- systems. Smallholder farms of the intra- urban and secondary town use diverse assortments of feed types, which fluctuate seasonally. Supplementation with agro- industrial by- products is practiced across all the production sub-systems. Very few farms provide mineral supplements to dairy cows and this is restricted to common salt. Survey of the reproductive performance of dairy cows indicated that the majority of the dairy farms combine age and size as a criteria to breed heifers for the first time. Most farms use a combination of AI and natural mating, though AI is less accessible. The majority of the farms detect oestrus visually. Most smallholders keep on waiting if the heifer/ cows fail to conceive. The mean age and weight of heifers at first mating was 20 months and 205 kg. Postpartum anoestrous interval based on observed oestrus was 88 days and the mean number of services per conception was 2.6. The mean calving interval was 410 days. Results of the monitoring study indicated that there were significant differences between the production sub-systems in total feed dry matter intake ($P < 0.01$) mean and total crude protein intake ($P < 0.001$) but not in total energy intake ($P > 0.05$). The mean nutrient intake in the production system was 9.5 and 1.42 kg / head/day for dry matter and crude protein and 81.62 MJ/ head /day for energy. The mean ratio of concentrate to roughage was 60:40. Cows in secondary town and medium – sized farms had higher nutrient intakes. Basal and total crude protein intakes were higher during the rainy season. Postpartum body weight and body condition varied significantly ($P < 0.001$) between the production sub- systems. Mean postpartum body weight and body condition were 403.7 kg and 3.1, respectively. Cows in secondary town and medium sized farms

had higher body weight and condition. Daily milk Yield per cow, lactation yield, 305- days yield and fat corrected milk yield varied significantly ($P < 0.001$) between the sub- production systems. The overall mean milk yield per cow per day was 8.63 kg, while the mean fat and protein composition of the milk was 3.95 and 2.91 g/kg, respectively. Mean lactation and 305- days milk yields were 2612 kg and 2365 kg, respectively, while the mean lactation length was 296 days. Cows in secondary town dairy farms had higher daily, lactation and 305 - days milk yields. The annual total dry matter intake in the production system was higher by 7% of the requirement. The annual crude protein intake was in accordance with the requirement. However, the annual energy intake was 26.5 % lower than requirement. About 95% of the dairy cows included in the study were cycling. Postpartum anoestrous interval based on progesterone concentrations was 53 days. The mean interval form calving to manifestations of the first behavioral oestrus was 93 days, but progesterone assay results showed an interval of 63 days. The mean interval between detected consecutive oestrus was 67 days. A total of 78 oestrous cycles occurred in 18 crossbred dairy cows. The mean cycle length for short, normal and long oestrous cycles were 11.5, 20.3 and 42.2 days respectively. The proportion of short, normal and long oestrous cycles were 41%, 42%, and 17% respectively. The mean intervals from calving to first mating and to conception were 100 and 116 days, respectively. The overall proportion of cows that become pregnant was 55%. The number of services per connection was 1.6 and the mean overall progestrone concentrations for cyclic cows was 6.9 ng/ml. Characterization of the postpartum overian activity indicated that delayed resumption of postpartum ovarian activities, delayed ovulations, delayed calving to first behavioral oestrus , long detected interoestrus interval, high incidence of repeated short oestrous cycles, high incidence of silent oestrus / undetected oestrus , long calving to conception interval , low progesterone concentrations and high embryonic / fetal mortality were the major problems that contributed to reproductive wastage in the production systems. Laboratory evaluation of non- conventional feed resources indicated that tela atella and katicala atella had higher organic matter (96.8-98%), crude proten (21), gross energy (21-22 MJ/kg DM), lower NDF (41-59)). Pulse hulls had higher gross energy (17-19) and medium to high crude proten (8-16%).Lentil hull was superior in most nutrients compared to the rest of the hulls (16%CP, 51% IVDMD, 49% NDF and 48% ADF), but had a low energy value (17 MJ/kg DM). Poultry litter had higher CP (30%) but lower energy value (17MJ/Kg DM). Orange peel had higher energy (28MJ/Kg DM) and IVDMD (80%) value. However, the major non- conventional feed types dominating the system were atella and pulse hulls. In vivo evaluation of selected non- conventional feeds indicated that supplementation with non- conventional feed resources improved the total dry matter, total organic matter, total nitrogen and total fiber intakes significantly ($P < 0.001$). The difference between treatments were significant ($P < 0.001$) for intakes. Supplementation with atella did not affect the basal feed intake, except increasing ($P < 0.001$) energy intakes. Supplementation with lentil hull increased ($P<0.01$ the basal feed intake compared to the other pulse hulls. Nevertheless, there was no significant difference ($P > 0.005$) between the atellas for feed intake. Supplementation with pulse hulls reduced ($P < 0.001$) the basal feed intakes significantly. Supplementation with atella increased ($P < 0.001$) the basal dry matter, organic matter, nitrogen, fiber and energy intakes significantly compared to pulse hulls. There were no significant differences ($P > 0.05$) between Supplements in dry matter, organic matter and fiber digestibility but nitrogen ($P < 0.01$) and energy ($P< 0.05$) digestibilities varied significantly between the supplements. Tela and Katicant atella had higher nitrogen and energy digestibility compared to hulls. There were significant differences ($P<0.001$) between the supplements for rumen ammonia-N ($P < 0.001$), rumen pH ($P < 0.05$) and rumen VFA ($P < 0.001$) concentrations. Supplementing with atella increased ($P < 0.001$) rumen ammonia N concentrations reduced ($P < 0.01$) rumen pH and increased ($P < 0.001$) rumen VFA concentrations. Supplementation with pulse hulls improved ($P<0.001$) rumen ammonia – N and VFA but had no effect on rumen pH. Katicala atella supplemented rams had higher ($P < 0.05$) rumen ammonia- N and higher rumen VFA ($P<0.001$) concentration but lower rumen pH ($P <0.001$) compared to tela atella supplemented rams. Supplementation with lentil hull improved rumen ammonia- N ($P < 0.01$) compared to other pulse hulls. The overall mean rumen ammonia

–N and VFA concentration reached a plateau 4 hours and 6 hours post prandium. There were significant ($P < 0.001$) differences in nitrogen retention between the supplements. Supplementation with atella ($P < 0.001$) and pulse hulls ($P < 0.05$ increased nitrogen retention. Rams supplemented with atella retained greater ($P < 0.001$) nitrogen compared to rams supplemented with pulse hulls. There were no ($P > 0.05$) differences between the atela and katicala atella in nitrogen retention. However supplementing with lentil hull increased ($P < 0.001$) nitrogen retention compared to the other pulse hulls. From this study it was recommended that dairy farmers should fulfil the energy and mineral requirements, improve the efficiency of heat detection, provide outdoor exercise and avoid long voluntary waiting period in order to improve milk production and optimize reproductive efficiency of dairy cows in intensively managed urban and peri- urban dairy production system. Besides, the prevailing inefficient AI system need to be improved and there should be a strong integration of research and extension to provide technical advice to beneficiaries and document feedback information for further research. The composition of commercial concentrate mix should be evaluated regularly and quality standard should be set in order to warrant the quality of the feed. Non – conventional feeds including tela atella, katicala atella and lentil hull could be used as a protein and energy (except lentil hull) supplements under smallholder dairy production systems.

64. Husbandry Practices and Productivity of Sheep in Laloo-Mama Mider Woreda of Central Highlands of Ethiopia

Abebe Mekoya, B.P.Hegde and Alemu Yami
Year: 2000

Abstract: The study of traditional sheep production was undertaken from February, 1998 to January 1999 in Lallo-Mama Mider woreda, Norther shoa, Ethiopia. From this study 90 flocks of the Menz sheep from three peasant association were included. Data were collected on management practices, composition of livestock mix, Ownership patter, flock demography, and production constraints that need to be tackled in the area. For the study of reproduction and growth performance, mortality and offtake rates, 36 flocks were further selected and monitored year round. In this woreda, sheep were kept at marginal situation as far as housing, lamb rearing, feeding and feed management and diseases control practices were concerned. Sheep constituted 80% of the total livestock mix. The mean number of sheep in small, medium and large flock were 11.7, 26.8 and 34.1 heads respectively. Over 51.68% of small flock were owned by two persons. Of the total sheep considered 67.4% were females, 28.1% males and 4.6% castrates. Age at first lambing ranged from 15-22 months. Lambing interval (n=485) was 268+-13 days. Annual reproduction rate (n=297) was 1.36 ± 0.02 lambs per ewe per year. Individual flock and season significantly influenced both lambing interval and annual reproduction rate. Average litter size (n= 392) was 1.03 ± 0.01 lambs per ewe per lambing and only season significantly affected litter size. Lambing occurred throughout the year with peaks during the big rain and dry season. Lambs weight on average 1.76 Kg at birth 3.87,6.02,7.74,9.03,10.13 and 11.06 kg at 30,60,90,120,150 and 180 day of age respectively. Weight gain from birth to 30, 60, 90, 120, 150 and 180 days of age ranged from 51.45 to 70.57 grams per day. Except birth weight both mean weight and weight gain were significantly affected by season, sex, parity, postpartum weight and individual flock. The mean body weight of sheep that had 1-4 pairs of permanent incisors ranged from 16.98 to 20.96 kg and annual weight gain was less than 0.05 grams per day. The sex, season and individual flock effects were significant in all age groups. Mean flock mortality was 16.84%, sex, age group season and individual flock had significant effect. Prerweaning mortality rate was 17.71% and was influenced by season of birth, parity and individual flock effects. The total offtake rate was 27.96 % per annum. The ratio of entry to exit was 1:1 and the total flock size during the year stayed fairly balanced. Production constraints had perceived by the flock owners were feed shortage, disease problems lack of improved genotype, lack of capital, low price of sheep and sheep products and inadequate extension services.

65. Production of Panicum Coloratum under Varying Stages of Harvest Low Levels of Nitrogen Fertilizer and in Combination with Stylosanthes Guianensis during Establishment Year

Diriba Geleti, Robert Baars and Mohammed.Yusuf
Year: 2000

Abstract: Two experiments were conducted. The objective of the first experiment was to investigate the effect of stages of harvest (10 and 12 weeks) and levels of N fertilizer (0, 50, 65, 80 and 95 kg/ha) on yield and quality of panicum coloratum (PC) was studied. In the second experiment, the productivity of PC and Stylosanthes guianensis (SG) in pure stands planted at optimum seed rate for herbage production, 10 kg/ha for PC and 14 kg/ha for SG, and in mixture at varying relative seed proportion (75 PC+ 25 DG, 50 PC+ SG,25 PC+ 75 WSG and 100 PC+ 100 SG) were investigated. Herbage yield and other morphological traits studied include seedling count (SC), dry matter Yield (DMY), leaf yield (LY), stem yield (SY), panicle yield (PY), plant height (HT), harvestable stand density (STD) and leaf to stem ratio (LSR) for the grass species. For the legume component in the second experiment, seedling counts SC, DMY, and proportion (%) of SG in total yield, HT, STD and number of branches per main stem (NOB) were recorded. Forage quality traits considered for the experiments were DM content, ash, organic matter (OM), crude protein (CP). Neutral detergent fiber (NDF) acid detergent fiber (ADF). Lignin, cellulose, hemicellulose, in vitro dry matter digestibility (DMD), phosphorous (P) and Calcium (Ca). A significant effect of stage of harvest were obtained for DMY ($P < 0.05$) LY ($P < 0.05$), SY ($P < 0.01$), HT ($P < 0.05$) and LSR ($P < 0.001$). No significant effect of stages of harvest was observed for PY and SD. Significant effects of levels of N fertilizer was observed for DMY ($P< 0.001$), SY ($P < 0.01$) SY ($P < 0.01$), STD ($P < 0.05$), HT ($P < 0.05$) and LSR ($P < 0.01$). The influence of the interaction terms for all herbage yield traits considered was not significant. The DMY, SY and STD exhibited a consistently increasing trend with stage of maturity. No apparent yield trends for LY, PY, HT, and LSR however, were observed. With increasing levels of N, DMY consistently increased. The same was true for STD and HT. No obvious trend was observed for the other traits. A significant effect of stages of harvest on DM content ($P < 0.001$) CP ($P < 0.01$), NDF ($P < 0.05$), and in vitro DMD ($P < 0.01$) was obtained. The effect of harvesting stage on the remaining quality parameters was not significant. Small differences for DM, CP and NDF contents were observed between the stages of maturity studied. The CP and in vitro DMD values were significantly ($P < 0.01$) lower for 12 weeks samples. Similarly, rates of N significantly ($P<0.01$) influenced the concentration of P, though the trend was not consistent and no significant effect was obtained for the other chemical entities and in vitro DMD profiles. Though not significant, an increasing trend with N rates was found for CP and the values obtained did not fall below the maintenance levels. Two harvests were obtained within the main rainy season for PC and SG mixture in the second experiment. Significant effects of seed proportion treatments for DMY of SG and weed ($P < 0.001$), STD for PC and SG ($P < 0.001$), HT for SG ($P < 0.001$) SC for SG ($P < 0.001$) and PC ($P < 0.05$) and NOB for SG ($P < 0.001$) were obtained. On the other hand, the effect on total dry matter yield (TDMY) and DMY of PC, botanical composition of weed and PC, as well as HT, LY,SY, and LSR for PC were not significant . The DMY, STD, HT and percentage composition for SG showed significant ($P < 0.01$) differences during the second harvest. All the herbage yield traits studied for PC during the second harvest were not significant. The botanical composition values for the different stand components revealed the dominance of PC in the mixture. No appreciable variability between treatments was observed for the different chemical components and in vitro DMD of PC. The CP values did not fall below the threshold levels required for maintenance. The NDF ranged from 71.98 to 75.12 with a mean value of 73.41. The in vitro DMD ranged from 55.74 to 60 percent. The effect of seed proportion was highly significant ($P < 0.001$) for SC, SMY, HT, STD, and NOB for SG during the first harvest. The DMY was very low when the proportion of the

legume component in the mixture was low as a result SG had a very low presenting botanical composition value in total DMY of the mixture. There was no significant variability bestrewn treatment for the different chemical components and in vitro DMD values. During the second harvest, the percentage contribution of PC to the TDMY ranged from 73.23 to 92.68 and there was no statistically significant difference between treatments. That of SG varied from 4.73 to 11.55 and treatment effect was highly significant ($P<0.001$). Though PC was again dominant in the mixture, the proportion of SG has shown a slight improvement compared to the first round harvest. Between treatments differences for the chemical composition and in vitro DMD values of PC were not wide. The same is true for the chemical entities of the legume component. During the first harvest, the relative yield (RY) of PC and SG were less than one indicating that the yield obtained in the pure stands were higher than those from the mixed stands for both species. Mean values of the relative yield total (RYT) were also less than one except for the mixture which constituted 25 PC and 75 SG indicating the absence of yield advantage from the remaining combinations as compared to the pure stand. The RYT value of 1.41 in the Mentioned combination suggests a biological yield advantage of 41 percent in mixed cropping compared to the pure stand plots. The RY values of PC during the second harvest were all greater than one, which could probably be attributed to the fixation of N by the legume and its transfer to the grass component. For SG, yields from the pure stand plots were higher than those from the mixed stand. The mean values of the RYT during the second harvest were all greater than unity suggesting the presence of the yield advantages from the mixed cropping system. The higher yield advantage of 77 percent was obtained from the mixture treatment where PC contributed only 25 percent of the total seed mass of the mixture. The calculated aggressively index values reveled the dominance of PC during both harvests. The mean values of the relative reproductive rates revealed the improvement in the botanical composition of SG during the second phase of growth as compared to the first growing season. In general, there was a good agreement between indices of intercomponent interaction and observed DM yields of the component species.

66. Productivity, Nutritive Value and Digestibility of Elephant Grass (*Pennisetum purpureum*) as Influenced by Height of Harvesting and Different Sources of Fertilizer Applications

Tessema Zewdu, Robert Baars and Alemu Yami
Year: 2000

Abstract: Morphological characteristic (agronomic performance), dry matter yield, chemical compositions, in vitro dry matter digestibility (IVDMD) and in sacco rumen DM and N degradability studies of Eleghhant grass (pennisetum purpureum) were conducted in the 1999/2000 crop season at Adet Agricultural Research Center, Northwestern Ethiopia. The study was executed using 5 x 3 factorial experiment arranged in a randomized complete block design with three replications in plot sizes of 5 m length by 3 m width. The treatment of the study were five levels of fertilizer application (0, 46 and 92 kg Nha^{-1}; two levels of cattle manure, 1 and 2 t ha^{-1}) and three heights of Elephant grass harvesting (0.5, 1 and 1.5 m). Analysis of variance (ANOVA) was carried out using MSTATC statistical package for morphological characteristic and dry matter yield. The general linear model procedure of statistical analysis system (SAS) was employed for chemical composition, IVDMD and in sacco rumen DM and N degradability of Elephant grass applied to factorial experiment in RCBD. Correlation and regression analysis were done for the different parameters studied. According to the results of the morphological analysis, only internode number per tiller (INPT) significantly ($P < 0.01$) responded for the interaction of height of harvesting by fertilizer application; number of leaves per tiller (NLPT), total leaves per plant (TLPP), leaf length (LLPT) and leaf : stem ratio (LSR) for height of harvesting ; INPT, internode length per tiller (ILPT), number of tiller per plant (NTPP) and basal circumference per plant (BCPP) for both height of harvesting and fertilizer application. INPT, ILPT, NLPT, TLPP and BCPP were increased as height of harvesting increased while LLPT and LSR reduced as harvesting height increased. There was a significant ($P < 0.01$) difference for dry matter yield of Elephant grass morphological fractions by height of harvesting and fertilizer application but not by their interaction. The higher total DM yields of Elephant grass were obtained as height of harvesting increased from 0.5-1.5 m with 0.98 and 4.8 tha^{-1}, respectively. Among the fertilizer treatments used, 46 and 92 kg N ha^{-1} gave the higher DM yield of 3.45 and 3.91 t^{-1}, respectively. DM yields of Elephant grass was positively correlated with INPT, ILPT, NLPT, TLPP, NTPP and BCPP and negatively correlated with LL and LSR of Elephant grass. Dry matter (DM), Ca, NDF, ADL, cellulose and ME contents were significantly ($P < 0.01$) affected by harvesting of height and DM, Total Ash, CP, P, ADF-ash and Hemicellulose showed a significant ($P < 0.01$) effect for both harvesting height and fertilizer application. However, the interaction treatment had no significant response for all chemical components of Elephant grass. Total ash, CP, Ca, P, Hemicellulose and ME contents increased as harvesting height reduced while DM, OM, NDF, ADF, ADL, ADF-ash and cellulose content increased as height of harvesting increased from 0.5 to 1.5 m. Fertilizer 46 and 92 kg N ha^{-1} had the highest OM, CP and Hemicellulose contents but farmyard manure application gave the highest total Ash, P, Ca and ADF-ash contents of Elephant grass. Only height of harvesting treatments had a highly significant ($P < 0.01$) effect on IVDMD values of Elephant grass. As height of harvesting increased from 0.5 to 1.5 m, there was a decline in IVDMD content of Elephant grass from 71.76-61.03%. Crude protein (CP), NDF, ADF, ADL, cellulose and hemicellose consents were the best predictors of IVDMD contents with a correlations of 0.921, -0.942, -0.957, -0.980, -0.827 and 0.736, respectively. Regression equation relating IVDMD values to be predicted reasonably and accurately by simple and quick chemical analysis in the future. Only height of harvesting had a significant ($P < 0.01$) effect on rumen DM and N degradability (%) and DM and N degradability characteristics of Elephant grass for each incubation time in the study. There was an increasing trend in DM and N degradability and DM and N degradability characteristics of Elephant grass with reduction in height of harvesting. Both fertilizer application and the interaction of height of harvesting by fertilizer application did not show a significant effect on DM and N degradability and degradability characteristic of Elephant grass at all incubation times. Relationships were highest between IVDMD and 48, 72 and 96 h DM and N degradability with a correlation value (r) of 0.917, 0.923 and 0.921 for DMD and 0.795, 0.814, 0.787 and 0.787 for ND, respectively. Relatively lowest correlation was recorded between 6, 12 and 24 h DMD and ND and IVDMD.

67. The Effect of Some Common Methods of Storage and Duration on Egg Quality and Hatchability in East Wollega, Ethiopia

Dereje Duressa, Alemu Yami and Mohamad Yusuf
Year: 2001

Abstract: Five most common egg storage containers and five storage durations were identified through a pre-limnery survey carried out in the rural and urban areas of East Wollega. Two experiments were conducted at Alemaya University poultry farm to see (evaluate) the effects of the containers and durations on the qualities and hatchability of eggs. Among the quality parameters considered, weight loss (%) and daily weight loss (%) of eggs were highly affected ($P<0.001$) by storage containers, durations and their interactions during both experiments. The maximum weight loss was observed after storage period of 16 days for all containers. Polythene bags were found to maintain minimum weight loss Vs the baskets at all stages of storage duration. Only storage durations had significant effects ($P < 0.05$) on the egg shell thickness during experiment I. Inconsistent but significant effect of storage durations was observed on the shell weight during experiment I, and weights of yolk and albumen during experiment II. Storage containers during experiment I, and storage durations during experiment II showed significant effects on albumen height and haugh unit values. Except polythene bags which had higher albumen height and haugh unit values, the other containers did not show significant variations for both parameters. The effect of storage duration on these parameters was linear with increasing storage duration; and higher beyond the 16 day of storage. The hatchability of total eggs was significantly affected ($P<0.001$) by the interaction of the storage containers and durations during both experiments. Eggs stored for 20 days in baskets during experiment I and in polythene bags during experiment II did not totally hatch out. In both experiments, except the baskets, which showed better hatchability results until the 16 day of storage, the hatchability of total eggs kept in all containers showed highly declining trend after day 12 of storage period. The hatchability of total eggs was significantly affected by the interaction of storage containers and durations in both experiments. Except the eggs stored in *Teff* grain the hatchability of eggs kept in other containers did not fall below 50 per cent in experiment I. The hatchability of total eggs stored for the first 8 days did not show significant variation except *Teff* grain. At the end of 20 days of pre-incubation storage, the hatchability of total eggs from all containers was below 20 per cent. Similar trend was also observed in the hatchability of fertile eggs during experiment I. The hatchability of fertile eggs kept in all containers was below 30 per cent at the 20 day of pre-incubation storage. During experiment II, clay pots and cartons showed better hatchability of fertile eggs (72.0 and 74.5 per cents) respectively. The hatchability of fertile eggs linearly declined within creasing storage period the rate of decline being highest beyond 16 days of storage (experiment II). Little variation in the percentage of quality chicks was observed among the storage containers during experiment I. The percentage of quality chicks linearly declined with increasing pre-incubation storage period and variation was higher beyond the 16 days of storage in experiment I. In experiment II, the percentage of quality chicks obtained from all containers did not significantly vary until the day 16 of pre-incubation storage.

68. On Farm Characterization of Types and Evaluation of Productivity of Goat in Northern Part of Ethiopia

Getente Ameha, H.P.Hegde, Bekele Tafese, and Enyew Negusse

Year: 2001

Abstract: Characteristic and on - farm evaluation of livestock genetic resources under their own environment is meaningful to understand types, productivity and husbandry practices of the area. In this study goat types of Benshangul were characterized using multivariate analytical techniques and farmers identification criteria. Phenotypic measurements using FAO standard descriptor list, adopted by FARM Africa, were used on 2076 goats' selected thorough stratified multistage random sampling. In areas where there is a practice of consuming goat milk 99 does on their 3-5 parity were selected using random sampling for the measurement of milk under farmers' management. The management systems and productivity of gats were identified through interview. In both case farmers classification criterion and multivariate analytical techniques morphologically five different goat types, namely Felata, Arab, Gumuz, oromo and Agew were identified using variables found on head and on the general body. The average daily milk obtained (0.6 l/day) from Felata goat was significantly ($P < 0.1$) higher than 0.52 and 0.49 l/day of Araband Gumuz goats, respectively. Most of the respondents in Benshangul replied that Arab goat were highly prolific with 60 percent and 10 percent twinning and triple births at 1.8 litter size followed by Gumuz goats with 45a nd 5 percent of twinning and triple birth with 1.55 litter size . Arab and Gumuz goat were found as early maturing with short kidding interval. Bearing in mind Gumuz, Felata and Arb goats live in a drier and harsh part of the region, as opposed to the rest (Oromo and Agew goat) abortion was common in these three breed types. In this region all the goat types identified were with transhumance pastoralists except some Felata goats were with nomadic people. The rest of goat types vary in dominance around sedentary agriculturists' areas, like 100 percent for Agew goat types and 10 percent for Felata goat types. The average holding of goat by the farmers was higher for goats found in semi-arid part of the region. The dominant goat types found in semi- arid were Felata, Arab and Gumuz goats. Agew and Oromo goat types are found in sub-humid parts of the region. The trypanotolerant attribute of Felata, Arab and Gumuz goat types may be the reason for the supremacy of them in the livestock population of the region. Among the respondents 74, 71 and 69 percent indicated that Felata, Arab and Gumuz goats were used for milk production respectively, and hence higher number of females to that of males. Felata, Arab and Gumuz goat could be selected for their milk production potential. Considering the larger body weight of Oromo and Agew goats, 41.5 kg and 42.3 kg of live weight, respectively, they were used for meat production. It was not only the meat and milk of goats is used for consumption in Benshangul, blood d viscera were also eaten as food by the indigenous society of the region, except the Shinasha ethnic group. In addition to this Arab and Gumuz goat types are employed as a dual – purpose type. In general goats of the region have got a good productive and reproductive performance, which is exhibited under farmer's management. Therefore, instead of introducing exotic goats in to the region this on- farm result should be endorsed through intensive selection of the indigenous goat types of the region and explore possibility of utilizing them for cross breeding with other unproductive types of goats.

69. Assessment of Calf Crop Productivity and Total Herd Life of Fogera Cows at Andassa Ranch in North-Western Ethiopia

Giday Yifter, B.P. Hegde and Alemu Gebre- Wold
Year: 2001

Abstract: The main objectives of this study were to assess the productivity with respect to longevity and lifetime productivity in terms of calf crop and to generate information on the influence of some environmental and genetic factors on the reproductive performance of Fogera cattle. A range of performance traits and the productivity of Fogera cattle were evaluated. The analyses carried out were based on 4367 date compiled from December 1980 to September 2000. Birth weight (BW), weaning weight (WW) and adjusted yearling weight (AYW) were significantly affected by genetic group, year and season of birth and parity of dam. Sex of calf only significantly affected BW. Mean BW, WW and AYW were 23.4 ±0.1, 108.7±0.1 and 151.1±0.8 kg, respectively. Average BW of 21.9 ±0.1 and 24.9 ±0.1 kg for pure Fogera (n= 1134) and F_1 crosses (n= 1075), respectively, was observed. Mean WW was 100.9 ±0.8 and 115.8 ±0.7 kg for pure Fogera (n= 863) and F_1 crosses (n= 938), respectively. An average AYW was 145.2 ±0.9 and 136.2±1.1 kg for pure Fogera (n= 863) and F_1 crosses (n=936), respectively; Growth performances reflected by BW, WW and AYW did not improve as expected as year pass by. BW was more in the early years and declined, WW and AYW were not consistent. Number of services per conception (NSC) was significantly influenced by year and season of birth while genetic group and parity of dam had no significant effect. Overall mean NSC required was 1.59 ± 0.1 average NSC was 1.54 ± 0.3 *and* 1.62 ± 0.03 for pure Fogera (n=1694) and F_1 crosses (n= 464), respectively. Age at first service (AFS) varied significantly with respect to genetic group and year of birth while season of birth and parity of dam didn't show any influence. Mean AFS of Fogera cow and F_1 crossbred was (40.0 ± 0.3) months. AFS averaged 44.8 ± 0.4 *and* 35.7 ± 0.4 for Fogera (n=313) and F_1 crossbred heifers (n=283), respectively. Days open (DO), gestation length (GL) and calving interval (CI) were significantly affected by year and season of birth and partity of dam. Mean DO, GL and CI were 280.5, 281.3 and 560.6 days, respectively, for Fogera herd. Sex of calf significantly affected GL. Reproductive performance traits such as NSC, AFS, DO and CI didn't show consistent improvement as the year passed by. NSC was low in the early years and then increased. AFS was high in the 1980's and declined in the late 1990's AFC was high in the 1980's. Longevity apparent productive Herd life (APHL), effective productive herd life (EPHL), actual unproductive herd life (AUGL) and total unproductive herd life (TUHL) were all significantly affected by year of birth parity of dam only showed significant influence on APHL and TUHL Mean longevity, APHL,AUHL and TUHL was 115.6 ±1.6, 69.9 ±0.9, 16.6 ±0.8 and 70.3 ±2.2 months, respectively. Longevity of Fogera cows as a whole was high. But the EPHL (38.9%) was much lower than the TUHL (61.1%) over the study period. Number of calving opportunities (NCO), number of calves born (NCB), number of calves weaned (NCW), number of female calves produced (NFCP) and number of kg calf weaned (NKg CW) per cow were significantly affected by year of birth. Parity of dam showed significant influence only on NCW. Average NCO, NCB, NCW, NFCP and N Kg CW per cow was 4.4±0.1, 3.3±0.1, 3.2±0.1, 1.6±0.1 and 312.4±11.9 kg respectively. Calf productivity of the Foger a breed/type seems to be very low. It was high in the early and then decreased in the later years. Reproductive rate was found to be very low.

70. Milk Production and Lactation Persistency of Crossbred (Friesian X Arsi) Cattle at Agarfa Multi-Purpose Training Center Bale, Ethiopia

Keberu Belayneh and B.P.Hegde
Year: 2001

Abstract: Milk production data were collected from Agarfa Multi-purpose Training center dairy farm for the years 1982 to 1999. The production traits and persistency measurement were analyzed to know the genetic and environmental component of variance. The trains that were analyzed and average values were lactation length $330.7 \pm 2.0\ days$, lactation yield $(2068.0 \pm 19.5kg)$, annual milk yield $(1581.0 \pm 15.3kg)$, 300 days milk yield $(2037.9 \pm 15.4\ kg)$,peak yield $(11.2 \pm 0.1\ kg)$,days to reach peak yield (32.8 ± 0.5), and persistency measurements P2: P1 $(77.6 \pm 0.32\%)$. The fixed effects which were supposed to affect these traits were level of exotic inheritance, parity (lactation number) year and season of calving. The effect of level of exotic inheritance was significant for all the traits studied except for lactation length and peak yield. 50% exotic inheritance level was the least performing animals in all traits except for peak yield compared to other groups. Difference between parities were highly significant ($P < 0.01$) for all traits under the study. The least squares means showed that highest lactation yield $(2215.3 \pm 47.0kg)$,annual milk yield $(1688.7 \pm 36.5\ kg)$, and 300 days milk yield $(2206.2 \pm 37.6\ kg)$,were recorded in cows in the third partity, whereas high peak yield were noticed in third and fourth parity. The first calvers had higher persistency, longer lactation length and longer period (days) to reach peak yield year of calving had significant effect in all traits ($P < 0.01$). The overall mean lactation yield was 2068.6 ± 19.5 kg with variation over the year from $1506.2 \pm 2353.1 \pm 78.7$ kg showing that the influence of environmental factors and management were important. The effect of season was highly significant ($P < 0.01$) for persistency measurement P2: P1 and P3: P1 and days to reach peak yield. There was no significant effect of season of calving on lactation length, lactation yield annual milk yield, 300 days milk yield and peak yield. The 300 days yield was significantly affected by peak and correlation of peak yield with 300 days milk yield was 0.817. The coefficient of determination (R^2) revealed that the predication equation (Y =407 +142 X) explain 66% variation on 300 days milk yield. The average daily milk yield calculated as fraction (0.63, 0.6, and 0.55) of peak yield $(\leq 8.5, 8.6 - 14.9\ and\ \geq 15\ kg)$were found to be fairly accurate and more practical to estimate 300 days yield.

71. Evaluation of Panicum Coloratum Productivity and Nutritive Value under Varying Stage of Harvest, Low Levels of N-Fertilization and in Association with Stylosthes Hamata at Different Seed Rate Proportions during Establishment Year

Tegegn Gudeta, Robert Baars and Berhan Tamir
Year: 2001

Abstract: Two separate experiments were conducted to evaluate the performance of panicum coloratum (PC) during the main rainy season of 2000/2001 at Alemaya University. East Hararghe. In the first experiment, the yield and quality of PC as influenced by varying stages of harvesting (6,8,10 and 2 weeks) and levels of N-fertilizer (0,50,75 and 100 kg ha^{-1}) were assessed. In addition, the effect of harvesting twice at interval of six weeks age and harvesting once at interval of twelve weeks age and rate of N-fertilizer (0, 50, 75 and 100 kg ha^{-1}) on yield of PC was also investigated. In the second experiment, the performance of PC and Stylosanths hamata cv Verano(SH) in pure stands planted at optimal seed rate of 10 kg and 14 kg ha^{-1} for PC and SH, respectively, and in mixture at different relative seed rate proportions of 75 PC + 25 SH, 50 PC + SH and 25 PC + 75 SH was studied. Morphological and herbage yield characters were significantly influenced by stage of harvesting and level of N-fertilizer as well as their interaction. The dry matter yield was significantly increased with increasing stage of harvesting from 6 to 12 weeks at all levels of N-fertilizer as well as their interaction on quality parameters was significant, except, for dry matter, ash and organic matter for levels of N-fertilizer and interaction effect. Appreciable variation was observed for digestible dry matter yield and crude protein yield between levels of N-application at all stage of harvest. The highest yield for digestible dry matter 23.6 tons ha^{-1} was obtained from the plot subjected to 100 kg. ha^{-1} N-fertilizer and harvested at 12 weeks of age. The fibre content was significantly high beyond 6 weeks of age at all levels of N-fertilizer. Calcium content was higher than phosphorus content in all samples and mean values of calcium to phosphorus ration varied from 1.60 to 3.09. Highly positive linear correlations were observed between dry matter yield and morphological parameters. Leaf to stem ration was highly negatively related to dry matter yield. Highly significantly or relations between in vitro dry matter digestibility and morphological parameters as well as chemical composition parameters were observed, exerted, for silica content.

72. Study on Practices and Problems of Camel Production in Afder Zone of Somali National Regional State, Ethiopia

Ahmed Mohamed
Year: 2001

Abstract: Camel management practices, productivity and camel production constraints were studied Afder zone of Ethiopia. The systematic random sampling technique was used. The herds were classified in to small (10 to 20 heads), medium (21-50 heads) and large (more than 50 heads). For each woreda five herds of each herd size were randomly sampled in five selected woreda of Afder zone. The study revealed that there are two types of dromedary camels namely Hoor, considered as milk type and Gel- lab considered as multipurpose camels. Among the studied household, women participated in camel husbandry practices, particularly in selling of milk and looking after the packing male camels. There was general trend of large families possessing large herd. To increase camel herd size bartering of sheep and goats was practiced. In all age groups, number of female camels was higher than that of males indicating the importance milk production in arid area. During grazing, particularly in dry season, camels were found to cover large area (8, 10. 9 km for small, medium and large herd respectively). The EL- Kari herds covered least distance compare to other woredas ($P \leq 0.05$). During the drought, they crossed national and international boundaries. All the camels irrespective of herd size and woreda ($P \leq 0.05$) grazed for 5.3 to 5.7 hours before noon. The overall mean intervals between grazing I was two hours. Salt sources of the study area were salt water, salty plants and salt itself. Salt feeding is commonly practiced during early dry season or late wet season. The mean water intake of adult camel was found to be 126-140 liters at first pause and 49-55 liters at the second pause. The mean watering intervals was 6.7-7.2 days during the dry season and watering interval of wet season varied from one to two months. El- kari herd owners offered water at longer interval ($P \leq 0.05$) than rest of woredas and these camels took more water during second pause ($P \leq 0.05$). It was noticed that longer the watering interval more the water intake in first pause ($P \leq 0.05$). The study confirmed that adult camels can exist without water for one to two months. During drought camels were the last species to be taken to market. According to herd owners, first breeding age was 3.9 to 4.5 year, estrus duration was 6.6 to 7.5 days ,gestation length was 12.7 to 12.8 months, age of first calving was 5 to 5.4 years, postpartum anoestrus period was 7 to 9 days, calving interval was 23 to 24 months regardless the herd size and woreda. The overall average of some parameters of traditionally managed bulls were reported to be 5.5 years for first service seen years for sexual maturity 10 service per day and the night , and single bull successfully serve 60 to 67 she camels in a breeding season. Herders were aware of the importance of colostum feeding, but at the same time restricted the quantity of colostrum to calves in all the herds and woreda and consequently high loss of calves was observed. High calf mortality was encountered during the first three months in general and most critical period was said to be first seven days of birth. Camels were identified with clan and herders brands on the neck and different clans have different brands and symbols. The milk yield per day at early lactation for the Hoor sub- type was 2.9 liters and for Gel- lab was 1.8 liters, while during the peak months of lactation yields were 5.5 liters for Hoor and 3.4 liters for Gel- lab. Dollo-Bay herders milked Hoor type more number of times compared to other woredas ($P \leq 0.05$) and small herders extracted more milk ($P \leq 0.05$) compared to other two herds sizes. The shelf life of milk was 3 to 5 days and excess milk was soured mostly in wet season. Camels were only means of transport in the study area and carry a load of around 180 kg. Aged and culled camels were normally slaughtered and on religious/ cultural occasion's young camel of 3-5 years were slaughtered. The Olobe- butter fried meat was common processed meat. The Dareerin was sun dried meat rope usually prepared in anticipation the death camels due to drought and diseases. The camel production constraints as identified by pastoralist were diseases, feed shortage, and labor shortage camel marketing problems, predators and conflicts. The study confirmed that disease is the top problem and causes serious economic loss.

73. An Assessment of Feed Resources, Their Management and Impact on Livestock Productivity in the Ginchi Watershed Area

Getachew Eshete, Alemu Yami and Robert Baars
Year: 2001

Abstract: The study was conducted in the Ginchi Watershed area found in Dendi Wereda of West shoa Zone of Oromiya Region from December, 2000 to October, 2001. The area is located 80 km west of Addis Ababa at altitudes ranging from 2140-2800 meter above sea level (masl). With mean annual rainfall of 1140 mm and average daily temperature of 16.3 ^{0}C. The soils are pellic vitriol, vertic ca mbisol and Nitosol. The objectives of the study were; 1. To assess the condition, quantity and quality of available feed resources by season for the watershed: and assess the seasonal and annual animal productivity as influenced by feed supply. 2. To assess and characterize the existing feed management system of the area and recommend a better feed management and utilization strategies. The study comprised a sample survey of 78 households. PRA practices for farmers and women group, assessment of pasture condition and yield of 37 grassland sample sites. Assessment of fodder yield of shrubs trees in 22 households and heart girth measurement and body condition scoring of 81 oxen. The sample farmers and grassland sites were selected randomly stratified over the three land types based on altitudinal ranges (2140-2200 masl= land type A, > 2200-2400 masl = land type and > 2400-2800 masl = land type C). For assessments of shrub. Tree fodder yields and oxen heart-girth measurement all sample farmers who had fodder shrub/tree and oxen were included. The PRA participants were key informants suggested by dweller enumerators. The farming system of the area was strictly mixed crop-livestock production system where 85.9% of the household undertake crop and livestock production simultaneously. The average land holding of 4.2 TLU/HH. The major problems hampering expansion of small- holder livestock production in the area were feed shortage, livestock diseases, labour problem, capital problem and lack of adequate livestock extension services. Natural pastures, crop residues, crop- aftermath and tree/shrub fodders were the major feed resources in the area. The quantity of the feed was very much inadequate in the dry season for the existing livestock, while there was a surplus in the wet season. The balance of the dry season feed resource showed a deficit of 42,26,36 and 33% in the DM, energy, protein and phosphorus maintenance requirements of the animals, respectively. In contrast there was a surplus production of 13, 20,51 and 97% DM, energy, protein and calcium, respectively over the requirements for moderate production in the wet season. On the average the condition of the grazing lands and hay lands were fair (27 points) and good (33.3 points) respectively. The condition of hay lands was significantly higher ($P<0.05$) than the grazing lands. The quality of the pasture was very good in terms of content of crude protein (9-15%) and IVDMD (49.6-75.2%). The crop residues had low content of crude protein (2.8-5.7%) and IVDMD (38.7-52.2% values. For the aftermaths the CP and IVDMD values were only 1.87-4.35% and 42-50% respectively. Maize Stover and cob had higher IVDMD values (66-68%) and moderate CP content (4.4-7.8%). Cows showed a lower average milk production (1.76 litre/day), longer age at first calving (50.6 months) and calving interval (22.2 months). The reason could be mainly due to feed shortages as there was dry season and annual feed deficit in the watershed. The negative correlation ($r=0.65$) between average household feed availability and age at first calving in the land types may indicate this fact. Sheep and goats showed a better age at first lambing/kidding interval. The blow holding of these animals compared to the available browse perhaps has helped them to satisfy their nutrient requirement and reproduce. The average body weight and body condition score (BCS) of oxen in the watershed were 272. kg and 5.6 points (M+) at the end of March, 264.2 kg and 5.3 points (M) at the end of May and 268 kg and 5.2 points (M) at the end of September, 2001. End of March and end of May measurement were supposed to show dry season performance while end of September measurements were supposed to show wet season performance. There was a decline and rise in average weight and BCS between end of March and end of September end of May measurement being the lowest. There was a division of labor among members of the family in livestock husbandry related activities. In 76% of cases herding was the duty of children while barn cleaning, water collection and milking were tasks of females in 94.7, 89 and 96% of cases respectively Males usually participate in feeding of animals at home. There was scarcity of labor for herding in 38.7% of cases and the problem was most sever in the crop growing periods. The possibility of transferring feeds from surplus to deficit season, the availability of adequate moisture to from forage and food crops sequentially on the same land, the comparative advantage of using animal drawn broad bed maker to improve drainage on the vertical, the opportunity of introducing improved forage plants owing to the above premises and the possibility of improving the use of crop residues are the basis for improvement

74. Re- Vegetation of Degraded Rangelands in Middle Awash of Afar Region with Cenchrus Ciliaris and Chloris Gayana

Lemma Zemedu, Robert Baars and T. Sharma
Year: 2001

Abstract: The study area was located in the southern part of Afar Region in Middle Awash rangelands about 280 km East of Addis Ababa It receives an annual rainfall amount of about 550- mm and mean annual temperature of 28 ^{0}C; and is situated on altitude of 740 to 960 meter above sea level. Three experimental sites were selected based on the degree of range degradation as representative of barren land (site 1), moderate (site 2) and relatively good (site 3) condition. Soil samples from the study sites were collected and analyzed for CEC, Ece, pH, total N percentage, organic matter percentage and available phosphorus. To achieve the objective for re-establishment of degraded rangelands, three treatment factors with one control were applied. The treatments were: supplementary irrigation (yes or no), seeding rate (5 or 10 kg/ha) and spesies (Cenchrus ciliaris or Chloris gayana). The control plots did not receive any of the treatments. A Randomized complete block design with three replications was used to apply the treatments. Parameters were collected before, during and after harvest. Harvesting was done after five - weeks from germination. The collected data were statistically analyzed according to Mead, et al (1993) by hand for analysis including control and by M-statc for treatments compared excluding control plot. Soil samples did not show significant difference within the site, but differed across location, except for available phosphorus. All parameters had medium to high values according to standard values set for the parameters. The study sites soil had different soil texture among sites. Sites 2 and 3 had clay soil while site- 1 had sandy loam and loamy texture. During the experimental season, particularly one- month before sowing, a high amount of rainfall affected number and plant height parameters were taken for over sown grasses. At site 3 from the control plot maximum dry matter yield (DMY) (1625 kg/ha; 80.5%), was obtained per hectare. On the across location combined analysis, site 3 also gave a significantly higher (1274 kg/ha) natural grass dry matter yield compared to site 1 that gave 135 kg/ha only. The remaining range component composition was inversely related with natural grass; whereby site1 possessed 59 % of whole dry matter while only about 24% of site 3 was covered by the remaining range components. At site 1 the whole treatments responded as follows. Supplementary irrigation gave a better Height (61 cm). Botanical composition of over sown grasses (44.5%), Dry matter yield (DMY) (699 kg/ha), Vigor (3.2 out of 5) and Lower the remaining range components' composition (46%) compared to non-irrigated plots. Grass species responded only for leaf to stem ratio (LSR) and crude protein (CP %), Where Chloris gayana gave a higher LSR (3.48), and CP% (16.8%) than Cenchrus ciliaris that gave 1.11 and 12.35%, respectively. Seeding rate also responded to seedling count, harvestable stand density (HSD), DMY of over sown grasses and vigor. Higher seeding rate (10 kg/ha) gave better: Seedling counts (340, 000/ha), HSD (3,680, 000 stand/ hectare), DMY of over sown grasses (689 kg/ha) and A good establishment performance or vigor (3.2 out of 5).About 25 plant species were collected and identified from the three experimental sites' plots. Among them Eragrostis cilanensis and Tribulus zeyhersond were classified as common grass and the remaining range components, respectively, at site-1, while Xanthium strumarium dominated the field at site 2. Thus, to re-vegetate rangelands degraded to different degree of severity, different approaches are required, based on the soil type, the remaining range components and natural grass condition before sowing and rainfall amount, before and during establishment period of over sown grasses. Based on the results obtained from this one season study, crude recommendations were drawn for each site. For rangelands in Middle Awash that are degraded like site-3-type, the remedy forwarded is to regenerate natural grass it– self simply by stock exclusion. For site 2-type rangelands, the remaining range components control, early sowing at the onset of the main rainy season, and over sowing. But, at barren land (site-1-type) condition of Middle Awash rangelands, used treatments gave a good establishment performance, which would be recommended for re- vegetation; and further research to determine exact seeding rates, irrigation water amount and frequency, and best grass species from larger number of germplasm.

75. Effect of Stage of Harvesting and Fertilizer Application on Dry Matter Yield and Quality of Natural Grass Land in the Highlands of Northern Shoa, Oromia Region

Adane Kitabe and Berhan Tamir
Year: 2003

Abstract: The major emphasis of the study was to assess forage yield and nutritional value of natural grasslands at different stages of harvesting and levels of fertilizer application, their relationship as well as evaluating the cost and gross return of fertilizer applications. The study consisted of a field experiment on the natural pastureland and laboratory analysis of forage samples collected from the natural pasture land under varying stages of harvest (30, 60, 90 and 120 days) and levels of fertilizer application (0, 25, 50, 75, 100 and 125 kg/ha). The effect of different frequencies of harvesting ; twice, three and four times, at an interval of 30 days on total yield was also compared with harvesting once at an interval of 60, 90, and 120 days, respectively. The influence of stages of harvesting and levels of fertilizer application were significant ($P < 0.01$) on total DM yield of the pasture. But, the interaction effect was non-significant. The highest DM yield (9.47 ton/ha) was obtained at 90- days of harvesting and at a fertilizer application of 125 kg/ha while the lowest was (2.2 ton/ha) from unfertilized plots at 30-days of harvesting. In evaluation of cutting intervals and levels of fertilizer application on pasture yield, pronounced effect of interaction were obtained for the total yield. The highest total DM yield (33.4 ton/ha) was observed from plots harvested four times with an interval of 30 days and fertilized at the level 125 kg/ha fertilizer whereas the lowest total DM yield (13 ton/ha) was obtained from unfertilized plots harvested four times. An increasing tendency of DM yield with increasing levels of fertilizer application and frequency of cutting was observed. The effect of stage of harvesting on DM yield of the grass and legume components was significant, ($P < 0.05$) and ($P < 0.001$), respectively at all fertilizer levels. The relative proportion of legumes in the grassland attained its climax at 60- days harvesting at all levels of fertilizer application. The proportion of legumes varied from the highest mean of 24.1% to the lowest of 4.5% at 60 and 120-days of harvesting, respectively while that of grasses ranged from 94.5% to 71.3% at 30 and 60- days of harvesting, respectively. The relative proportion percentage of grasses increased with increasing levels of fertilizer and stages of harvesting up to 90- days. A significant effect of stage of harvesting ($P < 0.001$) on crude protein, NDF, ADF, hemicelluloses, cellulose, phosphorous and in vitro dry matter digestibility were obtained at all levels of fertilizer application. At 30-days of harvesting, the highest values of 11.8%, 0.36% and 79.9% were obtained for crude protein, phosphorous, and in vitro dry matter digestibility, respectively. However, the lowest values of 45.7%, 21.4%, 23.5% and 14.64% were obtained for NDF, ADF, hemicelluloses and cellulose, respectively at the same stage of harvesting. The interaction effect was found to be significant for all quality parameters except phosphorous. However, the effect of fertilizer application on NDF, ADF, hemicelluloses and cellulose was not- significant. The CP content was significant ($P < 0.001$) lower (4.8%) at 120-days of harvesting compared with other stages of harvesting. At 75, 100 and 125 kg/ha levels of fertilizer, the mean crude protein content obtained was above the reported critical level (7%). The IVDMD at 90 and 120-day harvesting was 62.1% and 48.4%, respectively. The values at 120-days harvesting were below the reported threshold value that ranged between 55 and 70% for medium quality forages from natural pasture. Positive linear correlation value of 0.63 was obtained between dry matter yield and stages of harvesting and similarity the correlation coefficient was 0.48 with fertilizer application. The CP, P, IVDMD and total ash content gave negative correlation coefficient -0.81. -0.55, -0.87 and -0.16 with stages of harvesting and positive correlation coefficient of 0.51, 0.78, 0.42 and 0.12 fertilizer rate respectively. However, other quality parameters NDF, ADF, hemiclelluloes, and cellulose gave positive correlation value of 0.980.95, 0.37 and 0.92 with stages of harvesting. The correlation between fertilizer and the mentioned quality parameters was non- significant. Significantly ($P < 0.01$) higher correlation coefficient value of $r=0.88$ between DM yield and the proportion of grasses illustrated the significance of grasses in contributing to the dry matter yield of grasslands. The partial budget analysis of fertilizer input (cost) and output (return) on forage production indicated an increased income advantage of fertilizing pasturelands up to the level of 125 kg/ha. The results obtained in the present study revealed that fertilizer application increased the yield from well- managed grasslands by 88.14%. Pasture management strategies that are based on use of optimum stage of harvesting and levels of fertilizer application can play important roles in enriching on farm feed availability in smell holder communities.

76. Evaluation of Local Sheep under Traditional Management around Rural Areas of Dire Dawa

Aden Tekel and B.P. Hegde
Year: 2003

Abstract: To characterize production system and evaluate reproductive and productive performances of local sheep under traditional management, data obtained over a year were analyzed. Samples of 96 farmers and 49 flocks' total 405 animals were randomly selected from six peasant associations. Flocks were individually identified and monitored every 10 days on a regular basis. Ram s continuously run with flocks throughout the year without control of mating. Peak lambing activities were observed around August to October. Mean lambing interval was 336.93 ± 1.12days. Effect of farming system, parity, lambing period and post-partum dam weight were significant ($P < 0.05$) source of variation for lambing interval. Average little size at birth was 1.01 ± 0.01lambs per lambing; all the effects did not significantly influenced ($P < 0.05$) litter size. Average annual reproduction rate was 1.11 ± 0.01 lambs per ewe per year; effect of farming system, parity and lambing period had significant influence ($P < 0.05$) on annual reproduction rate. Lamb weight at birth averaged $2.33 \pm 0.01\ kg$, and significantly influenced ($P < 0.05$) by farming system, parity, lambing period dam weight and lamb sex. Pre-weaning lamb weight at one, two, three, four and five months of ages were $3.73 \pm 0.03, 5.75 \pm 0.04, 7.89 \pm 0.06, 9.35 \pm 0.10\ and\ 11.35 \pm 0.10\ kg$ respectively. The effects of farming system, parity, lambing period, dam post-partum weight, and lamb sex had significant influence ($P < 0.05$) on per-weaning weight. Post-weaning lamb weights at age 6, 7,8,9,10,11 and 12 months were average 13.22±0.14, 14.75±0.16, 16.53±0.20, 17.97±0.23, 19.48±0.24, 20.91±0.23, and 22.20±0.27 respectively; and significantly influenced ($P < 0.05$) by the effects of farming system, lambing period and lamb sex. However, the effect of parity and post-partum dam weight did not significantly influence ($P < 0.05$) all post-weaning lamb weights. Average post-partum dam weight was $22.32 \pm 0.09\ kg$,and the effects of farming system, parity, seasons of pre-pertum and lambing had significant influence ($P < 0.05$) on post-partum dam weight. Annual mortality rate for animals of all ages of both sexes pre-weaning lambs up to five month of age were 20.25% and 18.89% respectively. Lamb survival rates at age one, two, three and four months were $82.03 \pm 0.42, 81.90 \pm 0.39, 81.68 \pm 0.41\ and\ 81.93 \pm 0.37\%$ respectively. Effects of farming system, flock, size dam parity, and lambing period had highly significant influence ($P < 0.05$)on pre-weaning lamb survival up to four months of age; however, sex effect is not significantly influence ($P < 0.05$) lamb survival at any pre-weaning ages. Annual offtake rate was 30.37% of which 72.4% and 27.6% due to sales and slaughters respectively. Data on management, reproductive and weight performances obtained as first step information. Effect of season has the indications of the level of nutritional and environmental influences that can be improved.

77. Investigation on Artificial (AI) Based Technologies to Improve Fertility and Hatchability in Rhode Island Red (RIR) Breeds of Chickens

Getnet Zeleke, R.P. Moudgal and Asefa Asmare
Year: 2003

Abstract: A total of four experiments were conducted to determine the causative factors of poor fertility, hatchability, and their rectification in RIR breeds of chickens. A simple technique to estimate the number of spermatozoa under field condition was also developed. In experiment I, RIR females were grouped into three. Each group (n=30 each) were kept with 3 cocks having good quality semen, poor quality and randomly picked up cocks, respectively for natural mating. Fertility was found to be significantly ($P < 0.05$) higher in eggs from hens mated to cocks with good quality semen than cocks with poor quality semen (88.54%), 70.39%, respectively). In experiment II, three groups of RIR females (n=30 each) were utilized for natural mating (NM), MN+AI, and AI alone to investigate fertility and hatchability. Higher fertility and hatchability were recorded in NM+AI (93.33% and 80.18%) groups of chickens as compared to NM (81.18% and 72.27%) of AI (83.86 and 78.85%) groups, respectively. There was no significant difference between AI and NM groups for both fertility and hatchability. Experiment II consisted of groups I, II, III, and IV, which were randomly allotted as RIR (♀) X RIR(♂), RIR (♀) X WL(♂), WL (♀) X RIR(♂),and WL (♀) X WL(♂), respectively. Each group was inseminated with equal number of spermatozoa (125×10^6) on weekly basis. Lower fertility level was observed in pure RIR than pure WL breed (82.97% and 96.11%, respectively. Crossing RIR with WL did not improve the fertility of RIR chickens. Eggs of pure RIR had lower hatchability as compared to pure WL (76.67% and 97.12%, respectively). Crossing of WL (♀) with RIR (♂) showed numerical improvement in hatchability than pure WL breeds (97.72% and 97.12%, respectively), while crossing of RIR (♀) with WL (♂) resulted in significant improvement (86.67%) as compared to pure RIR (76.67%) but lower than pure WL. The egg weight loss in pure RIR was higher (20.2%) during 18 days of incubation followed by RIR (♀) X WL(♂) and WL (♀) X RIR(♂) breed (17.13% and 10.78%, respectively). The least egg weight loss was registered in pure WL breeds (9.56%). Higher number of RIR (♀) X WL(♂) dead-in shell embryos demonstrated yolk outside abdominal cavities followed by WL (♀) X RIR(♂) and pure RIR (70.07%, 57.38%, and 56.45%, respectively. The least number of dead-in shell embryos of pure WL chickens had yolk outside their abdominal cavities (12.65%). Spermatozoa of RIR cock in RIR oviduct poorly withstood the effect of ageing. Further, semen flow index method to estimate the number of spermatozoa in semen was developed. The correlation between the actual spermatozoa count by haemocytometer and the number estimated by the developed semen flow index method of the regression equation was positively correlated ($r=0.949$) and highly significant ($P < 0.01$). It is concluded that selection of cocks based on semen quality and supplementation of AI yield more viable chicks, and the poor fertility in RIR chickens is due to both of the sex but for lower hatchability female is responsible, and further more water loss during incubation, failure to cover yolk sac in abdominal cavity and faster aging in female tract are the causative factors for poor hatchability, and a simple method to count spermatozoa under field condition is also developed.

78. Studies on Camel (*Camellus dromedarius*) Mastitis in the Errer Valley, Eastern Ethiopia

Mitiku Eshetu, Asefa Asmare and H.P.Hedge
Year: 2003

Abstract: Four hundred sixty udder quarters of 115 traditionally managed lactating camels (Camellus dromedarius) belonging to 36 herds were examined to assess the prevalence of mastitis. Out of the 460 udder quarters, 11 (2.4%) quarters were blocked, hence milk samples of 449 quarters were available for California Masttitis Test (CMT) and milk samples from there quarters were not collected because of refusal by camels. Therefore, 446- quarters milk samples were available for Somatic Cell Count (SCC). For bacteriological analysis, 34 samples from camels having quarter with three and above CMT results were utilized. The effect of mastitis on milk quality was also assessed. Basal somatic cell levels was also established by collecting milk samples from clinically healthy first parity and late parity camels that had no mastitis history. The prevalence rate of camel mastitis was 29.57 percent. Among the mastitic camels 61.76, 29.4 and 8.82 percent had one, two and three affected quarters, respectively, with mastitis of different stages. Bacteriological examination showed that Staphylococcus auresu, Pasteurella haemolytica and Coagulase Negative Staphylococcus accounts for 76.5 percent of the total pathologic bacteria identified. Others pathogenic bacteria like enterobacter, pasteurella multocida, Bacillus species and Escherichia coli were also detected in 8.8,5.9,2.9 and 5.9 percent of milk samples, respectively. Quarters affected with Staphylococcus aureus, pasteurella ahemolytica and Enterobacter showed high somatic cell count (5,200,000 ±2,000,000, 15, 000, 00 ±3,000,000, and 4,100,000±2, 050, 00 cell/ml of milk, respectively). Parity and number of lactating camels in a herd showed significant effect ($P < 0.05$, $P < 0.01$, respectively) on the prevalence of mastitis. But lactation stage had no significant effect ($P > 0.05$) on the prevalence of mastitis. The study on the effect of mastitis on milk quality revealed that clinical mastitis significantly ($P < 0.01$) increased pH, and significantly decreased fat ($P < 0.05$) and total solid ($P < 0.01$), percentage of camel milk respectively. Fat percentage decreased by 7.05 percent and the total solids by 6.8 percent. Basal somatic cell level for normal quarter milk was found to be in the range of 45,500-350,000 cells /ml of milk. The somatic cell count of healthy quarters from late parity lactating camels that had no mastitis history was significantly higher ($P < 0.05$) than somatic cell count of the early parity camels (98,300±9,990 and 69,530±12,100 cells/ml of milk, respectively. Further, basal somatic cell count was influenced by lactating stage. Late lactation stage (10 and above months) showed high somatic cell count than early (0-4 month) and mid (5-9 month) lactation stage (95,750±7,215, 75,375±18,846, and 78,607±16,809 cell/ml of milk, respectively.

79. The Effect of Stubble Height, Raw Spacing and Subsequent Harvest on Dry Matter Yield, Nutrient Composition and In-Vitro Organic Matter Digestibility of Alfalfa (*Medicaco sativa* L.) in Tehulederie District, South Wollo

Ali Seid, Berhan Tamir and Solomon Melaku
Year: 2004

Abstract: Alfalfa (Medicaco Sativa L.)cv. Hairy Peruvian was sown on clay Soil at hitecha, Tehulederie district, South Wollo to assess the effect of row spacing, stubble height and subsequent harvests on establishment, and yield and nutritive value of alfalfa. To this effect, dry matter yield (DMY), leaf to steam ratio (LSR), Leaf dry matter yield (LDMY), Stem dry matter yield (SDMY), Harvestable stand density (HSD), Vigour , plant stand height (PSH) , chemical composition , and invitro dry organic matter digestibility (IVOMD) were determined. A factorial randomized complete block design was used with treatments arranged in split plots each replicated three times. Alfalfa sown at 15 and 25 cm row spacing was harvested at stubble heights of 5, 10, 15 and 20 cm in four successive harvests at 10% bloom after an average regrowth of 46 days. The chemical composition and IVOMD were determined by Near Infrared Reflectance Spectroscopy (NIRS). Row spacing had significant effect ($P < 0.05$) on neutral detergent fiber (NDF), hemicelluloses and HSD. Significantly higher, ($P < 0.05$) NDF (22.35%) was obtained from a 25 cm than NDF obtained from 15 cm row spacing (21.29%). Stubble height had a significant effect on DMY , LSR, LDMY , SDMY , dry matter (DM) ,crude protein (CP) , acid detergent fiber (ADF), and NDF ($P<0.01$) , and vigour , HSD and IVOMD ($P < 0.05$) . Its effect on DMY was a decrease from 1.99 t ha $^{-1}$ to 0.45 t ha^{-1} which was a reduction of 8.17 % as the stubble height increased from 5 to 20 cm. There was a decrease in NDF from 24 to 19.6 % , ADF from 20.7 to 16.5 % , vigour from 3.6 to 2.3 , HSD from 649 to 222 plants m^{-2} , LDMY from 1.13 to 0.30 t ha^{-1} ,SDMY from 0.86 to 0.15 t ha $^{-1}$ as the stubble height increased from 5 to 20 cm . Contrary to these, increase in stubble height at the same magnitude raised CP content from 16.9 to 19.2 %, IVODM from 63.4 to 66.5 % and LSR from 1.4 to 2.1. Interaction between row spacing and stubble height affected DM, ADF, DMY, LSR, LDMY, NDF and SDMY ($P < 0.01$), CP, HSD and vigour ($P < 0.05$). Progress from the first to the fourth harvesting significantly affected HSD , vigour ,PSH, LSR, SDMY, DM, CP, ADF, ADL, hemicelluloses and IVODM ($P<0.01$) in different directions . Interaction between row spacing and subsequent harvests affected DM, CP, IVOMD, vigour , HSD, LSR , SDMY and PSH ($P < 0.01$), and NDF , ADF and ADL ($P < 0.05$). The interaction between stubble height and subsequent harvests had a significant effect on DM, CP, NDF , ADF, IVOMD, DMY, vigour , HSD, LSR , PSH, LDMY and SDMY ($P < 0.01$), and ADL and hemicelluloses ($P < 0.05$). The interaction between row spacing, stubble height and subsequent harvests had an effect on DM, CP, NDF, ADF, IVOMD, DMY, vigour , HSD, LSR, PSH, LDMY and SDMY($P < 0.05$). Highest forage yield, regrowth following harvesting with good stand persistent, less insect damage and more number of shoots were associated with the decrease in the height of cutting in all successive harvests. However, the shortest stubble height (5 cm) reduced DP, IVOMD and LSR. Thus, Harvesting at 10 cm stubble height comprises between yield and quality parameters as DMY from 10 cm was as high as the DMY from 5 cm and the CP and IVOMD at 10 cm were also high as values obtained from 15 and 20 cm stubble heights.

80. Development of Two Stages Cock's Semen Extenders for Low and Room Temperature Storage Levels

Negassi Ameha, R.P.Moudgal and Assefa Asmare
Year: 2004

Abstract: Semen diluter is very important for the exploitation of AI to the maximum and it contributes markedly to the cost incurred in this process. Two- stage diluter from semen storage at both of room and freezing temperatures was considered in view of improving the efficacy with minimum complexity by decreasing motility and metabolism during storage at phase-one and recovery of motility prior to insemination by phase-two diluter. In the laboratory of Alemaya University , K_2HP0_4 and KH_2P0_4 were used at step one for the selection of appropriate buffer PH to reduce the motility for longer storage and recovery of spermatozoa with greater or equal to 60% motility and sustained less than 20 % dead plus abnormal spermatozoa for room or freezing temperature levels by maintaining osmolarity around 300 mOsm. For further increase of the storage time in step-two without affecting the osmolarity and maintain the laid down criteria of motility and percent dead plus abnormal, sodium glutamate was substituted in three levels on best identified buffer combination at step- one . In step- three, glucose was added in three levels on the best –selected media at step-two for further improvement of storage time. Antibiotics (2 ml, out of 300 mg penicillin and 250 mg of streptomycin dissolved in 5 ml of distilled water) were added per liter of diluter. Following this, the best phosphate buffer for storage at room and freezing temperature was 6.5 –PH but the best recovery buffer for room temperature was 7.5-PH and for freezing temperature 7.0 –PH. The selected sodium glutamate level for storage purpose for both temperature levels was 25% substituting of the phosphate buffer with sodium glutamate level. Finally, addition of 0.6 % glucose at both of the temperature levels yielded the best results. Two-stage diluter developed for room temperature cock's semen storage confers promising results. But at freezing temperature, the results did not support statistically. It is concluded that this new approach of using two –in –one semen extender particularly for room temperature is expected to reform the semen processing technology.

81. Effects of Days of Harvesting on Yield, Chemical Composition and Invitro Orgnic Matter Digestibility of *Pennissetum purpureum* Sole or Intercropped with *Demodium intortum* or *Lablab purpureus*

Taye Baybale, N.K.Prassad and Solomon Melaku
Year: 2004

Abstract: The experiment to assess the effects of days of harvesting on yield and quality of Napier grass (PENNISSETUM PURPUREUM) intercropped with desmodium intertum as well as with lablab purpuleus was conducted at Pawe Agricultural research center located Northwestern part of Ethiopia which lies between $36^{0}20'$ and 11 ^{0}E longitude 12' latitude at an elevation of 1150 meter above sea level, from July to November 2003. The treatments consisted of three harvesting days (60, 90 and 120 days from planting) in main plots and five plant associations. (P.Purpureum sole., D.intortum Sole, L. Purpureus sole ., P.Purpureus with D. intortum and plot design and replicated thrice , days of harvesting , intercropping and their interaction effects had no significant ($P<0.05$) effect on harvestable stand. Days of harvesting had significant ($P < 0.01$) effect on LSD. Intercropping Nappier grass with L. Purpureus and Napier grass with D.intortum is significantly. ($P < 0.01$) out yielded over solely Napier grass. Though, both intercropping associations were statistically similar in DMY however, Napier grass association with L. Purpureus appeared to be a better option, since it has given 17.74 t/ha DMY (6.51% More DMY/ha) as compared to the yield of Napier grass + D. intortum association 16.661 t/ha Significant ($P < 0.01$) effects of days of harvesting , intercropping and their interaction was observed on dry matter yield (DMY) , crude protein percentage (CP%), crude protein yield , Neutral detergent fiber (NDF), acid detergent fiber (ADF), acid detergent lignin (ADL), , ash, hemicellulose content and IVOMD. There were significantly ($P < 0.01$), increasing effects on DMY, CPY, NDF, ADF, ADL and hemicelluloses contents and a significantly ($P < 0.01$) decreasing effect on CP%, ash content and IVOMD as the days of harvesting advanced. The CP content of all the treatments (including the factors and their interaction) was above the minimum level of 7.5 % required for optimum rumen function. Harvesting Napier grass lablab and Desmodium mixtures at 60 and 90 days could also satisfy the minimum CP contents of 15 % for lactation and growth. The highest of harvesting (71.92, 67.96 and 63.52 % IVOMD values at 60 , 90 and 120 days of harvesting were observed for the Napier grass + Lablab mixed forage, though, DMY and DOMY obtained were maximum at 120 days of harvesting however, harvesting at 90 days would be the best to compromise feed quality with optimum DMY . It further pointed out that cutting of the grass legumes association of the grass with lablab was superior to the grass with Desmodium.

82. Effect of Planting Patterns and Harvesting Days on Yield and Quality of Bana Grass [*Pennisetum purpureum* (L.) X *Pennisetum americanum* (L.)

Berihun Melakie, Solomon Melaku and N.K. Prassad
Year: 2005

Abstract: The experiment was conducted to determine the optimum planting patterns and harvesting days for assessing forage yield and nutritional values of bana grass (*Pennisetum purpureum* x *Pennisetum americanum*). Field experiment was conducted in 2003/2004 cropping season at Libo Kemkem woreda, Northwestern Ethiopia in a split plot design with three replications. The treatments were three harvesting days (60, 90 and 120) as main plot and four planting patterns (100 x 50 cm, 100 x 75 cm, 75 x 50 cm and 75 x 75 cm) as sub plot. Morphological, yield, chemical composition, digestibility and energy parameters were studied. Harvesting days significantly ($P < 0.01$) influenced plant height (Ph), number of leaves per plant (NLPP), number of leaves per tiller (NLPT), number of internodes per plant (NIPP), length of internodes per plant (LIPP), leaf length per plant (LLPP) and leaf to stem ratio (LSR). Similarly, it significantly influenced dry matter yield (DMY), digestible dry matter yield (DDMY), crude protein (CP), crude protein yield (CPY), dry matter (DM), total ash, calcium (Ca), Phosphorus (P), neutral detergent fiber (NDF), acid detergent fiber (ADF), acid detergent lignin (ADL), cellulose, hemicellulose, in vitro dry matter digestibility (IVDMD), and metabolizable energy (ME) ($P < 0.01$) and number of tillers per plant (NTPP) ($P < 0.05$). Planting patterns significantly influenced Ph, NTPP, DM, CP, CPY, Ca, ADF, ADL, IVDMD and ME ($P < 0.01$), LLPP, NIPP, LSR, DMY, DDMY, NDF, P and total ash ($P < 0.05$). Crude protein yield was the only parameter that was significantly ($P < 0.01$) affected by the interaction of both harvesting days and planting patterns. The highest Ph, NTPP, NLPP, NLPT, NIPP, LIPP, DM, DMY, CPY, NDF, ADF, ADL, cellulose, and DDMY were recorded at 120 days of harvesting. Contrarily, highest LLPP, LSR, CP, total ash, P, Ca, hemicellulose, IVDMD and ME were obtained at 60 days of harvesting. Similarly, the highest Ph, NIPP, DMY, NDF, ADF and ADL were recorded at narrow (75 x 50 cm) planting pattern compared to wider (100 x 75 cm) planting pattern, and higher NTPP, LLPP, LSR, CP, total ash, P, Ca, IVDMD and ME content of bana grass were recorded at 100 x 75 cm planting pattern. However, the highest DDMY was recorded at 75 x 50 cm and 100 x 50 cm. The correlation analysis showed that DMY, DM, and DDMY were positively correlated to each other and to Ph, NTPP, CPY, NDF, ADF, ADL and cellulose. However, these parameters were negatively correlated to LSR, CP, hemicellulose, total ash, Ca, P and IVDMD. The study indicated a reduction in nutritive value of the grass with increasing days of harvesting. Likewise, the quality reduced at narrow planting patterns mainly in early maturation due to intense competition between plants. Higher CPY was observed at 90 days compared to 60 days of harvesting. The lignin content of plants harvested at 90 days was low compared to 120 days. The NTPP, NLPT, DM, CPY, P, hemicellulose, IVDMD and ME content were similar in plants harvested at 90 and 120 days. Likewise, the ME yield at 90 and 120 days of harvesting could fulfill requirement of maintenance and production for equal numbers of animals. Thus, to get an optimum yield and nutritive value in bana grass, it is suggested to harvest the grass at 90 days (around 1.1 m plant height) of growth. Moreover, it is concluded that establishing bana grass at narrow (75 x 50 cm) planting pattern was advantageous for optimum yield, nutritive value and as an option to solve the scarcity of land since it promoted higher Ph, DMY and DDMY as compared to wider (100 x 75 cm) planting pattern, and comparable Ph, NTPP, NIPP, LSR, DDMY, CP, CPY, IVDMD and ME as compared to 100 x 50 cm and 75 x 75 cm planting patterns.

83. On-Farm Phenotypic Characterization of Cattle Genetic Resources and Their Production Systems in South and North Wollo Zones of Amhara Region, North Eastern Ethiopia

Dereje Tadesse, Workneh Ayalew and B.P. Hegde
Year: 2005

Abstract: This study was conducted in South and North Wollo Zones of Amhara Region, North Eastern Ethiopia, to identify and describe the cattle genetic resources and production systems. A total of seven sampling sites were selected (6 from the two zones and 1 from Afar Region near the border area of the zones) based on the information obtained on the distribution of cattle types. Linear measurements were taken from 1,321 animals as well as notes on their color and body conformation. Information was also obtained on the functions, preferences, management, adaptive traits, herd structures and production and reproductive attributes of the indigenous cattle, through formal interview, using structured questionnaire. Multivariate analysis methods including discriminant analysis, canonical discriminant analysis, stepwise discriminant analysis and nonparametric discriminant analysis were employed for classification of cattle groups into distinct breed type. General Linear Model (GLM) analysis was also employed to see variation between the sample cattle populations in quantitative variables. Information on productive and reproductive performances, preference and functions of animal and, herd structures were analyzed using simple descriptive statistics. Results obtained from general linear model analysis on continuous variables showed significant ($P < 0.0001$) differences between sites separately for female and male samples. There were also strong ($P < 0.0001$) associations between discrete variables and sites. Horn length and navel flap were the best discriminating variables from continuous and discrete variables, respectively. The Mahalanobis' distances between sites were highly significant ($P < 0.0001$). The maximum and minimum distances were observed respectively between Were-Ilu and Afar sites (46.96) and Gimba and Kutaber sites (0.49) for female population and between Were-Ilu and Kobo/Raya sites (25.97) and Tehuledere and Habru (2.19) for male population. Based on discriminant analysis, sample populations from all sites were classified into their respective sites with overall matching rate of 55.2 and 60.1 per cent for females and males, respectively. Sample populations from Kobo and Afar were highly distinct when compared to other populations. The cluster analysis led to identification of three cattle breed types. These are the Wollo Highland Zebu (cattle from Gimba, Were-Ilu and Kutaber sites), the Raya Sanga (Kobo site) and the Afar Sanga (Afar site). The fourth cluster is considered as intermediate type found in the adjacent areas of Sanga and highland breeds. The highland types of cattle are compact animals with short legs, ear and horn with coat color being dominantly black. On the other hand, in lower altitude areas like Kobo and Afar sites, animals have long leg, ear and horn reaching to maximum measurements for the Afar cattle. Surviving and producing under environmental stresses like drought, diseases/parasites and low quality and quantity feeds, indigenous animals were generally preferred by the communities over exotic animals. They serve several functions that differ between sites. Mostly, they are used as sources of draught power, milk, cash and meat. The majority of the farmers in all sites practice selection of breeding animals especially female based on similar selection criteria. Much emphasis was put on four selection criteria such as history of animals, milk production, fertility and body size. The most common breeding system in all study area was pure breeding, though some form of crossbreeding was exercised by few farmers residing in mid and highland areas. Over 91 per cent of the respondents practiced natural, unplanned and uncontrolled mating system. Animal holding in the study area ranged from 1 to 24 with mean herd size ranging from 5.5 to 14.0. Except for Kobo/Raya site, the male to female ratio ranged from 1:1.23 to 1:1.04 indicating a relatively large number (44.9 to 49.1%) of male animals. At Kobo/ Raya site, the ratio of male to female was 1:1.73, indicating a high proportion of females (63.4%) in the herds. The number of adult breeding bulls in each herd gave a ratio of one bull to less than three breeding females. Regarding their indicative productive and reproductive performances, overall average age at first calving in the study area was about 4 years with range of 3.4 to 4.4 years. Indicative average calving intervals ranged between 14.4 and 19.3 months with overall average of 17.6 months. The overall average daily milk yield reported in the study area was 1.9 liters with significant differences between sites ranging from 1.6 to 2.3 liters. The overall reported average lifetime calf production was estimated to be 6.5. The reported overall average age at culling of breeding animals during normal years was about 8 and 10 years for male and female animals, respectively. There are a number of constraints that affect livestock production in the area of which diseases and feed shortage as a result of land degradation and expansion of croplands, are the two most serious problems. Further research on the productive and reproductive performances of the identified cattle types is essential at a larger scale. Genetic characterization is also important to further refine the distinctiveness of the identified breed types in the study area.

84. Evaluation of Forage Yield and Effects of Forms of Feeding of *Acacia saligna* L. on Intake and Live Weight Gain of Farta Sheep Fed on Grass Hay

Getachew Asefa, Berihan Tamir and C.K. Singh
Year: 2005

Abstract: The present study was undertaken with the objectives of assessing the forage yield of *Acacia saligna* and to evaluate the effects of different forms of feeding *Acacia saligna* on the intake, digestibility and growth performance of lambs (aging 8-12 months) of local Farta sheep. The potential forage yield of *Acacia saligna* grown on gullies of Farta Woreda was evaluated at two levels of age (3 and 4 years), two levels of plant density (low, 400-1400 plants/ha and high, 1401-2400 plants/ha) and two levels of altitude (medium, 2200-2400 and high, 2500-2700 meter above sea level.). The results indicated that four years old *Acacia saligna*, planted in medium density at medium altitude produced significantly higher forage yield per hectare ($P < 0.01$). The feeding and digestibility trials were conducted using twenty male Farta lambs of similar age (8-12 months) and body weight (17.36± 1 kg). The lambs were blocked into five blocks of four animals each. The four dietary treatments were randomly allocated to each animal in the block. Treatment 1 was fed on grass hay alone, while treatments 2, 3, and 4 received Acacia (*Acacia saligna*) in fresh or wilted or dried form (66, 63 and 8 % moisture content, respectively) along with grass hay for 90 days. The dry matter intake DMI of acacia was about 26% of the total DMI of treatment 2, 3 and 4; and that the DMI was higher in acacia fed groups compared to those fed hay alone ($P < 0.01$). The DMI was similar in treatments 2, 3, and 4 indicating that different forms of feeding acacia had no influence on the feed DMI. Lambs fed hay only lost body weight, while the lambs supplemented with acacia gained higher body weights ($P < 0.01$). The digestibility of DM, OM and CP were higher ($P < 0.05$) in lambs fed dried acacia, compared to those fed with fresh acacia. Correspondingly, the ADG of the lambs fed dried acacia was higher (21.9 g) than those fed acacia in the fresh form (16.8 g) ($P < 0.05$). It was concluded that the *Acacia saligna* could form a good supplement to the hay diet; however, feeding acacia in the dried form could increase the utilization of nutrients with higher growth performance of lambs compared to feeding in the fresh form.

85. Investigations into Technical Interventions to Improve Rural Poultry Production System in South Wello Zone, Ethiopia

Gezahegn Tadesse Derseh, R.P. Moudgal and Berhan Tamir
Year: 2005

Abstract: The effect of some technical interventions (breed introduction, feed supplementation and ND vaccination) on the improvement of rural poultry production system was studied in Klau woreda, south Wello zone of Amhara region between December 2003 and September 2004. The primary objective of the study was to identify the contributions of these technical interventions in improving the traditional poultry production system. Eight treatments were arranged in 2^3 factorial in CRD i.e. two breeds: Local (L) and Rhode Island Red (RIR), two levels of feeding: supplemented and non-supplemented and health care: vaccinated and Non-vaccinated conditions. Each treatment was replicated nine times and a total of 72 households were used and 7 birds were distributed to each household at the age of two months. Breed introduction (RIR) and feed supplementation (S) made significant ($P < 0.05$) improvement in body weight gain. Average egg weight improved significantly ($P < 0.05$) more with RIR breed introduction, however feed supplementation had little role in average egg weight. The RIR breed introduction, supplementation and vaccination contributed significantly ($P < 0.05$) to number of eggs collected. Egg mass improved by RIR breed introduction and feed supplementation significantly ($P < 0.05$). In age at onset of egg laying, RIR breed introduction and vaccination have more ($P < 0.05$) contribution than feed supplementation. The laying percentage significantly ($P < 0.05$) improved by RIR breed introduction, supplementation and vaccination. In general, egg production significantly ($P < 0.05$) improved by the three technical interventions with limited role of vaccination. The egg production traits had positive and negative correlations with body weight gain and mortality, respectively. Negative association of age at onset of egg laying with body weight gain, egg mass, and number of eggs collected and weak association between age at onset of egg laying and mortality were also recorded. The mortality was significantly ($P < 0.05$) lower in RIR and supplemented groups as compared to local and non-supplemented groups of birds. The significantly ($P < 0.05$) more relative empty weight of important organs (gizzard, duodenum, jejunum, ileum and liver) in RIR may be responsible for superior production traits on account of better digestion and absorption oriented process. But, no significant difference was detected due to either supplementation or vaccination. Rhode Island Red had significantly ($P < 0.05$) more absolute and relative weights of magnum and uterus and also bigger in ovarian yellow follicles size as compared to local birds. The poor egg production efficiency in local birds was noticed due to the arrival of lesser number of yellow follicles to mature stage, as a result of atresia, though initial entry of dormant follicles into developing follicle was not the limiting factor. The lower size of yellow follicles in local birds on account of smaller liver size and lower albumen and egg shell deposition ability due to smaller size of magnum and uterus recorded in the present study might be responsible for smaller egg size in local as compared to RIR and similar reasons on feed supplementation were also detected. It is concluded that a significant improvement in poultry production at farmers door is a realistic proposition by replacing local breeds with RIR, feed supplementation to scavenging birds following vaccination schedule against New castle disease and some physio-anatomical causes of difference at digestive and female reproductive system levels on production traits due to breed and feed interventions are divulged.

86. Study on Honeybee Production Systems, Opportunities and Challenges in Enebse Sar Midir Wereda (Amhara Region) and Amaro Special Wereda (Southern Nations, Nationalities and Peoples Region), Ethiopia

Kerealem Ejigu, Nuru Adgaba and Wagayehu Bekele
Year: 2005

Abstract: Beekeeping production system in Ethiopian is a centuries-old tradition that forms an integral part of the smallholder farming system. The present study was conducted in Enebse Sar Midir Wereda of ANRS and Amaro Special Wereda of SNNPRS in 2004. The objectives of the study were to characterize honeybee production systems, to identify potentials and major constraints of honeybee production systems, and to assess the economic contribution of beekeeping under different production systems in the study areas. In this study six representatives Peasant Associations, three from each wereda, were selected using purposive sampling techniques. Then, 180 household farmers (90 beekeepers and 90 non-beekeepers) were drawn by random sampling technique. The collected data were analyzed using SPSS 10.0 version software and the results were interpreted and presented using Descriptive Statistics. The financial contributions of beekeeping under different production systems to the household economy were determined using Standard Cost Benefit Analysis method. Based on the results of this survey, two types of honeybee production systems were identified, namely: (1) Traditional honeybee production systems; and (2) Movable comb top-bar (MCTB) honeybee production systems. Moreover, honey hunting and migratory beekeeping practices were exercised by a few beekeepers. About 22 percent of households from Amaro and nearly 8 percent of households from Enebse are currently engaged in beekeeping and majority of them are using local hives. Beekeeping in the study areas was dominantly a man's occupation and only a few women beekeepers were engaged in Enebse Wereda. Beekeepers and non-beekeepers of Amaro and Enebse Weredas have no significant variations in the major economic variables. Beekeepers of the two weredas have similarities in knowledge of honeybee floras and identification of potentials and constraints in their respective areas. But they significantly differ in landholding, oxen number, honeybee colony number, hive placement and in the management aspects of honeybee colonies. The result of this study revealed that honey production was correlated with colony number ($r = 0.532$ and $r = 0.386$ for Amaro and Enebse, respectively). Based on the financial analysis, in Amaro the net returns from traditional and workshop MCTB hives honeybee production systems were Birr 17.84 and 33.16, respectively, which was different significantly ($P < 0.01$). Similarly, in Enebse the net returns from traditional and workshops made MCTB hives were Birr 25.40 and Birr 58.98, respectively, which showed significant difference ($P < 0.01$). Moreover, in Enebse, the net returns comparisons of traditional hive (25.40 Birr) and homemade made MCTB hive (76.84 Birr) were showed significant difference ($P < 0.01$). Honeybee flora compositions of Amaro wereda are natural vegetation, undergrowth, and some perennial crops; while in Enebse wereda cultivated crops, annual herbs, and some natural trees have significant contribution for beekeeping. Based on the result of this study, the major challenges were drought, lack of bee forage, pests and predators, pesticide poisoning, low hive occupation rate, absconding, lack of beekeeping equipment and materials, lack of water, honeybee diseases, marketing problems, lack of honey storage facilities, poor extension service, non-existence or low involvement of women in beekeeping development and lack of knowledge of appropriate methods of beekeeping. On the other hand, the opportunities for beekeeping in the study areas were the presence of natural resources and human capital, the current attention of the government towards the introduction of different beekeeping technology packages, the establishments of beekeeping association and beekeepers co-operatives in Amhara Region as well as beekeepers' group in Amaro, the presence of governmental and non-governmental organizations who are involved in beekeeping activities and the presence of micro finance institutes at grass-root level. From the results of this study, it can be concluded that MCTB hive production system resulted in significantly higher returns compared with traditional hive production system. As concluding remarks, the traditional and homemade MCTB hives were financially feasible and appropriate for the rural areas that make relatively good use of locally available resources. Thus, the major concern to sustain the beekeeping activities should be integration of beekeeping with natural resources conservation programs, introducing affordable and appropriate beekeeping technology with all accessories in the form of MCTB hive, strengthening the appropriate beekeeping management practices, mobilizing women and non-beekeepers into the sub-sector through training, and encouraging coordinated efforts among various actors to avoid the destroying of non-target insects.

87. Effect of Feeding Different Levels of Khat (*Catha edulis*) Leftover on Feed Intake and Growth Performance of Goats Fed on Sorghum Stover

Mohammed Ismail, Berhan Tamir and Mulugeta Assefa
Year: 2005

Abstract: The study comprising three trials, acceptability, feeding, and digestibility of different levels of khat leftover fed by goats was conducted at Alemaya University. The objectives of the study were evaluating the acceptability of sole khat leftover, determining the nutrient composition and optimum level of supplementation of khat leftover on growth performance of goats. The acceptability trial was conducted using 12 young Somali goats weighing on average 11.67 ± 1.15 kg and the same age. The average daily sole khat leftover consumption was 419.23 g DM with maximum and minimum values of 448.15 g and 390.28 g respectively. The dry matter content of Khat leftover was 39.6% whereas the OM, CP, NDF, ADF, and ADL contents were 92.11, 10.68, 45.1, 40.44, and 14.76% of the dry matter respectively. Moreover khat leftover contained condensed tannin of 21.74%. Goats gained on average 21 ± 11 g/day on a diet consisting of sole khat leftover. The feeding trial was conducted to evaluate the effect of khat leftover supplementation on nutrient intake and growth performance of goats fed on sorghum stover basal diet. Thirty new batches of the same breed with an average body weight of 12.53 ± 0.8 kg were supplemented with khat leftover at the levels of 0%, 15%, 30%, 45% or 60% of khat leftover. Supplementation of khat leftover increased ($P < 0.01$) the intakes of the total DM, OM, and CP and DM intake of sorghum stover ($P < 0.05$). Total DMI significantly ($P < 0.01$) increased with increasing levels of khat leftover supplementation from 222.5 in control to 470.69 in 60% level of supplementation. Intake of CP was increased ($P < 0.01$) at all levels of supplementation from 9.03 in control group to 36.97 in 60% supplementation. Weight gain (g/day) increased for all supplemented diets with the highest value (38.73) was recorded for 45% supplementation and weight loss was recorded (-3.3) for the control. Digestibility trial was conducted using 20 goats weighing on average 14.0 ± 1.23 kg. Animals were offered the same five diets described under the feeding trial. Supplementation showed significant ($P < 0.01$) increase on apparent digestibility of DM, OM, CP, and NDF, while supplementation affected ($P < 0.05$) on digestibility of ADF. Digestibility of DM, OM and CP was higher in 45% supplementation relatively to the rest of the treatments. It was concluded that supplementation of khat leftover improved the total DM and nutrients intake, nutrients digestibility and growth performance of goats. Khat leftover fed as a sole diet and as supplement did not result in any negative effect in blood parameters of goats. Thus on account of weight gain and digestibility khat leftover could be supplemented at 45% of sole khat leftover consumption, above which condensed tannins may interfere to limit intake and digestibility of the total diet.

88. Effects of Feeding Different Levels of Brewers' Dried Grain on Live Weight Gain and Carcass Characteristics of Wogera Sheep Fed on Hay Basal Diet

Mulu Moges, Berhan Tamir and Alemu Yami
Year: 2005

Abstract: Effects of feeding different levels of brewers' dried grain on intake, digestibility, live weight change and carcass characteristics were evaluated using 20 Wogera sheep with an average body weight of 16.96 ±2.4 kg. Lambs were blocked based on their initial body weight into five blocks and the four dietary treatments were randomly distributed to each animal in the block. The treatments were grass hay alone, grass hay +100 g BDG DM, grass hay +200 g BDG DM and grass hay + 300 g BDG DM per lamb per day. At the end of 90 days feeding trial the digestibility trial was carried out, after which the animals were deprived of feed for 12 hrs and slaughtered for analysis of carcass characteristics. The results of the experiment showed that the daily total dry matter intake increased significantly ($P < 0.05$) as the proportion of BDG supplementation increased. The daily hay DM intake of un supplemented groups was significantly higher ($P < 0.05$) compared to high and medium level supplemented groups. Similar to the daily total DM intake, supplementation with higher levels of BDG resulted in significantly higher ($P< 0.05$) final live weight and daily live weight gain than the low level supplemented groups. While the supplemented groups gained weight, the un supplemented groups lost weight (-3 g/d). The feed conversion efficiency was also significantly ($P < 0.05$) higher with the BDG supplementation. The apparent digestibility of CP was higher ($P < 0.05$) in lambs fed higher and medium levels of BDG compared to those fed lower level of supplement whereas no significant difference was observed in NDF, ADF, OM, DMD between control and supplemented groups. This level also resulted in higher dressing percentage, EBW, Loin eye area. Results of this study suggested that supplementing the growing Wogera Lambs with 300 g DM BDG improved feed intake, better response on live weight gain, feed conversion efficiency and, carcass parameters.

89. Characterization of Livestock Production System: A Case Study of Yerer Watershed, Adaa Liben District of East Showa, Ethiopia

Samuel Menbere, Azage Tegegne and B.P. Hegde
Year: 2005

Abstract: The study was carried out in 'Yerer watershed' of Adaa Liben district which comprises two peasant associations namely Yerer Silassie and Gende Gorba, with a general objective of characterization of livestock production systems and specific objectives of identifying potentials and constraints in the system. A total of 150 sample farmers or 10 percent of household heads in the watershed were included in the study. Among the different livestock activities, milking, barn cleaning and animal product marketing were the responsibilities of female members of the family. On the other hand, live animal marketing, livestock herding and watering, and feed collection were the responsibilities of males. Except animal herding and watering which were the responsibilities of age group of 10-14 years, all the other activities are mainly the responsibilities of the productive age group (15-64 years) within the family. The household heads themselves were responsible for herding, watering and feed collection. Labour shortage was a problem for about 46.3 percent (n=62) of the farmers. Feed collection and livestock herding, respectively were the first and second important activities for which most farmers have labour shortages and give priority for labour allocation. Due to year round demand of labour for herding, most farmers in the area hire additional labour for herding at first. *Teff*, wheat and chickpea were major crops that were cultivated in the watershed in decreasing order of importance. However, *teff* ($P < 0.01$) and wheat ($P < 0.05$) were priority crops at Gende Gorba and Yerer Silassie, respectively. The average farm size in the watershed was 1.47 ± 0.04 ha. The farm size was found to be determined

by family size or labour unit (P<0.001). Crop and animal (poultry, sheep and goat) selling were major important means of income generation for households major expenditures (crop input, land rent and additional food purchasing). Moreover, animal products (eggs, butter and local cheese 'Ayib') were sold to cover household daily expenses. Much of the income was spent in purchasing of fertilizer, draught oxen, livestock feed and for labour wage. Due to importance of oxen for draught power, donkey for transportation and poultry for income, 84.0, 76.0 and 74.0 percent of the farmers possess these animals, respectively with average size of holdings 2.32, 1.69 and 5.31, respectively. Female animals and animals above 1 year of age, respectively account for higher proportion of (70.1 and 43.6%) sheep and (60.0 and 37.3%) goats flocks. The cattle herd comprises 48.3 and 17.2 percent of oxen and cows above 4 years of age, respectively. The average age at first parturition of 17.01 ± 1.38 and 13.18 ± 1.45 months and parturition interval of 12.14 ± 0.94 and 11.52 ± 0.96 months in sheep and goats, respectively were longer than figures reported within the country. The average annual reproductive rate of 192.4 ± 15.5 percent in sheep and 195.5 ± 15.3 percent in goats were higher than other reports within the country. The overall mortality rate of 39.8 ± 4.53 percent in cattle was lower than the rate reported from similar production system in the country. The overall mortality rate in small ruminant was 34.5 ± 4.12 percent and the mortality rate was higher (P<0.05) in goats, during the main rainy season 'Kiremt' and caused by diseases. Due to dystocia and mis-mothering, the mortality rate in small ruminants was also higher (P<0.05) for young born at first parity and born single. Due to lower sample size and less precise farmers estimation, the average lactation length (5.42 ± 1.8 months) and daily milk yield (1.35 ± 0.25 liters) in crossbred cows are far lower than figures reported in the country. The livestock management system in the watershed was more of traditional. Hence, about 66.7 percent (n=90) of the farmers keep all species and classes of animals together. The rest of the farmers kept small ruminants separately to avoid predators and possible attack by cattle. Enclosure without roofing was a common type of livestock shelter. Traditional health treatments were a major livestock health management system parallel with veterinary treatments. Interestingly, about 71.8 percent (n=74) of the farmers believe that treating the animals with traditional health treatment was quite efficient and effective. Rivers were the major dry season livestock water sources for about 88.9 percent (n=120) of the farmers in the area. In general, the majority of livestock have access to water only once daily during the dry season. Crop residues (*teff* and wheat straws), natural pastures (comprising Gecha 'Pennisetum schimperi' and Serdo 'Cynodon dactylon') and commercially available feeds (Noug cake 'Guizotia abyssinica' and wheat bran) were major feed resources in decreasing order of importance. Except improved forage growing, provision of supplemental feeds, feed conservation and crop residues treatments were common practices in the feed management system. About 89.6 percent (n=121) of the farmers have feed shortage problem that extends from the month of June up to December. Purchase of additional feed and reduced feeding were major measures taken to overcome this problem. About 98.5 percent (n=133) of the farmers give priority for oxen, cows and calves in decreasing order to provide available quality and quantity of feed mainly crop residues and commercially available feeds. Crop residues were utilized throughout the year as a major feed. Natural pasture was utilized from the month of June up to December. Commercially available feeds were utilized from the month of April up to September. Only about 42.2 percent (n=57) of the farmers possess private grazing land with an average holding of 0.22 ± 0.02 ha. Shortage of feed, grazing land, water and poor productivity of local animals were major constraints for livestock production in decreasing order of importance. Introduction of improved forages, family planning, water development and introduction of improved animal breeds are suggested solutions for these constraints by farmers. Natural resource degradation was a critical problem in the watershed. Declining of soil fertility, soil erosion, deforestation and land shortage were major natural resource related problems in decreasing order of priority. The interventions made by different institutions in livestock and natural resource management were negligible. Therefore, all concerned institutes need to strengthen their efforts in addressing both livestock production and natural resource problems in the watershed.

90. Supplementation of Graded Levels of Peanut Cake and Wheat Bran Mixtures on Nutrient Utilization and Carcass Parameters of Somali Goats

Simret Betsha, Solomon Melaku
Year: 2005

Abstract: The experiment was conducted at Alemaya University using twenty-four yearling male Somali goats with a mean live weight of 20.4 ± 2.02(mean ± SD). The experiment consisted of ninety days of feeding trail, ten days of digestibility and nitrogen balance trial and followed by evaluation of carcass parameters at the end of the experiment. The treatments included ad libitum feeding of hay and supplementation with three graded levels (200 g, 300 g and 400 g) of 3:1 mixture of peanut cake and wheat bran, respectively. Six animals were assigned to each treatment. The objective of the experiment were to evaluate the effect of graded levels of supplementation with mixture of peanut cake and wheat bran on feed intake, live weight gain, feed digestibility, N balance and carcass parameters of Somali goats. Significant decrease ($P < 0.001$) in hay intake was observed as the level of the supplement increased. Besides, substitution rate increased with increasing levels of supplementation. Animals fed on the control diet lost weight (-30.2 g/day), while the supplemented ones gained weight in the range of 39.9-44.7 g/day. No significant difference was observed in NDF, ADF and OM digestibility between supplemented and control groups, whereas digestibility of CP was significantly higher ($P < 0.001$) for supplemented goats. Urinary nitrogen, total nitrogen excretion and retention increased significantly ($P < 0.01$) as the level of supplementation increased. Animals fed on hay alone had significantly lower ($P < 0.001$) empty body weight, hot carcass weight and dressing percentage. On the other hand, goats supplemented with graded levels of peanut cake and wheat bran mixture had significantly higher ($P < 0.05$) dressing percentage. Muscle, bone ratio and fat weight did not show a similar trend with increased daily gain. Thus, animals fed on medium level of the supplement had relatively more muscle ($P < 0.001$). Level of feeding did not ($P > 0.01$) have effect on rib eye muscle area, though it had higher correlation ($P < 0.001$) with lean meat. Goats fed on the medium level of mixture had heavier ($P < 0.001$) liver, whereas those on hay alone exhibited significantly heavier ($P < 0.05$) bone, head and gut content. Results from this study suggested that supplementation with peanut cake and wheat bran mixture (3:1) at 200 g DM/day appears to be economical.

91. Effect of Feeding Varying Proportion of Napier Grass (*Pennisetum purpureum*) and Sesbania (*Sesbania sesban*) on Feed Intake, Digestibility and Live Weight Gain of Local Sheep

Tibebu Manaye, C.K. Singh and Adugna Tolera
Year: 2005

Abstract: The study was conducted at Awassa College of Agriculture (7° 04' N and 38° 31' E), in Southern Ethiopia. The study comprised of two experiments viz., a feeding trial of 90 days to assess feed intake and live weight performance in a randomized complete block design (RCBD) and a digestibility trial of 7 days in a completely randomized design (CRD). The experiment was conducted with the specific objectives to study the effect of feeding Sesbania (*Sesbania sesban*) mixed with Napier grass (*Pennisetum purpureum*) at different proportion on voluntary feed intake, digestibility and live weight change of local sheep. The dietary treatments were 0 (control), 10, 20, 30, and 40% S. sesban mixed with Napier grass on DM basis. The ratio at which the green feed was mixed was adjusted every week based on the DM content so that the ratio on DM basis would be maintained constant. The DM and nutrient intake and digestibility were significantly higher in the Napier grass and S. sesban mixed diets as a group compared to the control diet. However, except crude protein intake, there was no significant difference among the Napier grass and S. sesban mixed diets and consequently no significant growth performance difference observed between the treatment groups of Alaba local sheep. This was because the sheep preferred to consume Napier grass to S. sesban. The CPI was increasing with increasing inclusion rate of S. sesban, but it was not reflected in animal performance. Nevertheless, all the animals grew noticeably even though inclusion of S. sesban into young Napier grass (4 weeks regrowth) basal diet at a rate of up to 40% did not result significant live weight change of the animals. Under the conditions of this experiment supplementation of Napier grass (4 weeks regrowth) with S. sesban may not be necessary, as it did not have any significant effect on body weight gain of the animals.

92. Compatibility of Quality Protein Maize and Sesame Seed Meal as a Substitute for Synthetic Amino Acids in Broiler Rations

Tekeba Eshetie, R.P.Moudgal and Alemu Yami
Year: 2005

Abstract: Ration formulation to meet the nutritional requirements of mono gastric animals is challenging, since the ban of the use of animal protein as feed. Two experiments were conducted to evaluate the compatibility of QPM and SSM as a substitute for synthetic amino acids (SAAs) and their economic advantage over the commercial feed. Four of each of iso-caloric and iso-nitrogenous starter and finisher broiler treatment rations (T_1-T_4) containing four different combinations of QPM and SSM were studied with 360 commercial broiler chicks in CRD with 3-replications, using commercial ration (T_6) and treatment ration containing SAA (T_5) as control. Both QPM and SSM were included to contribute 50% of the total CP requirements of the broilers in each of the four treatments. At the end of the experiments, 2 broilers (one male and one female) from each replication were selected and scarified to evaluate the development of different cut ups and abdominal fat. The result obtained indicated that, there were no significant difference ($P > 0.05$) between the groups fed on the treatment containing SAA and the treatment containing 36% QPM and 17.3% SSM in feed consumption, body weight gain and mortality during the entire experimental period. However, rate of survival, uniformity and posture of birds were affected as the level of SSM inclusion was beyond 17.3% during the first phase of the brooding. Biological and economic efficiencies as measured by the amount of feed and feed cost required per kg live weight gain was significantly lower for the groups fed on the treatments (T_1 and T_2) containing 30-36% QPM plus 15-17.3% SSM during the entire study period. There was no significant ($P > 0.05$) difference in abdominal fat and breast weight and in average drumstick and thigh percent between all the groups, although there was a tendency of increase in abdominal fat with the increase in the level of SSM. In summary the results of this study indicated that 30-36% of QPM plus 15-17.3% SSM could safely and economically be used to substitute SAA in broiler ration. Moreover, the inclusion of 30-36% QPM plus 15-17.3% SSM in broiler ration has significant economic advantage over the use of commercial ration.

93. Ification and Comparative Evaluation of the Existing and Modified Hay-Box Brooder in Mecha Woreda of Amhara Region

Yeshambel Mekuriaw, R.P. Moudgal and Tilahun Seyoum
Year: 2005

Abstract: The present study was conducted to assess the shortcomings in the existing hay-box brooder and to modify and evaluate the comparative performance of the existing and modified hay-box brooders in Merawi town, Mecha Woreda of Amhara Region. A survey aimed at identification of the shortcomings of the existing hay-box brooder was conducted in six peasant associations. In experimental part, 200 white leghorn chicks were used to study the comparative performance of the existing hay-box (T2), and modified hay-boxes consisting of turmeric powder encircled, hay sealed in polythene bag (T3), Turmeric encircled, hot water Jericans (T4) and turmeric powder encircled, hay sealed in polythene bag plus hot water Jerican (T5), using electric brooder (T1) as positive control in CRD with four replications. Mean feed consumption, weight gain, feed efficiency, rate of mortality, carcass yield, and weight of relevant internal organs were used as evaluation parameters. The results of the survey showed that the existing hay-box brooder is currently adapted in the study area. The general indications are that the technology may be influenced by season, predators (wild and domestic), weight of the run, space shortage and design of the run. About 45% of the farmers responded that it can be influenced by external parasites. Almost 33 and 21% of the farmers mentioned the ant and disease problems associated respectively indicating the need for improvement of the existing hay-box chick brooding technology. According to the results of experiment two, turmeric powder tested as ant repellants was found to be effective in controlling the ant problem associated with hay-box chick brooding technology. The groups assigned to electric brooder and subjected appetite feeding were significantly higher than all the others in feed consumption and body weight gain ($P < 0.01$), followed by the groups assigned to modified hay box brooders containing hot water Jericans. The groups assigned to electric brooder and modified hay-box brooders containing hot water Jericans were also significantly higher than the other two treatment groups in feed conversion efficiency. There were no significant differences between the existing and modified hay-box treatment groups in rate of mortality. Weight of liver and adrenal were significantly lower for the groups assigned to electric brooder and modified hay- box brooder with hot water Jerican. Thus the results of this study indicated that modified hay-box brooder with hot water was superior to the existing hay-box brooder in chick brooding performance.

94. Effect of Varietal Differences on Dry Matter Yield, Chemical Composition and Quality of Field Pea (*Pisum sativum* L.) and Faba Bean (*Vicia faba* L.) Straws

Yetimwork Gebremeskel and Solomon Melaku
Year: 2005

Abstract: The study was conducted at Alemaya University campus and Hirna Experiment Stations, Ethiopia, during 2004 cropping season with the objectives of determining days to flowering and maturity, plant height, leaf to stem ratio, straw dry matter yield (SDMY), harvesting index (HI), potential utility index (PUI), grain yield, straw to grain ratio (S:G), chemical composition, in vitro dry matter digestibility (IVDMD) and in sacco DM, organic matter (OM) and neutral detergent fiber (NDF) degradability. The experiment was conducted at both sites using five field pea and faba bean varieties in a randomized complete block design with three replications. The faba bean varieties at Alemaya were significantly different in HI, grain yield ($P<0.05$), PUI ($P<0.001$), SDMY ($P<0.05$) and S:G ($P < 0.001$). Among the field pea varieties, significant difference was observed in PUI, SDMY, S:G and HI($P < 0.01$) at both sites and in grain yield at Hirna. At Alemaya, faba bean varieties had no significant difference ($P > 0.05$) in crude protein (CP) and lignin contents. However, there were significant differences ($P < 0.001$) in NDF, acid detergent fiber (ADF), cellulose, hemicellulos contents IVDMD ($P < 0.05$). The CP and lignin contents ranged from 10% to 10.6% and 5.5% to 6.5%, respectively. At Hirna, faba bean varieties had no significant difference ($P > 0.05$) in CP content, but there were significant differences in NDF, cellulose, hemicellulos and ADF contents ($P<0.001$) and IVDMD ($P < 0.05$) contents. Similarly, among the field pea varieties there was no significant difference ($P > 0.05$) in CP content at both sites, whereas significant differences were observed in their NDF ($P < 0.001$), lignin, cellulose and hemicellulose ($P<0.001$) contents. Rumen degradability parameters were similar for varieties of faba bean as well as field pea at Alemaya. At Hirna, the faba bean varieties had significant differences ($P < 0.001$) in rapidly degradable, slowly degradable and potential degradability, lag time and effective degradability ($P < 0.01$) with respective mean values of 43.4%, 31.7%, 75.3%, 4.8 hour and 52.7%. Among the field pea varieties, there were significant differences ($P < 0.001$) in rapidly degradable fraction, slowly degradable, potential degradability, lag time and effective degradability, with respective means of 44.43%, 33.7%, 78.1%, 4.82 hour and 49.7%. There were significant differences ($P < 0.001$) among the varieties of faba bean and field pea in OM and NDF degradability parameters at Alemaya, rapidly degradable fraction, slowly degradable fraction, potential degradability, lag time and effective degradability, whereas there were no significant differences ($P > 0.05$) in rate of OM and NDF degradability. The overall result showed evidence of varietal differences in grain yield, SDMY and straw quality and indicated the possibility of selecting for faba bean and field pea varieties that combine high grain yield and desirable straw characteristics. Under the condition of this study, the varieties such as Tesfa, Mesay, and local bean from faba bean and Tegenech from field pea varieties were identified to have high grain yield and SDMY. It is concluded that in addition to grain yield, the varietal differences in SDMY and nutritive value need to be considered in promoting production of faba beans and field peas.

95. Evaluation of the Feeding and Replacement Value of Brewer's Dried Grain Yeast Mixture for Noug (*Guizotia abyssinica*) Cake in Chick's Starter Diet as Protein Supplement

Zewdu Wondifraw, Berhan Tamir and R.P. Modugal
Year: 2005

Abstract: The feeding and replacement value of brewer's dried grain yeast mixture for noug (*Guizotia abyssinica*) cake in chick's starter diet as protein supplement was studied to assess its effects on dry matter intake, growth performance and weight as well as length of different gastro-intestinal tract parts. Cost-benefit analysis for growing chicken on diets containing different level of BDGY was also undertaken. Three hundred twenty four day-old white leghorn unsexed chicks with an average body weight of 33.88 ± 1.8 g were used for the feeding trial on deep litter. The experiment was designed in CRD with six dietary treatments each with three replications. The treatment rations were isonitrogenous (20% CP) and isocaloric (12.28 ME MJ/kg DM). In addition to the basal diet T1 contains (30% NSC), T2 (6% BDGY+ 24% NSC), T3 (12% BDGY + 18% NSC), T4 (18% BDGY + 12% NSC), T5 (24% BDGY+6% NSC) and T6 (30% BDGY). BDGY was composed of 80% BDG and 20% BDY. The results of the experiment showed that the mean dry matter intake, cost of feed per kg live weight gain and absolute as well as relative length and empty weights of GIT parts (except gizzard) did not vary ($P > 0.05$) among the dietary treatments. However, significantly ($P < 0.01$) lower difference in mean daily gain and absolute liver weight as well as inferior ($P < 0.05$) dry matter conversion ratio as (dry matter intake/gain) and relative liver weight were obtained in chicks fed T5 and T6 than the rest of dietary treatments. T6 was cost effective ($P < 0.05$) than T1. With increasing level of replacement of NSC by BDGY significant reduction ($P < 0.05$) in liver weight was obtained. Chicks on the diets that contained only NSC (T1) attained quantitatively the highest gain and superior dry matter conversion ratio. Growth rate was generally depressed progressively with increasing levels of replacement of NSC by BDGY in the ration. T5 and T6 with the highest ratio of chick sales to feed cost 7.61 and 8.247 were found to be the least cost rations indicating the highest return (Birr) from sale of chicks than the control. However, the average daily gains as well as dry matter conversion ratio of chicks in T5 and T6 were extremely affected. On the other hand, similarity in growth performance between chicks fed T1 (control) and T4 was observed which suggested that BDGY could replace up to 60% of the NSC in chick's starters diet. In conclusion, the absence of significant difference in the body weight gain, dry matter conversion ratio and dry matter intake between T4 (18% BDGY + 12% NSC) and that of T1 (control diet) suggests that replacing up to 60% NSC by BDGY appear to be a diet of good feeding value and cheaper ration which can be used in chick's starter diet as protein supplement without adverse effects on growth performance of starter chicks between 0-8 weeks of age.

96. Supplementation with Linseed (*Linum usitatissimum*) Cake, Wheat Bran and Their Mixtures on Feed Intake, Digestibility, Live Weight Changes, and Carcass Characteristics in Intact Male Arsi-Bale Sheep

Abebe Tafa and Solomon Melaku
Year: 2006

Abstract: The experiment was conducted at Bokoji, Arsi Zone, Ethiopia using thirty yearling male Arsi- Bale sheep with a mean live weight of 15 ±0.21 (mean± SD). The objectives of the experiment were to evaluate the effect of supplementation with linseed cake (LSC), wheat bran (WB) and their mixtures at different proportions on feed intake, live weight gain, feed digestibility and carcass parameters of Arsi- Bale sheep fed on hay. The experiment consisted of ninety days of feeding trial, seven days of digestibility trial followed by evaluation of carcass parameters at the end of the experiment. The treatments included ad libitum feeding of hay and supplementation with 300 g DM of LSC, WB and their mixtures at 65 LSC : 35 WB and 35 LSC : 65WB. Six animals were randomly assigned to each treatment using randomized complete block design. For the digestibility trial, and carcass analysis 4 animals were randomly used in each treatment using a completely randomized design. There were no significant difference ($P > 0.001$) hay intake among supplemented treatments. Animals fed on the control diet lost weight (-1.52 g/day), while the supplemented ones gained weight in the range of 69.04-104.11 g/day. No significant difference ($P > 0.05$) as observed in DM, OM NDF, and ADF digestibility between supplemented and control treatments, whereas digestibility of CP was significantly higher ($P < 0.001$) for supplemented sheep. Animals fed on hay alone had significantly lower ($P < 0.001$) slaughter weight, empty body weight and hot carcass weight. On the other hand, sheep supplemented with different proportion of LSC, WB and their mixtures had no significant ($P > 0.05$) difference in dressing percentage. Results from this study suggested that supplementation with different proportion of LSC, WB and their mixture showed better nutrient utilization, response in live weight gains and carcass parameters in Arsi-Bale sheep. if capital is not constraint of small holder farmers, Sheep fed on T_3 (65 LSC: 35 WB) returned the highest net profit compared to the other treatments but higher marginal rate of return (MRR) was recorded for T4 (35 LSC: 65 WB) mixture which has minimum amount of linseed cake inclusion to wheat bran found to be better to improve the productivity of Arsi-Bale sheep.

97. Reproductive Performance of Dairy Cows under Urban Dairy Production Systems in Dire Dewa, Ethiopia

Emebet Moreda, Zeleke Mekuriaw and B. P. Hegde
Year: 2006

Abstract: A cross-sectional survey on reproductive parameters and abnormalities were undertaken to assess the reproductive performance of 304 crossbred dairy animals in Dire-Dawa. The total number of crossbred dairy cows in each production system were 58, 124 and 122 in smallholder (SUDP), Medium scale (MSDP) and Large Scale specialized (LSSDP) dairy production systems, respectively. Data on general farm management variables, feed resource, herd health problems and reproductive history were collected from a total of 57 farms by means of questionnaire and from individual cow records. Records of crossbred dairy cows and heifers were used to calculate the least square means of reproductive traits. Mean (± SD) herd size in farms under SUDP, MSDP and LSSDP systems were 3.24 ± 1.73, 11.29 ± 6.05 and 140.67 ± 59.67, respectively. The main sources of feed for SUDP farms were concentrate, non-conventional feeds, hay and crop residues. The respective proportions were 97, 85, 79 and 66.7%. The proportion of farms from MSDP systems that used concentrate, hay, and crop residue were 95, 81 and 67%, respectively. The main sources of feed for LSSLP were hay and concentrate. All farms from LSSDP and 67% of farms from MSDP had reported mastitis, calf scour and reproductive disorders as major herd health problems. In SUDP none of the above health problems were of major concern. Only 24, 15 and 15% of farms had reported the occurrence of the respective health problems in SUDP. The overall mean for age at first service and age at first calving across all production systems were 25.55 (n=283) and 36.20 (n=210) months, respectively. Ages at first service and at first calving were significantly longer ($P < 0.05$) in the MSDP than in the SUDP and LSSDP systems. The overall mean intervals from calving to first service and from calving to conception were 162.54 (n=149) and 218.47 (n=108) days, respectively. Crossbred cows under the management system of SUDP had shorter ($P < 0.05$) interval from calving to first service and calving to conception than those managed under MSDP and LSSDP. There was no significant difference ($P > 0.05$) between the later two production systems for the same variables. The intervals from calving to first service and calving to conception were longest ($P < 0.05$) for lactation group one (parity one) and four ($\geq 6^{th}$ parity) as compared to lactation group two and three (parity 2 and 3) and (parity 4). The overall mean of the number of services per conception was 2.16 (n=108), and there was no significant difference ($P > 0.05$) between crossbred cows under different production systems. The mean calving interval for cows under all production systems was 17.83 (n=155) months. Cows managed under SUDPS had significantly shorter ($P < 0.05$) calving intervals as compared to cows managed under MSDP and LSSDP. The overall pregnancy, calving and conception to first service rates across all production systems were 72.8%, 63.4% and 45.9%, respectively. There was no significant difference ($P < 0.05$) among production systems for these variables. The principal postpartum reproductive health problems across all the systems were retention of placenta (19.4%), anoestrus (17.1%) and uterine infections (15.2%). Two or more concurrent disorders were seen in 18.8% of dairy cows. There was no significant difference ($P < 0.05$) among production systems for these variables. Without exception, every reproductive trait measured was affected adversely by the reproductive health status of a cow. Abnormal cows had longer ($P < 0.05$) intervals from calving to first service and from calving to conception and required more ($P < 0.05$) services per conception. It was concluded that crossbred cows under the SUDP management systems had a good reproductive performance followed by LSSDP in contrast to MSDP system. The result showed that shortage of feed coupled with poor husbandry and herd health management were important factors that contributed to reproductive inefficiency. An appropriate feed resource and reproductive herd health management, a reliable AI service and an appropriate level of husbandry could be the management options to reduce or alleviate some of the prevailing problems.

98. Assessment of Milk Production, Marketing, Feeds and Feeding System of Dairy Cows in and around Dire Dawa Town

Fayo Dubis, Mohammed Yosuf and B.P. Hegde
Year: 2006

Abstract: Assessment of milk production, marketing, feeds and feeding systems of dairy cows in and around Dire Dawa tow were studied. A total of 146 farms, 64 from urban farm and 82 from peri-urban farm were studied. Depending on their herd size farms were stratified into small (1 to 4), medium (5 to 10) and large farms of more than 10 cattle. Farms owners were interviewed using structured questionnaire and total of ten farms from urban areas were monitored for milk yield, body condition score, and feed intake. Data were analyzed using Statistical Package for Social Science (SPSS). In urban areas milking cows accounts 79%, 79% and 83.46% of small, medium and large farms respectively while in peri-urban these value were 79.7%, 63% and 52% of small, medium and large farms respectively. In urban areas pregnant cows accounts 39.6%, 52% and 66.53% of small, medium and large farms respectively, while these values were 16%, 20.4% and 21.7% of small, medium and large farms respectively. In peri-urban areas low percentage of pregnant cows as compared to urban farms which indicates that long calving interval. Large urban farms on average produced 141 litres of milk per day per farm while, medium and small scale farms, respectively produced 27 and 8.6 litres of milk per day while peri-urban farms produced on average 4.25, 3 and 2.38 litres of milk is large medium and small farms, respectively. Small, medium and large urban farms contributed 10.1, 17.5, and 64.8 percent of milk produce in the study farm, respectively while these value were 4.8, 2.2 and 0.6 percent for peri-urban farm respectively. Large urban farms on average sold 126 litres of milk per day while for medium and small urban farms, disposed 22 and 7.1 litres of milk/day. Milk used for home consumption/household/ day increased with herd size in urban farms. Accordingly, 1.18, 2.72 and 4 litres of milk /day were used in small, medium and large urban farms, respectively. In peri-urban farms the amount of milk produced as well as sold were much lower than urban farms. At middle stage of lactation condition score of cows in large farms were lower than the recommended level. Condition of cows were significantly ($P<0.05$) higher in small farms at late stage of lactation than large and small farms. Condition score at late stage of lactation in large and medium farms were below the recommended level. In large farms body weight of cows was significantly ($P < 0.05$) higher (520 + 10.36 kg) than medium farms (476 + 11.89 kg). Higher body weights were observed in large farms followed by small farms. Dry matter intake from roughages were significant by ($P < 0.05$) higher in large farms than medium and small farms. Protein source from roughage feed were significantly ($P < 0.05$) higher for large as well as medium farms than small farms. There is no formal milk marketing channel in the study area. About 86.2 percent and 61.1 percent of small and medium urban farms sell milk at farm gate while 38.5 percent of large farms sell to hotel or cafeteria. Price of milk was significantly ($P < 0.001$) higher in urban farms than peri-urban farms. Milk price varied from 3.30 Birr/liter in Dire Dawa at farm gate on contract basis to 3.20 Birr/liter at hotel or cafeteria. Most of the urban farms (70.3%) use zero grazing while peri-urban farms (91.9%) use communal grazing. Leuaena and Napair grass are the common forage crops developed in large urban farms. Urban farm used various feed ingredients such as maize grain, haricot beans, bean hulls, noug cake and hay while peri-urban farms used wheat middling, wheat bran and sorghum stovers. Peri-urban farmers mainly depended on sorghum and maize stovers. Hence appropriate technology adoption from other areas would be required to improve the nutritive quality and digestibility of available feed resources. The productivity of the dairy sector could be improved through adoption of improved forage and better management of crop residue. Adoption of treating stover with urea should give due consideration and research should also consider identification of suitable forage crops in the area. Most medium urban farms were in the residential area and the odor of feces and urine disturbed the microenvironment. Lack of land for barn construction and forage development were also the major problems in urban farms. Encouraging medium and large farms and providing land for forage production and barn construction.

99. Effect of Urea Treatment and Leucaena (*Leucaena leucocephala*) Supplementation on the Utilization of Wheat Straw by Sheep

Getahun Kebede and Solomon Melaku
Year: 2006

Abstract: The study was conducted at Debre Zeit Research station with the objectives to evaluate the combined effect of wheat straw treatment with urea and/or supplementation with dried foliage of *Leucaena leucocephala* (LL) on feed intake, body weight change, feed digestibility, nitrogen balance and rumen fermentation products in Arsi-Bale sheep. The experiment consisted of a feeding trial of 98 days and digestibility and nitrogen balance trial of 7 days. Treatment diets were: untreated wheat straw (T1), urea treated wheat straw (T2), urea treated straw supplemented with 100, 200, 300 g of LL foliage hay as T3, T4, T5, respectively and untreated straw with 300 g LL supplementation. Urea treatment increased straw crude protein (CP) from 3.2 to 6.0% and decreased contents of neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) from 80.7 to 74.3, 52.3 to 50.4, 7.5 to 7.0%, respectively. Treatment with urea increased ($P<0.001$) straw dry matter intake (DMI) from 323 to 566 g/day, along with associated nutrients intake. Supplementation led to further increase ($P < 0.001$) in straw DMI at 100 g LL, but it led to substitution of straw DMI with supplement at higher levels. Feeding with sole treated wheat straw shifted mean daily live weight loss of 33.9 g to a gain of 10.7 g, which was further elevated to 47.2 g at maximum level of supplementation. Sheep supplemented with 300 g LL on untreated straw attained average daily gain of 29.2 g, nearly equivalent ($P > 0.05$) to sheep fed treated straw at 100 g LL. Urea treatment of wheat straw significantly ($P< 0.001$) increased apparent straw dry matter (DM), organic matter (OM), and CP digestibility from 42 to 58, 48 to 63 and 6.1 to 28.6%, respectively. Supplementation further enhanced ($P < 0.001$) the digestibility of DM, CP and total ash content. Treated straw at 300 g of LL supplementation was superior ($P < 0.001$) in the digestibility of DM, OM, NDF, ADF, ash and digestible energy (DE) compared to untreated straw supplemented with the same level of LL. Nitrogen balance was positive for treatment diets except for the control (-0.71 g/day) and increased significantly ($P < 0.001$) with level of LL supplementation. Increasing the level of LL supplementation resulted in increased loss of fecal nitrogen more than loss in urinary nitrogen. Rumen pH was not affected ($P>0.05$) by treatment diets, but the values were above the threshold for cellulolysis and varied diurnally ($P < 0.05$). The mean rumen NH_3-N concentration ranged from 47.5 to 152 mg/l and varied significantly ($P < 0.05$) after morning feeding. Feeding sole treated straw raised rumen concentration of acetate, propionate and volatile fatty acids significantly ($P < 0.05$) from 34.87 to 48.29, 10.13 to 15.31 and 49.75 to 68.75 μm/ml, respectively as compared to sole untreated straw. Treated straw was also more fermentable than untreated straw increasing DM soluble fraction, rate of DM degradation, potential and effective DM degradability by about 96.58, 34.87, 24.29 and 48.43%, respectively. It is concluded that ad libitum feeding of urea treated straw supplemented with up to 200 g of LL foliage hay could be used to improve nutrients availability and utilization, rumen fermentation and live weight gain of sheep better than when both strategies are used separately.

100. Survey on Village Chicken Production under Traditional Management Systems in Jamma Woreda South Wollo, Ethiopia

Mammo Mengesha, Berhan Tamir and Tadelle Dessie
Year: 2006

Abstract: This study was conducted in four Peasant Associations in Jamma Woreda South Wollo, Ethiopia. A total of 120 households from four PAs were involved in the study. The objectives were to assess traditional poultry management practices in relation to feeding practices, egg production and hatchability of village chickens. A single-visit and multi-subject type of survey was conducted using structured questionnaires between November and December 2005, which was complemented by one arrival survey in August 2005 aiming at assessing seasonal variation in village chicken production. The data were analyzed by using SPSS software program. The survey work indicated that the overall average flock size was 5.6±0. 8 per household. Flock size was significantly higher ($P < 0.05$) for rich households than medium and poor households. Average flock size was not significantly ($P > 0.05$) affected by PAs and agro ecologies. Major phenotypic appearance of chicken flock was white 28.9 %) followed by gray (25.9%). Ninety eight percent of farmers were supplementing extra feeds and water for their chickens, with the main proportion of food leftover 26.4%) followed by spoiled grain 25.12%. The proportions of households providing supplementary feeding were 19.76, 21.51, 37.33 and 21.4% in the morning, at noon, afternoon and evening respectively. Most of the households (77.7%) were not giving feeds separately to the flock compositions (i.e. layers, chicks).Households practicing of chicken selection for the main characters of egg productivity was 35.38% and body weight was 38.38%. The mean of age at first lay, number of clutches per hen per year and number of eggs laid per clutch per hen were 5.05±1.34 months, 5.06±1.65 and 15.39±5.05, respectively. The ratio of male to female was around 1:3. The purpose of keeping poultry was mainly for sale (38.11%) followed by home consumption (31.56%). Majority of households (78%) were using their living room for birds penning at night and women were more (72%) responsible for flock management (feeding, watering, housing hygiene etc.). The mean hatchability was 84% per hen per household. The larger eggs with oval shape and smooth in eggshell were the preferred characters in selection of incubating eggs. Farmers (38%) adapted a practice of mixing local eggs with exotic or crossbred eggs while incubating for better hatchability for exotic or crossbred eggs. Around 73% the respondents reported that the highest mortality of chicks was occurring up to 2 weeks of age. But around 12.56% of the households was treating their sick birds with traditional-treatments. Ninety-one per cent of farmers pointed out that more frequently occurring and devastating disease was Newcastle Disease. The major criteria used for judging of the price of local chickens were body weight (34.22%), plumage color (33.33%) and comp-type (32.35%). Fluctuations in the prices of the village chicken and chicken-products were mainly due to purchasing power of the consumers (33.35%) and fasting (33.20% and availability of products (32.45%). Almost all farmers were selling their chicken and chicken products in local markets with the average prices of 7.88±2.29, 11.66 ±2.56, 11.86 ± 4.35, 9.08 ± 4.45 and 0.31±. 0 4 Birr for pullets, hens, cocks, cockerels and eggs, respectively. Of all classes of chicken, significant ($P < 0.05$) variation between seasons and prices were observed for cockerels, which were 10.5 in winter and 9.0 Birr in summer seasons while season had significant ($P < 0.05$) effect on the body weight of local cockerels and the body weight of cross bred hens was affected by agro ecology. For better productivity, changing traditional management would be the first priority.

101. Study on Goat Husbandery Practice and Productive Performances in Sekota Woreda of Amhara Region

Muluken Zeryhun, Zeleke Mekuriaw and Eyassu Seifu
Year: 2006

Abstract: The study was conducted in Sekota Woreda of Amhara National Regional State with the objectives of assessing traditional goat husbandry practices, identification of production potentials and constraints and quantifying on-farm pre-weaning growth and milk yield performance of local goats. In this study, the Woreda was divided into two strata based on agro-ecology: sub-humid and semi-arid. A total of six PAs (12.4 percent of the total PAs), i.e., four PAs from semi-arid and two PAs from sub-humid stratum were purposively selected based on their accessibility and density of goat population. A total of 144 households were randomly selected for this purpose (24 households from each selected PA). The sample households were selected randomly with the assistance of Development Agents of the respective PAs. Following Survey work, on-farm evaluation of pre-weaning kid growth rate and milk yield of local goat types were carried out. The results revealed that goats are the most widely reared livestock species in the semi-arid stratum whereas cattle are widely maintained in sub-humid stratum. Extensive system of grazing is the only grazing practice in the area. The flock structure comprises mostly adult females and their offspring. Animal husbandry tasks such as tending and milking are handled by the family members. Age at first mating for the female and male goats was found to be 6-8 months and 8-10 months, respectively. The probable service life of a buck was about 2-4 years and the reproductive life of a doe was 10-12 years. Milking of goats starts within a week after kidding and they are milked twice a day. On-farm growth performance assessment of Sekota Woreda goats indicated that the average birth weight, weaning weight and pre-weaning growth rate were 2.27 kg, 7.91 kg and 67.63 g/day, respectively. Goats kept in the study area had smaller lactation milk yield and average daily milk yield compared to other African breeds. The lactation milk yield, average daily milk yields and lactation length were 31.26 kg, 351.28 g/day and 3 months, respectively. Thus, the study area goats are non-dairy type. The major constraints of goat production in the study area were drought, feed shortage, disease, market problem and predator. Therefore, to improve goat production (milk and meat) in Sekota Woreda the aforementioned constraints should be mitigated.

102. Identification and Rectification of the Causes of Poor Fertility and Hatchability of Eggs from Rhode Island Red (RIR) Chicken Breeds in Selected Zones of Ethiopia

Shiferaw Mulugeta, Tadelle Dessie and Alemu Yami
Year: 2006

Abstract: This study comprises two parts: survey and on-station experiment. The objectives of the study was to identify some possible causes of poor fertility and hatchability of eggs from Rhode Island Red (RIR) breed and to determine the effect of spraying vegetable oil and elevating relative humidity during incubation to control water loss of fertile eggs. The field study was carried out in four regional zones (Sidama, Western Gojam, Eastern Hararghe and Eastern Shoa) of Ethiopia. The sampling technique used was a non-probability sampling comprising both purposive sampling (zones and woredas) and convenience sampling (villages and farmers). The on-station experiment was conducted at Debre-zeit Agricultural Research Center (DZARC) with the following five treatments. Treatment 1 = 80-85% RH for the whole incubation period (no=298 eggs). Treatment 2 = treatment 1 + spraying vegetable oil on the eggs (no=298 eggs). Treatment 3 = 90% RH for the whole incubation period (n=291 eggs). Treatment 4 = after 12th days of incubation till the hatching period the RH was 90% RH (n= 292 egg) and treatment 5 = 5% more RH than treatment 1 (90% RH) during the hatching period only (n=294 eggs). The current survey result revealed that there is a highly significant hatchability difference ($P < 0.001$) between breeds (local and RIR). The different management practices like egg storage duration, egg storage condition, egg storage position, Selection and testing of eggs for incubation, treatment of broody hens, setting and bedding materials, treatment of hatching eggs before incubation, size of the eggs, sex ratio, disease, nutrition and environmental factors like season were observed to affect the hatchability and also contributed to the observed highly significant hatchability difference ($P< 0.001$) among zones. Eastern Shoa zone showed a significant ($P < 0.05$) hatchability difference with Western Gojam and Eastern Hararghe for eggs from local breed and also showed a significant ($P < 0.05$) hatchability difference with other zones for eggs from RIR breed but numerically have higher mean percent hatchability of eggs from local and RIR breeds than other zones. On contrary Eastern Hararghe zone showed a significant ($P < 0.05$) hatchability difference with other zones for eggs from local breed and numerically have lower hatchability value of eggs from local and RIR breeds than other zones.The experimental result from DZARC revealed that there was significant hatchability difference ($P < 0.05$) within treatments in percent fertility between treatments and percent hatchability both on total set eggs and on fertile eggs. Mean percent fertility for Treatment 2 was significantly ($P < 0.05$) different from other treatments. Treatment 5 showed significant difference ($P < 0.05$) on mean hatchability of eggs from both fertile and total set eggs than all treatments except Treatment 1 but numerically treatment 5 was higher in the mean percent fertility and mean percent hatchability both on fertile and total set eggs than Treatment 1. The weight loss from Treatment 2 was less than the recommended level as compared with other treatments. Breakout analysis result indicated that death at later stage (after 18th day) was observed to be higher than death at early stage and death at medium stage. From the survey result it can be concluded that high evaporation of water due to longer egg storage duration, lack of attention for the position of eggs during storage and inappropriate egg storage position which prevent growth of the embryo towards air cell, lack of treating which are laid at home than other sources and lack of good methods of selecting and testing eggs for incubation and also the accuracy of egg selection methods, lack of practice of treating broody hens by providing feed and water regularly, minimum weight loss caused by blockage of pores from contamination of eggs with feaces and mud due to lack of treating hatching eggs before incubation, the presence of many pores on shell and high evaporation of water through these pores due to selection of bigger sized eggs, inability to limit the number of male(s) running with females, diseases like new castle disease and mites, poor nutrition and environmental factors like season especially long rainy season were identified as the major causes of poor hatchability of eggs from RIR, local as well. From the result of on-station experiment it can be concluded that spraying vegetable oil on hatching eggs was also observed to decrease the hatchability of eggs from RIR drastically by preventing the recommended level of weight loss through evaporation. On contrary increasing the RH by 5% more than the recommended level during the hatching period only increased hatchability of RIR eggs.

103. Chicken Production Systems and Monitoring Around the Villages of Dire Dawa Town

Tesfu Tadesse, B.P. Hegde and Tadelle Dessie
Year: 2006

Abstract: Survey and monitoring study on village chicken production system was conducted in three low land peasant associations of Dire Dawa Administration, Ethiopia. A total of 100 households were involved of which 72 and 28 households have participated in the surveying and monitoring part of the study, respectively. The objectives were to assess the local chicken management practices and productivity of village chicken. The study was conducted between April and September 2006. The study revealed that, the overall mean flock size per household were 8.39 ± 0.50 of which 7.43 ± 0.45 (88.6 percent) were local chicken. The overall average age at laying, and clutch cycle/bird/year was found to be 6.69 ± 0.07 months and 3.67 ± 0.08 cycle/year, respectively. All households provided water and supplementary feed to their chicken. Sorghum or mixture of sorghum and maize and pearl millet were the common grains supplemented. Source of supplementary feed was mainly both household harvest and purchase. Women were mostly responsible to make decision on off take of egg and chicken and own the income from sale. The overall mean number of mature hens per household was 2.17 ± 0 .12 of which about 11.5 percent were idle hens. About 59.7 percent households select breeding cock based on body size, color, double comb, yellow smooth shank and activeness. Similarly, about 76.4 percent of respondents select hens for brooding. Past hatching performance was the main selection criteria while mothering ability was also considered. Mostly eggs and birds were used for sale and replacement, respectively. About 55.8, 34.9, 9.3 percent of eggs produced were used for sale, hatching and consumption, respectively. Eggs were sold only for money by 54.9 percent of respondents and other methods were for money and exchange for consumables in the same village shops, sold for money and or given as payment for grain milling service in the same village. Almost all farmers sell their chicken in Dire Dawa town to middle men. Predation and disease were the main constraints of chicken production. The overall mean weight of chicks at hatch, eighth week of age and at laying were 29.95 ± 0.31, 225.61 ± 2.50 and 1022.46 ± 4.24 g, respectively. The mean number of eggs/bird/clutch was 14.07 ± 0.61. The number of eggs set for hatch was low (6.00 ± 0.25) and hatching percentage was 81.5 percent. Mortality up to eight week of age was 50.3 percent. The overall average age at weaning of chicks was found to be 52.71 ± 1.77 days. The mean slaughter weight of male and female chicken was 1325.00 ± 37.88 and 1096.67 ± 15.40, respectively. The overall mean carcass weight and dressing percentage (both sexes) was 826.12 ± 24.03 g and 68.13 ± 0.48 percent, respectively. There was significant difference ($P < 0.01$) between male and female birds in slaughter weight, carcass weight and dressing percentage ($p<0.05$).

104. The Status and Major Constraints of the Production and Marketing of Camel in Babilie and Kebribeyah Woredas of Jijiga Zone, Ethiopia

Yohannes Mehari and Zeleke Mekuriaw
Year: 2006

Abstract: The study was conducted in Babilie and Kebribeyah woredas, Jijiga Zone of the Somali Regional State with the objectives of identifying the production potential, socioeconomic value of camels and to examine the existing marketing situation of camel and camel products in the study areas. The method of data collection employed was a single-visit-formal-survey. The biological and social variables considered were milk production, body weight, herd structure, draught power, reproductive performance, marketing and constraints to camel production. The data were analyzed using Statistical Package for Social Sciences (SPSS) version 12. The mean age at first mating for male and female camels was 5.8 and 4.9 years for Babilie and 5.8 and 5.0 for Kebribeyah woredas, respectively. The mean linear body measurement of camels was compared with age. It was found that abdominal girth, chest girth in front of breast pad, and height was not significantly different ($P > 0.05$) between different age groups of camels but chest girth behind breast pad was significantly higher ($P< 0.05$) in 13 than in 18 years of age . The mean live weight of camels for Babilie woreda was 435.2 and 378 kg for mature male and female camels, respectively, whereas in Kebribeyah it was found to be 407.3 and 402 kg for mature male and female camels, respectively. In the present study, the majority of respondents indicated the lactation length of camels to be 12 months. Meat production potential of a camel was found to be 230.02 – 240.28 kg for male and 187.74 – 195.14 kg for female in Babilie woreda, respectively, whereas in Kebribeyah woreda it was found to be 214.77 – 225.03 kg for male and 199.76 – 207.16 kg for female, respectively. The regular and occasional type of work of camels in the study area were packing, transportation, ploughing and traction. The analysis of variance (ANOVA) of the paired sample t-test for age, average selling price and number of camels sold and bought indicated the existence of significance difference ($P < 0.01$) between age of camels sold and bought and that of average price of camels sold and bought. There was significance difference ($P < 0.05$) for camel numbers sold and bought also. All respondents from Babilie and Kebribeyah woredas were agro-pastoralists, and migration is common to all. Migration places were different between and within woreda. The ownership right for camels in Kebribeyah woreda was for both male and female, whereas in Babilie woreda the ownership right goes to the male only. The number of camels for dowry depends on the wealth status of parents. Fertility problems, diseases, lack of veterinary services, deforestation, and lack of water were the major constraints for camel production in these areas. Lack of mineral water, marketing problems, conflicts and drought were found to be the minor problems. No saving and credit service were available in both woredas. The existence of a wealth of indigenous knowledge for treating different diseases was identified in this study. In conclusion, camel is one of the most important livestock for pastoralists' livelihood as a source of milk, meat and draught power. For the better productivity of camels, the major constraints such as lower fertility rate, shortage of water and disease problems should be mitigated.

105. Effects of Rice Bran and/Or Noug Seed (*Guizotia abyssinica*) Cake Supplementation on Feed Utilization and Live Weight Change of Farta Sheep

Abebaw Nega and Solomon Melaku
Year:2007

Abstract: The study was conducted with the objectives to determine the feed intake, digestibility, and live weight change of Fatra sheep fed on hay and supplemented with rice bran, noug seed cake and their mixtures. Twenty five intact Farta sheep with a mean initial live weight of 19.23 $\pm$ 0.28 kg were used. The experimental sheep were blocked into five blocks of five animals based on their initial body weight in randomized complete block experimental design. The five dietary treatments consisted of hay alone (T_1), hay + rice bran (RB) (T_2), hay + mixtures of rice bran(RB) and noug seed cake (NSC) at a ratio of 1:2 (T_3), hay + mixtures of (RB) and (NSC) at a ratio of 2 :1 (T_4) and hay + NSC (T_5) and randomly assigned to each sheep within a block. The basal diet hay, water, and common salt were offered ad libitum, but the concentrates were fed at the level of 300 g dry matter (DM)/head/day. The study had two parts, i. e., the digestion and feeding trials of 7 and 90 days, respectively. In both cases the sheep were housed in individual pens. The experimental feeds were analyzed for dry matter (DM), and nutrients. During the trial period, feed offered, refusals, faeces and body weight change were recorded .The result of the study showed that supplementation improved the total dry matter intake (TDMI), organic matter intake (OMI), crude protein intake (CPI) and acid detergent fiber intake (ADFI) in the feeding trial, but not neutral detergent fiber intake (NDFI). The digestibility of (DM) in T_5 was significantly higher ($P < 0.05$) than in T_1 and T_2. The digestibility of (DM) in T_4 was also significantly ($P < 0.05$) higher than T_1. This showed that the digestibility of (DM) was highly improved by the supplementation of NSC, and its high proportion with RB (at a ratio of 2:1). The digestibility of crude protein (CP) in T_5 was significantly higher ($P < 0.001$) than in T_1. Crude protein intake and all nutrient digestibilities including the DM were positively correlated. All forms of supplementation enhanced the digestibility of nutrients significantly ($P < 0.01$) except for ADF. Besides these results, live weight gain of experimental sheep was significantly improved ($P < 0.01$) by supplementation with NSC (T_5) or its mixtures with RB (T_3 and T_4). Similar to feed intake, digestibility and live weight gain, feed conversion efficiency was found to be improved in T_4 and T_5 than in T_2 and T_1, likewise, the economic benefit was found in T_3, T_4 and T_5, respectively. Based on these results, it can be concluded that supplementation of NSC and its mixtures with RB at a ratio of 2:1 and/or 1:2 at the rate of 42, 43 and 44% of the total DMI, respectively could be recommended as optimal level for better feed intake, digestibility live weigh gain and profitability in the feeding of Farta sheep.

106. Effects of Supplementation of Cactus (*Opuntia ficus* Indica)-*Teff* Straw Based Diets with Oil Seed Cakes on Feed Utilization, Body Weight Changes and Carcass Traits of Tigray Highland Sheep

Amare Degu, Solomon Melaku and Gebreyohannes Berhane
Year: 2007

Abstract: The experiment was carried on at Maichew Agricultural Technical Vocational Education and Training College (ATVETC). Twenty four male yearling Tigray High land sheep with an average live weight of 21±2.6 kg (mean ± SD) were used to investigate the effect of different protein sources on feed intake, nutrient digestibility, live weight change and carcass parameters in a study comprising of 90 days feeding trial, followed by seven days of digestibility trial and evaluation of carcass parameters at the end of the experiment. The treatments consisted of ad libitum feeding of *teff* straw plus 172 g dry matter (DM) of cactus pear (control) supplemented with either 145 g DM cotton seed cake (CSC), 195 g (DM) noug cake (NC) or 149 g DM peanut cake (PC) per head per day each calculated to supply 62.5 g crude protein (CP). A randomized complete block design was used to conduct the experiment. The experimental sheep were categorized into six blocks of four animals based on their initial weight and the four feed treatments were randomly assigned to each animal in a block, giving six animals per treatment. *Teff* straw intake was significantly depressed ($P < 0.01$) as the result of NC supplementation. Cactus intake was not significantly different ($P > 0.05$) among the treatments. However, animals supplemented with CSC and PC had significantly higher ($P < 0.001$) total DM intake than the control and NC supplemented ones. There was no significant difference ($P > 0.05$) in apparent digestibility of NDF and ADF between the control and supplemented treatments, but CP digestibility was significantly higher ($P < 0.001$) in supplemented sheep than unsupplemented ones. DM and OM digestibility was significantly higher in groups supplemented with NC and PC compared to the control group. However, apparent digestibility of DM, OM, CP, neutral detergent fiber (NDF) and acid detergent fiber (ADF) was non-significant among the supplemented animals. A significantly superior ($P < 0.0001$) average growth rate was recorded in animals supplemented with CSC (69.1 g/d) and PC (56.7 g/d). A positive average daily gain (19.8 g/d) was observed in sheep on the unsupplemented diet. Feed conversion efficiency (FCE) was only higher ($P < 0.01$) in CSC and PC supplemented sheep compared to the un supplemented sheep. Dressing percentage on slaughter weight (SW) base was significantly higher ($P < 0.01$) in supplemented sheep than the unsupplemented ones. Significantly higher dressed carcass weight ($P < 0.01$) were observed in CSC and PC supplemented sheep compared to the control. Significantly higher ($P < 0.05$) rib-eye muscle area was observed only between T_1 and T_4. Fat thickness above rib-eye muscle was non-significant between the treatments ($P > 0.05$). When the different protein supplements were ranked based on the ratio of g CP to the average daily gain (ADG) and FCE, it was concluded that supplementation of cotton seed cake and peanut cake under the feeding condition resulted in better live weight gain, nutrient intake and carcass traits of Tigray high land sheep.

107. Production, Handling, Traditional Processing Practices and Quality of Milk in Bahir Dar Milk Shed Area, Ethiopia

Asaminew Tassew and Eyassu Seifu
Year: 2007

Abstract: The study was conducted in Bahir Dar Zuria and Mecha woredas, West Gojam Zone of the Amhara Regional State with the following objectives: to assess the milk production systems, traditional milk handling and processing practices and to determine the compositional and microbiological quality of milk produced at smallholder farmers' level. A single-visit-multiple-subject formal survey was used to collect data on milk production systems, milk handling and processing practices. A total of 150 households (75 from each woreda) were individually interviewed. Mixed crop-livestock production system was found to be the typical feature of the farming system in the study area. The major cattle breeds kept by farmers in the study area were local Zebu animals belonging to Fogera breed, unidentified indigenous animals and Fogera-Friesian crossbreds. Crossbred cows are reported to produce more milk than the local cows. The major sources of feed are natural pasture (grazing), hay, crop residues, crop after-math and non-conventional feedstuffs (Attela and Brinti). The area is characterized by a recurrent feed shortage. Concentrate and improved forage supplementation is practiced by few respondents especially those who owned crossbred cows. Mastitis, trypanosomiasis, anthrax, dermatophilosis, facioliasis and bloat were the most prevalent diseases in the area. In the study area, cows were hand milked and calves are allowed to suckle their dams prior to as well as after milking. All respondents reported that they wash hands and milk vessels before milking cows. However, the overall milking hygienic practice followed by the farmers in the area is poor. Gourd is the major container used for milking and storing dairy products in the study area. All the respondents (100%) in Bahir Dar Zuria and 93.3 percent in Mecha woreda use gourd for milking. With regard to churning, the majority of the respondents (98.7%) in Bahir Dar Zuria use gourd churn while 76.32 percent in Mecha woreda use clay pot churn. Ocimum hardiense is the most common plant species used to clean vessels used to store milk and milk products. Terminalia brownie and Acacia spp. are the most frequently used plant species for smoking milk vessels in the study area. Fresh whole milk, sour milk (Ergo), butter, buttermilk, cottage cheese (Ayib), whey, Metata Ayib and Zure are among the common dairy products produced and consumed in the study area. Metata Ayib and Zure are unique traditional dairy products produced in the study area and warrants detailed study. The reported shelf life of sour milk, cottage cheese, Metata Ayib, butter, spiced butter and ghee were found to be 4.1 days, 2.9 days, 2.8 years, 13.7 days, 11.4 months, and 19.2 months at ambient temperature, respectively. The dairy products sold in the study area through the informal marketing system are fresh whole milk, butter, spiced butter and Metata Ayib. Lack of market, low milk yield and lack of demand were the major reasons reported for not selling fresh whole milk in the study area. The major constraints to milk production in the study area are feed shortage, disease prevalence, low milk yield of local cows, inadequate artificial insemination services, lack of milk collection centers, and shortage of labour. Whereas, lack of milk collection centers/ lack of market, poor quality milk products and long churning time were reported to be the major problems of the traditional milk processing practices. Only two dairy cooperatives were identified in Bahir Dar Zuria woreda; whereas there is no dairy cooperative in Mecha woreda. Lack of market, low product price, less demand for processed dairy products, lack of cooling facilities coupled with lack of electric power supply and frequent breakage of cream separator are the major constraints encountered at the dairy cooperatives. The overall mean fat, protein, total solids, ash and solids-not-fat (SNF) contents of local cows' milk produced in the study area were 4.71, 3.25, 13.47, 0.73 and 8.78 percent, respectively. Whereas, the overall mean fat, protein, total solids, ash and SNF contents of crossbred cows' milk were 4.14, 3.45, 13.15, 0.70 and 8.96 percent, respectively. The overall mean total bacterial count, coliform count and percent lactic acid of milk produced in the study area were 7.58 ± 0.09 $\log_{10}$ cfu/ml, 4.49 ± 0.11 $\log_{10}$ cfu/ml and $0.23\% \pm 0.01$, respectively. The overall mean of the predicted probabilities of clot-on-boiling and alcohol tests were 0.23 ± 0.12 and 0.51 ± 0.11, respectively. The milk samples collected from the dairy cooperatives in Bahir Dar Zuria woreda had poor microbiological quality as compared to the milk samples collected form individual farmers. In general, the microbiological quality of milk produced by individual farmers and by the dairy cooperatives in the study area was poor and this calls for scrupulous hygienic measures during production and handling of milk and milk products in the study area.

108. Effect of Vetch (*Vicia dasycarpa*, L.) and Alfalfa (*Medicago sativa* 'Hunter River') Hay Supplementation on Feed Intake, Digestibility and Body Weight Change of Arsi Bale Sheep Fed a Basal Diet of Urea Treated Barley Straw

Dawit Abate and Solomon Melaku
Year: 2007

Abstract: The study was aimed to assess the effect of supplementing different levels of vetch (Vicia dasycarpa `lana') and alfalfa (Medicago sativa,' Hunter river') hay on feed intake, digestibility and body weight change of Arsi-Bale sheep fed on urea treated barley straw. The experiment consisted of the digestibility trial of 7 days and a feeding trial of 90 days. The digestibility trial was undertaken with twenty eight yearling intact male of Arsi-Bale sheep with the body weight of 15.92 $\pm$ 1.88 (mean $\pm$ SD) kg whereas, thirty- five yearling intact male sheep with initial live weight of 16.42 $\pm$ 0.56 (mean $\pm$ SD) kg were used for the intake and live weight change study in completely randomized block design (CRBD) with seven treatments. The dietary treatments were urea treated barley straw (UTBS) (T1), UTBS plus 150, 250 and 350 g DM per day of vetch for T2, T3, T4, respectively and UTBS plus 150, 250 and 350 g DM/ day of alfalfa for T5, T6 and T7, respectively. Urea treatment improved crude protein (CP) and in vitro organic matter digestibility (IVOMD), and decreased the neutral detergent fiber (NDF) component of barley straw. Intake of UTBS was significantly affected ($P < 0.001$) by the level of forage legume supplement it decreased as the amount of supplement increased. However, intake of UTBS was not affected ($P > 0.05$) when forage legumes were supplemented at lower and medium level of supplementation. The fact that the highest dry matter (DM) intake of UTBS was obtained at this supplementation level may indicate that the optimum level of forage legume supplementation lies in the range of 25-35% of the total diet. Supplementation of UTBS with the higher levels of vetch and alfalfa resulted in a lower intake of the basal forage, but higher total DM and digestible DM intake. The apparent digestibility of DM of the diet increased ($P < 0.001$) substantially by supplementation of UTBS with vetch and alfalfa hay as compared to the control. However, there was no significant differences in apparent DM digestibility among the vetch supplemented group at the level of 250 and 350 g for T3 and T4 and hence, further increase in the quantity of forage legumes might not result in improvement of DM digestibility of the diet. The total intake of CP increased with level of supplementation of both forage legumes. The high level of alfalfa supplementation resulted in higher ($P < 0.05$) CP digestibility than similar levels of vetch supplementation. Among the forage supplemented sheep, T6 resulted in higher ($P < 0.001$) CP digestibility without any significant reduction of basal feed intake and substitution effect. At the same level of forage legume supplementation, intake of digestible CP was lower ($P < 0.001$) for vetch hay than alfalfa hay supplemented sheep. Supplementation of UTBS with forage legumes increased total metabolizable energy (ME) and organic matter (OM) intake and digestibility of OM, however, since there were no significant differences ($P > 0.05$) in OM digestibility among the higher and medium level, supplementation of vetch and alfalfa above 250 g DM/day might not result in further increment in OM digestibility. The NDF and ADF digestibility improved when UTBS was supplemented with both forage legumes hay. The highest daily live weight gain and total live weight change over the feeding period was recorded for the higher level of forage legume supplementation. However, the average daily gains per g DM supplement decreased as forage legume supplementation increased and the higher ($P < 0.001$) gain of 0.14 and 0.1 g per g DM supplement were recorded for alfalfa and vetch hay supplemented at 150 g DM/day, respectively. Generally, it can be said that offering animals with UTBS as sole feed was enough to meet the maintenance needs and allow small gain in weight. The increase in total intake of DM and other nutrients indicated that the intake of metabolizable energy and protein would have been greater in the forage legumes supplemented diets and this may account for the better animal performance. Comparing the two forage legumes species, sheep fed on alfalfa hay recorded higher total CP and ME intake; and showed higher body weight gains. Hence, vetch hay appeared to be slightly inferior in nutritive value compared to alfalfa hay as a source of nutrients for sheep fed low quality feeds such as UTBS. Future studies should investigate on the inclusion of other additional feedstuffs to broaden the options for supplementation of low quality feeds such as UTBS with other forage legumes. Moreover, on farm studies in improving the utilization of poor quality roughages by employing different supplementation strategies need to be conducted.

109. Effect of Supplementation of Hay with Noug Seed Cake (*Guizotia abyssinica*), Wheat Bran and Their Mixtures on Feed Utilization, Digestibility and Live Weight Change in Farta Sheep

Fentie Bishaw and Solomon Melaku
Year: 2007

Abstract: This study was carried out with the objective of studying the response of Farta sheep in feed intake and live weight change when fed on hay supplemented with noug seed cake (NSC), wheat bran (WB) and their mixtures. The digestibility trial of 7 days and 90 days of feeding trial was conducted using 25 intact male Farta sheep with a mean initial live weight of 16.83 ±0.169 kg. The experimental animals were arranged randomly into five blocks based on the initial live weight and the five treatments were assigned randomly to each animal in a block. Five dietary treatments used in the experiment comprised of grass hay fed ad libitum (T1), grass hay ad libitum + 300 g DM WB (T2), grass hay ad libitum + 300 g DM (67% WB: 33% NSC mixture) (T3), grass hay ad libitum + 300 g DM (67% NSC: 33% WB) (T4) and 300 g DM/ head/day NSC (T5). Common salt and water were offered ad libitum. The supplements were offered twice daily at 0800 and 1600 hours. The experimental sheep were kept in individual pens. Supplementation of NSC, WB and their mixtures significantly increased ($P < 0.01$) the total dry matter (DM) (665.84-788 g/head/day) and ($P < 0.001$) crude protein (CP) intake. Unsupplemented sheep consumed significantly higher ($P < 0.01$) grass hay DM (540.5 g/head/day) as compared to the supplemented treatments (365.8-488 g/h/d), except T2. Among supplemented sheep, T5 had significantly higher ($P < 0.001$) CP intake (99.98 g/head/day) than the others (85.52-90.2 g/head/day). Supplementation significantly improved ($P < 0.001$) the digestibility of CP (66.61-78.9%), but there was no significant effect ($P > 0.05$) on DM, OM, NDF, and ADF digestibility between supplemented and control treatments. Very low CP digestibility (11.55%) observed in basal diet (grass hay) used in this study indicated that feeding sole grass hay could not provide nutrients even for maintenance requirement of growing sheep. Significant final and daily live weight gain ($P < 0.001$) in the range of 70.11-82.44 g/head/day was observed in supplemented Farta sheep, but unsupplemented sheep lost weight by 9.11 g/head/day. Numerically, among the supplemented treatments, sheep supplemented with higher proportion of NSC in T4 (201 NSC + 99 g WB) gained more weight than the rest though not statistically significant ($P > 0.05$). The absence of statistical difference in daily body weight gain between all supplemented sheep indicated that the supplementation of NSC, WB and their mixtures had similar potential to provide nutrients. Generally, supplementation of NSC, WB, and their mixtures to the basal grass hay diet improved feed conversion ratio, total DM intake, CP intake and CP digestibility and it also improved the growth performance with similar trend for all supplemented Farta sheep over the control group. Therefore, from biological point of view to attain required level of slaughter body weight within short period of growing program, sheep producer can use all the supplement types depending upon their local availability, but in the order of priority T4, T5, T3 and T2, respectively. However, based on partial budget analysis, supplementation of 300 g DM/head /day NSC (T5) could be recommended as profitable for producers with no capital limitation; whereas, T4 supplementation (201 g NSC + 99 WB DM/day) is recommended when there is capital scarcity.

110. Reproductive and Productive Performance of Holstein Friesian Cattle at Alage, Southern Ethiopia

Fisseha Melaku and Zeleke Mekuriaw
Year: 2007

Abstract: Alage located at about 217 km southwest of Addis Ababa and situated at longitude of about $38^{0}30'$ east and latitude of 07^{0} 30' north. It lies at an altitude of 1600 meters above sea level in the agro-ecologically dry plateau of the southwestern part of the Ethiopian Rift Valley system. The area has three distinct seasons, namely main rainy (June to September), short rainy (March to May), and dry (October to February) seasons. The mean annual rainfall of the area is 800 mm, with mean minimum and maximum temperatures of 11 and 29 ^{0}C, respectively. The Alage dairy farm was established in 1983 by introducing 300 Holstein Friesian heifers from different sources. At the time of establishment, the primary objective of the dairy farm was to provide milk and milk by-products to orphan children, as the institute itself was an orphan care center. Animals kept at Alage dairy farm are exclusively stall-fed and the management system of the farm can be considered as intensive. Grass usually harvested from the natural type of conserved open savanna grassland was used for hay making and served as the major source of feed for heifers and milking cows. Concentrate purchased from the market and formulated in the feed processing plant of the dairy farm has been used as supplement. Calves were allowed to stay with dams for an hour after birth and then they were separated from their mothers and bucket fed with one to two liters of milk for seven days. Besides, the calves were provided with four liters of mixed milk individually in bucket for the following six months period then transferred to the heifer's house. The farm had been using pure Holstein Friesian semen from National Artificial Insemination Center for inseminating cows since 1985. Heat detection was usually done from 6:00 AM to 9:00 PM when the milking cows and heifers are in exercise yards. Animals were Culled based on low reproductive rate, old age, and serious disease conditions. Milking cows that kept in conventional barn milked by hand twice a day, morning and evening (i.e. at 3:00 AM and 3:00 PM), and the volume of milk per milking per cow is measured immediately. The study was carried out to evaluate the productive and reproductive performances of Holstein Friesian cattle kept at Alage farm. For this study, records compiled from 1990 to 2006 at the Alage dairy farm were used as original data. After checking the compiled record cards, those cards that had animal's birth date, disposal date, first calving date, and lactation and breeding records were used as sources of data. Cards having incomplete records and unclear handwritings were not used for this study. Effect of season, year, parity, and age group at 1st calving on reproductive and productive traits were evaluated. A total 186 records were used to generate 1745 data for reproductive traits (186, 404,596,404, and 155 for AFC, CI, NSPC, DO, and longevity, respectively) and 1706 data for productive traits (572, 561 and 573 for LL, LMY, DMY, respectively). The data were analyzed using the general Linear Model of the Statistical Analysis System (SAS, 1999). The overall mean ± (SE) for reproductive traits were 43.14 ± 1.7 months, 514.33 ± 23.44 days, 236.71± 23.96 days, 1.30± 0.24 service, and 8.18± 0.4 years for AFC, CI, DO, NSPC, and longevity, respectively. The overall mean ± (SE) for productive traits was 8.54 ± 0.28 kg, 2685.46± 98.56 kg, and 342±15.61 days for DMY, LMY, and LL, respectively. Season of calving significantly affected ($P < 0.05$) all productive traits. Cows that calved during the short rainy season performed better, but season of birth had no effect on both productive and reproductive traits. Similarly, season of insemination had no effect on NSPC. Daily milk yield (DMY), LMY and reproductive traits were significantly affected ($P < 0.001$) by year of birth. Calves born in 2000 and 2002 showed relatively better performance for AFC, DMY and LMY. Longevity, and CI and DO values were better for calves born in 1990 and 1997. Year of calving and parity also significantly affected ($P < 0.001$) all productive and reproductive traits. But NSPC did not affect by year of insemination and parity. Cows that calved in 1997 and 2005 had relatively better performance of CI, DO, DMY, LMY, and LL. The CI, DO, DMY, and LMY were relatively better at 5th parity and deteriorated thereafter.

111. Characterization of Milk Production System and Opportunity for Market Orientation: A Case Study of Mieso District, Oromia Region, Ethiopia

Kedija Hussen, Mohammed Yosuf and Azage Tegegne
Year: 2007

Abstract: This study was conducted in Mieso district in western Hararghe Zone of Oromia Regional State to characterize milk production and marketing system and identify opportunity for market orientation. This study was initiated with the objectives of generating baseline data in the area of milk production and marketing system. The study was undertaken in five purposely selected rural kebeles of Mieso district; and these were Dire-kalu, Welda-jejeba, Hunde-misoma, Gena, and Huse-mendera. Farmers from each rural kebeles were selected using Proportional Probability to Size (PPS) approach for each rural kebele. A total of 120 farmers were selected based on the number of households. The sample households in each rural kebeles were stratified in to female and male headed households. For the market study, two market sites were purposively selected namely, Mieso and Asebot markets due to the accessibility of the area. Milk marketing was monitored over two seasons, i.e., rainy and dry seasons. The average pasture land size of the sampled households was 1 ha, with a range of 0.25-10 ha. On average, there were more number of goats (6.03 ± 0.30) holdings than cattle (5.69 ± 0.35) and camel (1.83 ± 0.92) per household. However, the average numbers of animals per species found in the studied rural kebeles was highest for goats (723), than for cattle (683) and camel (220). The proportion of female to male ratio of cattle in the district was 2.57: 1. Traditional hand milking was the major type of milking practices in the whole parts of studied area. During the study period, about 99.2 % of the households had milking cows, and 97.5 % of these households indicated that only female members of the household are responsible for milking. However, 2.5 % of the households indicate that not only females, but also males take part in milking of cows. Almost all of the households indicated that cows are milked twice during the wet season and once during the dry season. About 72 % of the respondents indicated that camels are milked up to thrice a day during the wet and dry seasons. Milk and milk product sale (96 % of the respondents) and crop sale (95 % of the respondents) take the highest percentage of source of income. All the respondents indicated that cattle, camels and goats are fed principally on communal natural pasture throughout the year. Agricultural byproducts, mainly crop residues of sorghum and maize are the major feed resources in the studied area. Traditionally, sorghum and maize plantation used as fodder for livestock feed, and it is locally called as chinki. As an additional feed, mineral soil salt, locally known as "haya", it is used by 40 % of the respondents during wet as well as in the dry season. All milk animals in the study area are indigenous breeds and have not been characterized. The overall mean (mean ± SE) age at first calving for cows and she camels were 52.49 ± 0.91 and 63.37 ± 1.55 months, respectively. The overall mean calving interval for cows and she camel were 16.01 ± 0.49 and 18.53 ± 1.02 months, respectively. The estimated mean milk yield/head/day was 1.24 ± 0.02 liter for cows and lactation yield per cow was 271.4 liters over an average lactation period of seven month (7.29 ± 0.17). Overall estimated mean camel milk yield/head/day was 2.4 ± 0.06 and lactation yield head was 797 liters over an average lactation period of eleven months. The estimated average total milk produced per household per day in the wet and dry seasons was 4.80 ± 0.22 and 2.37 ± 0.11 liters, respectively for cows. Similarly, the average total milk produce per household per day in the wet and dry seasons was 13.19 ± 0.945 and 7.63 ± 0.82 liters, respectively for camels. The majority of the households sale whole milk (78 %) than whey (4.2 %). Butter is produced for sell by about 67 % of the respondents. About 72% of the respondent indicated that they sale cow milk during both the dry and wet seasons. The average volume of cow and camel milk sold per household per day during the rainy season was 3.55 ± 0.28 and 3.61 ± 0.45 liters, respectively. However, during the dry season, the respective volumes decreased to 2.15 ± 0.22 and 2.58 ± 0.37 liters. Cow and camel milk supply to the market decreases by 39 % and 28 % during the dry season, respectively. This indicates that camel milk sale increases during the dry season. The amount of milk sold in Mieso market per day was significantly ($P \leq 0.05$) higher for cow (496.6 ± 19.12 liters) as well as camel milk (187.89 ± 19.12 liters) than the Asebot market site. The price of cow and camel milk during the wet season is lower (1.88 ± 0.10 Birr/liter and 1.63 ± 0.10 Birr/liter) than during the dry season (3.38 ± 0.10 Birr/liter and 2.98 ± 0.10 Birr/liter), respectively. Generally, there are two milk marketing systems; namely, traditional milk associations or groups and the producer themselves (individual seller). The traditional milk association or group is locally known as 'Faraqa Annanni'. From the total (n=94) households who sell milk, only 22 (23 %) were involved in the milk association or groups. An average amount of milk sale by group (3.94 ± 0.18 liter/person) were significantly ($P \leq 0.05$) higher than individual (1.64 ± 0.06 liter/person). The total amount of milk sold (liter/person/day) at the two market sites differed significantly, being higher in Mieso (3.27 ± 0.17 liters/person) than in Asebot (1.91 ± 0.06 liters/person). The number of individuals per

Faraqa Annenni/day was not significantly ($P > 0.05$) different between Asebot (2.94 ± 0.12) and Mieso (3.05 ± 0.22). However, there was more number of seller groups in Mieso. This may be due to the involvement of pastoral milk seller groups from the adjacent district of Mullu in Somalia Region. As the logit regression result indicates the availability of Faraqa Annanni in the area had positively ($R^2 = 0.60$) and significantly ($P \leq 0.1$) related with the participation decision of the household to sale cow milk. The other variable which has a significant ($P \leq 0.05$) impact on the decision behavior of the household is its location from the market. As the model output indicates, the farther the household is away from the market center the less will be its participation to the cow milk sale. Education level of the household heads were negatively ($P \leq 0.05$) correlated with participation decision on cow milk sale. This negative correlation ($R^2 = 0.60$) of education level of the household heads with participation on cow milk sell indicates that rather than milk sale, decision on other activities were more. Contrary to the expectation, amount of goat and camel milk produced in the household were negatively ($R^2 = 0.60$) and significantly ($P \leq 0.01$ and $P \leq 0.1$) related to market participation decision of the household on cow milk sale. This indicates that more production of camel and cow milk tends to shift the household consumption pattern from camel and goat milk to cow milk, which reduces the available cow milk for sale. Most of the respondents indicated that milk sale was highly affected by small milk quantity (73 %) followed by distance to market (38 %). Only 7.6 % of the respondents indicated cultural taboo as a limiting factor for milk market participation. Therefore, the figure indicating that this issue is not a serious problem in the area. Overall cattle and camel pre-weaning mortality rates were 61.7 ± 5.2 and 66.7 ± 14.7. Mortality due to diseases was identified as a major cause of loss in cattle (65% of respondents) and camels (67%) in the study area. Mastitis, Anthrax, pasteurolosis, diarrhea, Blackleg and FMD (Foot and Mouth Diseases) were the major diseases that affect cattle in the area. Only 33 % of the respondents indicated that they have access to extension services on dairy animal production. The farmers contact with extension staff once or twice a year and there is no strong and regular visit and follow-up. Generally, among the problems of dairy production in the area, seasonal feed and water shortage, security problem, and poor access to veterinary services were the major ones. In addition to this, low knowledge capacity and the limited number of the development agents were also reported to be common problems in the extension service. All milk animals in the study area have not been characterized. There is no any milk cooperatives organized in the area. Instead there are traditional self-organized milk seller groups, Faraqa Annanni. Milk sale was highly affected by small milk quantity followed by distance to market. In addition, milk sale was also affected by non-availability of Faraqa Annanni in the area. Accordingly, improve the available natural pasture and implement rangeland management systems, introduce and develop improved forages as sole crops or integrated with cereal crop production should be made. There should due attention to the way of dealing with conflicts over use of resources in the district, conflict resolution method should be addressed and community should be a starting point for ideas to develop a strategic plan. There should be training for development agents and extension staff in the district about milk production, handling and processing techniques. It is necessary to improve animal health services through paravet training and drug supply system with close monitoring and supervision. Breed improvement should consider the multipurpose utility of local breeds, where it is feasible with improved feeding and proper management systems. Furthermore, establish milk collecting and processing unit through encouraging the already existing self-organized group, 'Faraqa Annanni'. The longer AFC and DO limited the animals not to produced more than three calves throughout their lifetime. Therefore, attention should be given to early heifer management. Besides, with a better efficient heat detection, timely insemination, postpartum reproductive health management and feeding, it is possible to improve DO from first service. Season of calving significantly affect only the productivity of the animals. However, year of calving and year of birth highly significantly affect both productivity and reproductivity of the animals under consideration. Therefore, management practices should be persistent across years and seasons to avoid seasonal and annual variability in productivity and reproductivity of the animals. In addition to this, the average level of 305-days milk yield in the study was evidently 46-55% below the genetic potential of the animals, which should not be less than 5000-6000 kg. Therefore, use of pure Holstein Friesian cattle in resource limited areas essentially requires serious precautionary measures.

112. Quality and Hatchability of Eggs Stored in Zeer Pot Compared to Traditional Storage Containers of Metema District, North Gonder, Ethiopia

Molla Muhammed, B. P. Hegde and Berhan Tamir
Year: 2007

Abstract: A formal random survey on 120 farmers and a series of on-station experiments were conducted on storage of eggs. The survey revealed that the farmers of Metema Woreda stored the eggs on an average 7 days and 14 days before marketing and brooding, respectively. The two most common containers used were card board carton and plastic jugs bedded with dry grass and straw. The costume made standardized Zeer pot (with 4 cm gap between the inner and outer earthen pot to fill the gap with sand and then soaked with water) was compared with carton, plastic jug and cold room of the hatchery for 21 days. The average temperature inside the inner pot was significantly less (13.5 ^{0}C) compared to other storage devices (16^0 C to 18.5 ^{0}C). The quality and hatchability of stored eggs were compared in CRD factorial experimental design with four storage methods (Zeer pots, cartons, plastic jugs and cold room) and three storage durations(7, 14 and 21 days) and three replications (each with 12 eggs). It was found that weight loss of eggs stored in cold room (2.33 %) and Zeer pots (2.11 %) were statistically similar at 14 days of storage and less than cartons and plastic jugs. On 21 days of storage, weight loss of eggs stored in Zeer pots was 4.17 percent which was not significantly different from eggs stored in cold room but local storage methods lost more weight. There was no significant variation in egg shell thickness among four methods of storages. The average Haugh unit of eggs stored in Zeer pots (81.75) was not different from eggs stored in cold room (80.23) and superior to that of eggs stored in traditional methods during first week of storage. On 21 days of storage, eggs stored in Zeer pots, cold room, plastic jugs and cartons were significantly superior one over the other in that order. Even at 21 days, the eggs stored in Zeer pots and cold room were under the group of AA grade. In experiment of the hatchability of total eggs set, percentage hatchability of eggs stored for 7 days varied from 61.10 to 66.7 and values were similar among storage methods. On 14th day, the hatchability of eggs stored in Zeer pots (55.50 %) and cold room were similar and significantly superior ($P \leq 0.001$) to the local storage methods. However, the eggs stored for 21 days in Zeer pot achieved 47.23 percent hatchability, which is significantly higher than the eggs stored in cold room (30.53 %), plastic jugs (27.77 %) and cartons (13.97 %) and significant difference among each egg containers were found. The trend on fertile eggs set was similar to total eggs for 7 and 14 holding periods. But, on 21 days of storage, fertile eggs of Zeer pots, cold room, plastic jugs and cartons produced 53.34, 34.24, 31.34 and 16.06 percent chicks, respectively. Zeer pot was significantly superior devise compared to the rest of treatments. The eggs stored in control room, plastic jugs and Zeer pots were similar in percentage mortality of embryos at early stage of development up to second week of storage. But, at 21 days, early death percentage of embryos for Zeer pots (34.24 %) was significantly ($P \leq 0.001$) lower than the traditional storages and the cold room of modern hatchery (50.00 %). Highest incidence of early death (74.24 %) was recorded for cartons at third week of holding period. Late death percentage of embryo was not influenced by storage methods and interaction. But, storage duration had significant effect. Except for interaction, the effect of storage methods and duration was significant ($P < 0.01$) for percentage values of quality chicks. Even though the effect of two factors on chick quality was independent, significant influence of storage methods on chicken quality was found at holding period of three weeks. The two most common egg storages of Metema district were significantly lower than Zeer pots in quality chick output (58.9 percent). Therefore, Zeer pot is superior in preservation of egg quality and producing more number of quality chicks.

113. Husbandry Practices of Goats in Dalocha Woreda, Southern Ethiopia

Wondwosen Kebede and Mohammed Yosuf
Year: 2007

Abstract: The study was conducted in the Dalocha Woreda located in Siltie Administrative Zone of Southern Nations, Nationalities and Peoples Region from January to September 2005. The objectives were assessing husbandry practices of goat and identifying major goat production constraints in the study area. The study was undertaken through survey and on-farm monitoring. Informal survey and Participatory Rapid Appraisal method were used to generate information during the exploratory survey. Ninety households were selected randomly for formal survey. The eighteen households and animals for on-farm monitoring were purposely selected. Higher labour unit of the family is derived from adult females than adult males. Adult females were also more involved in goat milking and goat house cleaning. An average of 7.1 goats per household was kept in the study area. Main reason for goat raising for household was consumption as stated by farmers (52.6%). Goat flocks were dominated by large proportions of adult females. The major feed resource for goats was natural vegetation that comprises mainly (76.6%) browse plant species. Around 50% of the farmers water goats every other day and most farmers (91.1%) supply minerals to goats. Most farmers (84.4%) housed goat together with other animals. About 53.3% of the informants removed mucous from the newly born kids to prevent respiratory problems. Exposing kids to air and sunlight was also practiced by a few (35%) farmers. Most kids were (54.4%) weaned just after three months of age. About 64.7% of the farmers traditionally castrate goats after one year of age. Most farmers (85.6%) didn't use controlled breeding. The method of selection of goats for breeding purpose involves assessment of different body parts such as leg, chest, neck, shoulder, brisket, udder and hip bones. From November to March and from March to September were main mating and kidding seasons, respectively. The mean age at first mating of both does and bucks were 8.8 $\pm$ 3.72 and 8.5 $\pm$ 3.80 months, respectively. Age at first kidding was 14.4 $\pm$ 4.35 months. Goat kidding potential per year and per two years was 1.52 $\pm$ 0.50 and 2.97 $\pm$ 0.68, respectively. Kidding interval was found to be 8.62 $\pm$ 3.21 months and litter size of 1.34 $\pm$ 0.5 was observed. Annual reproductive rate (ARR) of 189.13% was recorded for goats. The overall mean daily milk yield per goat of 0.352 $\pm$ 0.008 liters and total (lactation) milk yield per dose of 29.532 $\pm$ 0.627 liters were obtained. Mean birth weight, weight at 3 and 6 months of age for kids were 1.64 $\pm$ 0.08 and 7.85 $\pm$ 0.34 and 10.67 $\pm$ 0.39 Kg, respectively. Male kids were found to be heavier than females. Pestedespetitis Ruminant (PPR) and Helminthiasis respectively were more prevalent diseases of goats in the area. Pre-weaning mortality rate of kids was 22.8%. In general, the comprehensive goat husbandry practice in the woreda is traditional system with major goat production constraints such as goat disease, diminishing size of grazing lands, inefficient livestock extension services, predators attack and small farm size. Moreover, inefficient livestock development interventions both from governmental and non-governmental organizations coupled with absence of good marketing facilities and road are also important constraints of goat production in the study area. Therefore, appropriate disease control and prevention measures; and establishment of health services with all required facilities and treatment programs, man power, and accessible to farmers; and training to livestock experts and extension staff and farmers concerning goat health should be considered. Moreover, introduction of forage legumes and mixed cereal/ shrub grazing approach need to be recognized to tackle feed shortage problem. Facilitate farmers' participation in goat development programs and related issues, effective and closer linkages between governmental and non-governmental institutions involved on goat production and related issues should be realized. Choice of breed adapted to the local area and goat housing problems should be recognized in the study area. Infrastructures such as construction of roads, and an alternate market in addition to the present markets should be realized.

114. The Effect of Different Levels of Cottonseed Meal Supplementation on Feed Intake, Digestibility, Live Weight Changes, and Carcass Parameters of Sidama Goats

Matiwos Solomon, Solomon Melaku and Adugna Tolera
Year: 2007

Abstract: The experiment was conducted at Dilla Agricultural Technical Vocational Education and Training (ATVET) College using twenty-four yearling intact male Sidama goats with a mean live weight of 16.78 ± 1.14 kg (mean ± SD). The objective of the experiment was to examine the effect of different levels of cottonseed meal on the feed utilization, weight change, and nutrient digestibility and carcass parameters of Sidama goats. The experiment consisted of ninety days of feeding trial and seven days of digestibility trial followed by evaluation of carcass parameters at the end of the experiment. The treatments included ad libitum feeding of hay (control) and supplementation with three levels of cottonseed meal (CSM) at 200 g, 300 g and 400 g per head per day on dry matter (DM) basis. The experimental design was RCBD. The experimental goats were blocked into six blocks of four animals based on initial live weight and randomly assigned to one of the four treatment diets. Significantly lower ($P < 0.01$) hay DM intake was observed in supplemented goats. Cottonseed meal DM intake was significantly different ($P < 0.01$) among the supplemented treatments, increasing as the level of CSM increased. Unsupplemented goats were significantly ($P < 0.01$) lower in average daily gain (ADG) and final body weight. A positive ADG (10.19 g/d) was observed in goats on the control treatment. No significant difference was seen in NDF and ADF digestibility ($P > 0.05$) between supplemented and control treatments, whereas CP digestibility was significantly higher ($P < 0.01$) for supplemented goats, and significantly higher difference ($P < 0.05$) in DM and OM digestibility was observed between the control and highest level of CSM supplemented treatment. Animals fed hay alone had significantly lower ($P < 0.01$) empty body weight, hot carcass weight, dressing percentage and rib-eye muscle area. It was concluded that supplementation of CSM at 300 g DM per day appears to be an economical level to Sidama goats.

115. Study on Sheep and Goat Raw Skin Grading and the Effects of Different Methods of Line Air-Drying On Goat Skin Preservation in and Around Bahir Dar, Amhara Region

Zenbaba telila, Solomon Melaku and Desalegne Mengesha
Year: 2007

Abstract: The study was conducted to assess the major defects in sheep and goatskins and to evaluate the effects of different line gaps in line air-drying on goatskin preservation. The study was conducted from September to December 2006 in four skin traders hide and skins shades located in Bahir Dar town. The skin traders' stores were selected purposively based on the size of their operation, with a minimum collecting capacity of 10,000 skins per annum. Thirty percent of the raw sheep and goatskins (fresh, wet-salted sheep and goatskins and air-dried goatskins), collected by the traders was selected using simple random sampling method for examination of these skins for different defects (peri-slaughter and post-slaughter), masses (extra light, light, medium, heavy and extra heavy) and sizes (extra small, small, medium, large and extra-large). Samples were examined every day in the study period at all selected skin traders' shades. The skins were sampled and graded by their appearance and category based on the standard set by the Ethiopian Quality and Standard Authority. The experiment on line air drying of fresh goatskins was conducted using a 4 x 3 x 3 factorial arrangement in a complete randomized design (CRD) with three replications to see the effect of different gaps of line air drying (0, 15, 30 and 45 cm), skin masses (light, medium and heavy) and stocking time (0, 30 and 60 days) on proportion of putrefaction and weight difference. Defects caused by dirt and knife (holes, gouge marks, poor pattern and corduyoring) are found to be among the most important defects of sheep and goat skins. The proportion of grade 1 skins in case of salted sheepskins was 29.68% while that of fresh sheepskins was 21.60% of the total samples examined. The proportion of grade 1 in case of fresh and salted goatskins was 23.2% and 29.63%, respectively among the total goat skin samples examined. The result of analysis of the effect of the different factors studied (mass, rope gap and stocking period) on the proportion of putrefaction of goat skins indicated that there is a significant effect ($P \leq 0.01$) on the proportion of putrefaction and weight difference of the skins between each category of all these three factors. The result of the current study on the correlation between putrefaction proportion and weight difference proportion within the three mass categories and the four rope gaps showed that they are inversely related in that putrefaction proportion decreases with the increase in weight difference proportion. Recommendations were given so that slaughtering of sheep and goats should be done by professionals in order to reduce the defects created during flaying which are found to be among the major defects observed during examination of sheep and goatskins in the current study. In areas where the temperature and relative humidity is similar with Bahir Dar, the three rope suspension method with the 30 cm rope gap is recommended for use based on the results of the current study as a routine method of line air drying of goat skins in order to reduce putrefaction. It is also recommended that appropriate standards should be set for skin in order to reduce the defects such as putrefaction created during storage.

116. The Effect of Feeding Azolla (*Azolla filiculoide*) as a Partial Protein Supplementation on the Performance and Carcass Characteristics of Broiler Chicks

Befikadu Zewdie, Mengistu Urge and L. M. Pant
Year: 2008

Abstract: Feeding different levels of azolla (*Azolla filiculoide*) as a partial protein supplement in broiler chick diets were studied to assess its effects on dry matter intake, growth performance, feed and protein conversion ratio and efficiency, carcass characteristics and profitability of the ration. The experiment was conducted for 56 days and 180-two-day-old COBB-500 commercial broiler chicks that were purchased from Alema farm, Debre-Zeit were used. The broiler chicks were randomly allotted to four dietary treatments namely, control diet (T1, 0% azolla inclusion), diet containing 5% azolla meal (T2), diet containing 10% azolla meal (T3) and diet containing 15% azolla meal (T4), with azolla altering mainly the proportion of noug seed cake, in three replicates. The chemical composition of the azolla meal were 23.9 % crude protein (CP), 13.8 % crude fiber (CF), 2.3 % ether extract (EE) and 19.6 % ash. Noug cake contained 20.4 % CP, 17.2% CF, 4.5% EE and 10.6% ash. The daily body weight gain (BWG) and dry matter intake (DMI) during the starter phase ranged from 26.6 (T4) to 28.4 g/day/bird (T2), and 22.9 (T3) to 23.2 (T2) g/day/head, respectively. There were no significant differences in BWG and DMI during the starter phase of the experiment ($P > 0.05$), but T2 had numerically slightly better feed conversion ratio (0.82) than T3 (0.86) and T4 (0.87) groups ($P > 0.05$). Daily body weight gain and feed conversion ratio (FCR) during the finisher phase ranged between 20.5 (T4) to 29.4 (T2) g/day/bird, and 4.71(T2) to 6.83 (T4), respectively. The daily BWG and FCR during the finisher phase were higher ($P < 0.001$) in T2 as compared to the other treatment groups. Combined analysis of both starter and finisher phases data also revealed that daily body weight gain and feed conversion ratio were higher in T2 (28.9 g/day/bird and 2.7) compared to the other treatments ($P < 0.001$). Growth rate and feed conversion ratio generally depressed progressively with increasing levels of azolla above 5% inclusion in the ration. However, no significant difference recorded in feed intake throughout the experimental period. Dressed carcass weight, which ranged between 1334.2 (T3) to 1513.8 (T2) g/day/head, was higher ($P<0.05$) in chicks fed with diet containing 5% azolla as compared to the other treatments, indicating that nutrients consumed by T2 were more efficiently used for carcass production. Giblet percentage was significantly ($P < 0.01$) increased with increasing levels of azolla meal in the ration indicating that high level of fibre inclusion in the ration of chickens enlarge body organ. T2 had higher total return (10.75 Birr) and net return (2.3 Birr) as compared to the rest treatments indicating the profitability of this treatment. Inclusion of azolla at 5% level (T2) in broiler ration improved all animal performance parameters measured in the current experiment as compared to T1, T3 and T4. The results of the present experiment, therefore, suggested that low level of azolla (5%) inclusion in the ration could be used as an alternative source of cheap protein in broiler diet.

117. Supplementation of Graded Levels of Rice Bran and Noug Seed (*Guizotia abissynica*) Cake Mixtures on Nutrient Utilization of Farta Sheep Fed Natural Pasture Hay

Bimrew Asmare and Solomon Melaku
Year: 2008

Abstract: The study was carried out at Woreta Agricultural Technical Vocational Education and Training College, Ethiopia, with the objective to determine the feed intake, digestibility body weight change and to evaluate the economics of the feeding regime in Farta sheep fed on natural pasture hay and supplemented with graded levels of noug seed cake (NSC) and rice bran (RB) in 2:1 ratio. Twenty intact male Farta sheep with average body weight of 16.9 + 1.68 kg were used in both the 90 days of feeding and 7 days of digestibility trials. The experimental animals were arranged randomly into five blocks of four animals based on the initial body weight and the four treatments were assigned to each animal in a block. The dietary treatments used in the experiment consisted of grass hay fed ad libitum (T1), grass hay ad libitum + 200 g DM (T2, low), grass hay ad libitum + 300 g DM (T3, medium), grass hay ad libitum + 400 g DM (T4, high). Common salt and water were available to animals allt the time. The supplements were offered twice daily at 0800 and 1600 hours. Supplementation of NSC and RB mixtures in 2:1 ratio significantly increased ($P < 0.001$) the total DM intake which was in the range of 447.37 g/d in the control treatment to 749.05 g/din the high level supplemented group. Among supplemented sheep, T4 had significantly higher ($P < 0.05$) CP intake (92.01 g/head/day) than the other treatments (45.51-82.44 g/head/day). Supplementation significantly improved ($P < 0.001$) the digestibility of DM (58.10-69.77%) compared to the control (47.65%). The control group and lower level of supplementation had lower digestibility coefficients of OM, CP, NDF and ADF. The final body weight and daily body weight gains were higher ($P < 0.001$) for the supplemented compared to the control treatment. The average daily body weight gains of 2.67, 37.78,47.78, 77.22 g/head/day were observed for T1, T2, T3 and T4, respectively. The current study also revealed that, supplementation of grass hay diet improved total DM intake, nutrient digestibility and feed conversion efficiency of the supplemented treatments than the control group. The partial budget analysis of the present study showed that sheep offered with the highest level of concentrate (T4) returned a higher net income (34.36 ETB) as compared to the other levels of supplementation. However, the marginal rate of return decreased as the level of supplementation increased with the value of 2.63, 2.08, and 1.97 for T2, T3 and T4, respectively. In the current study, it was concluded that supplementation of hay with 400 g DM/day/head concentrate mixture is biologically efficient and potentially profitable in the feeding of growing Farta sheep.

118. Effects of Supplementation with Sweet Potato Tuber and Haricot Bean Screenings on Feed Utilization, Growth and Carcass Characteristics of Adilo Sheep

Biru Kefeni, Solomon Melaku and Adugna Tolera
Year: 2008

Abstract: The experiment was carried out at Wolayita Soddo Agricultural Technical Vocational Education and Training College, using twenty-four male intact yearling Adilo sheep with a mean body weight of 24.4 ± 2.15 kg (mean ±SD) in a feeding trial and 24.5± 2.17(mean ±SD) in digestibility trial. The experiment was conducted with the objective of determining the impact of different levels of mixtures of sweet potato tuber (SPT) and haricot bean screenings (HBS) supplements to native grass hay on feed intake, digestibility, and body weight change and carcass parameters of Adilo sheep. The digestibility trial was conducted for 7 days after acclimatizing the sheep for 15 days to the treatment feeds followed by a feeding trial of 90 days. The animals were vaccinated against anthrax and pasteurellosis, dewormed and sprayed against internal and external parasites, respectively, before the start of the experiment. The experimental design used for all parameters was randomized complete block design. The experimental sheep were blocked into six blocks of four animals based on their initial body weight and randomly assigned to one of the four treatment diets within a block. The treatments included ad libitum feeding of grass hay (control, T1) and supplementation with mixture of SPT and HBS at 1:1 ratio and three levels namely 125 g dry matter (DM) (T2), 250 g DM, (T3) and 375 g DM,(T4). Water and salt were available free choice. The grass hay in the current study contained 3.8% crude protein (CP), 62.07% Neutral detergent fiber (NDF) and 43.61% acid detergent fiber (ADF) and thus low in nutrient value. Control sheep consumed statistically similar amount of grass hay (726.1±21.98 g/d) compared to the supplemented groups which were 715.6±21.98 g, 712.1±21.98 g and 710.2±21.98 g for T2, T3, and T4, respectively. Higher ($P < 0.001$) total DM intake (840.6 ±21 g, 962.6 ±21 g and 1085.2 ±21 g) respectively for T2, T3 and T4 were recorded than the control (726.1±21 g/d). Supplementation significantly improved digestibility co-efficient of DM, organic matter (OM) ($P < 0.01$) and of CP ($P < 0.001$). NDF and ADF digestibility, however, did not improve ($P > 0.05$) as compared to control group. Supplementation highly increased ($P < 0.001$) final body weight (FBW), feed conversion efficiency (FCE) and average daily gain (ADG). Those supplemented with T4 had significantly higher ($P < 0.001$), FBW (27.3±0.5 kg),FCE (0.03±0.007) and ADG (36.1±5.0 g/d) as compared to the control treatment (22.0±0.5 kg), (-0.04.0±0.007) and (-24.5±5.0 g/d), T2 (25.9±0.5 kg), (0.02±0.007) and (13.2±5.0 g/d) as well as T3 (27.1±0.5 kg), (0.03±0.007) and (26.9±5.0 g/d). Moreover, dressing percentage on slaughter weight and empty body weight (EBW) basis were high for T3 ($P < 0.01$), supplemented sheep than the control. T4 had significantly higher ($P < 0.05$) for rib-eye muscle area and higher ($P < 0.001$) for slaughter weight (8.6 cm^2 and 26.7 kg), respectively. Empty body weight and hot carcass weight (20.8 and 10.8 kg) for T4 were significantly higher ($P < 0.001$) than the control treatment (14.4 and 6.6 kg). Though T4 shows better performance in most biological parameters, partial budget analysis indicated that better return in net income was obtained in T3. So T3 is an alternative and profitable feed in the feeding regime of fattening Adilo sheep using the treatment diets of this experiment.

119. Supplementation with Dried Foliage of Selected Indigenous Browses: Effects on Feed Intake, Digestibility, Body Weight Gain and Carcass Characteristics of Abergelle Goats Offered Hay

Bruh Weldemariam, Solomon Melaku and Berhan Tamir
Year: 2008

Abstract: This study was conducted at Abergelle wereda, Central Zone of Tigray, Ethiopia, using 20 male Abergelle goats with full milk teeth and mean initial body weight (BW) of 11.7± 0.34 kg (mean ±SD). The objectives were to evaluate the effect of supplementation with dried foliages of Ziziphus spina-christi (ZSC), Sterculia africana (STA) and Terminalia brownii (TBR) on feed intake, digestibility, body weight gain and carcass characteristics of Abergelle weaned kid goats fed hay. Experimental goats were adapted for 15 days to the treatment feeds. The experiment consisted of digestibility trial of 7 days and feeding trial of 90 days and finalized by evaluation of carcass parameters at the end. The experimental design was randomized complete block design with five replications consisting of four animals per block. The dietary treatments used were hay ad libitum (T1), hay + 200 g ZSC foliage (T2), hay + 200 g TBR foliage (T3) and hay + 200 g STA foliage on dry matter (DM) basis, water and salt block were available free choice. Data on daily feed intake and BW change at 10 days intervals were recorded throughout the experiment. The CP contents of hay, ZSC, TBR and STA were 6.6, 14.5, 17.5 and 19.4, respectively. Hay intakes were 276.6 g/day, 189.8 g/day, 222.2 g/day and 177.2 g for T1, T2 T3 and T4 respectively and was higher ($P < 0.001$) for T1 compared to T2 and T4 . The intake of TBR foliage (131.6 g/day) was lower ($P < 0.001$) compared to the other two browse species (187.4-195.1 g/day). Total DM intake (353.8-384.9 g/day) was higher ($P < 0.001$) in supplemented animals than the control (276.6 g/day). The total CP intake was affected by supplementation and was higher for supplemented goats (37.8-48.1 g/day) than the control (18.4 g/day). Nutrient digestibility except NDF was improved in all supplemented goats as compared to the control ones. Similarly, there was higher ($P < 0.01$) daily BW gain (12.4-23.8 g/day) in the supplemented weaned kids than non-supplemented weaned kids (-2.9 g/day). In addition feed conversion efficiency was improved ($P < 0.05$) in supplemented goats compared to the control. Mean slaughter weight (SW), empty body weight and rib eye- muscle area were higher ($P < 0.01$) for the supplemented treatments than the control except for TBR supplemented goats. However, hot carcass weight was found to be heavier ($P < 0.001$) in T2 than the control. Dressing percentage in SW was higher ($P<0.05$) for ZSC compared to the control and TBR supplemented goats. Nevertheless total edible offals (TEO), total usable product (TUP) ($P < 0.01$) and total usable product percent (TUP %) were higher ($P < 0.001$) for supplemented compared to the control. In conclusion, supplementation with dried browse foliage to goats kept on hay resulted in improved DM intake, nutrient digestibility, to some extent BW gain and carcass parameters. However, feeding hay alone to Abergelle goats cannot supply nutrients for maintenance of BW. Among the browse foliage used as supplement, ZSC appears to be a better supplement since it resulted in relatively higher feed intake, digestibility, BW gain and carcass parameters. Thus, ZSC supplementation to goats when based on low quality feed is more beneficial to producers.

120. Beef Cattle Production System and Opportunities for Market Orientation in Borena Zone, Southern Ethiopia

Daniel Tewodros, Tadelle Dessie, Azage Tegegne and Zeleke Mekuriaw
Year: 2008

Abstract: This study attempted to investigate the beef cattle production system and opportunities for market orientation in southern Ethiopia, Borena Zone. The specific objectives of the study were to characterize cattle production systems, assessment of marketing systems, assess seasonality of domestic cattle meat consumption; and assess potentials and constraints of export abattoirs in Ethiopia. To achieve these objectives, secondary and primary data were used. Export abattoirs, producers, and butcheries interview were sources of primary data. Export abattoirs survey was undertaken on ELFORA Agro-Industries PLC and LUNA export slaughter house PLC. Producers' survey was done the pastoral areas of Borana Zone of Oromiya Regional State in three Pastoral Associations (PAs) and these were Surupha, Dida Yabello and Dubluk. Producers from each PA were selected using Proportional Probability to Size (PPS) approach for each PA. A total of 150 producers were selected based on the number of households in the PAs. To see the marketing system, four markets were covered from Borena pastoral area (Surupha, Haro Beke, Yabelo, and Dubluk). Butcheries survey was done on the purposively selected areas and these were Kara, Sululta, Dukem and Burayu. Butchery's from each direction of Addis Ababa were selected using Proportional Probability to Size (PPS). A total of 50 butcheries were selected based on their availability in each of the four areas. To see the seasonality of cattle meat consumption, slaughterhouses which give services to the respective butcheries were covered. According to results of the study, 52.7% of the herd owners keep beef cattle to generate cash income and farming purposes. The major feed resources for 147 (98.6%) of the respondents rely on grass from grazing as a basal feed for their cattle, out of which 54 (36.2%) of them used salt as a supplement. Deep wells are the major sources of water in the study areas. According to the sample households the constraints to cattle production system were shortage of grazing land, water, disease, lack of technical supports, lack of security, labor shortage and conflict. Regarding the market information sources, the majority of the respondents 138 (92%), got market information before they went out to sell their cattle. However, the major sources of market information in the study area were informal. Technical supports on cattle marketing issues were obtained from development/extension agents. For 63.3% of the respondents, the determination of the price at the market places were through negotiation between the sellers/producers and the buyers. About 33% (N=149) of the respondents stated that cattle prices increase during the rainy (wet) seasons, mostly from July to August. The major reasons for the cattle price variation across months/seasons as stated by 114 (76.5 %) of the respondents were the seasonal feed and water availability. The major countries that import beef from Ethiopia are Yemen, Egypt, Congo Brazzaville and Cote D'Ivoire, and the export of beef cattle were either in the form of live or processed meat (chilled or frozen carcass). Thus breed, sex, age, weight and sometimes color of the animal for the live export are the major criteria considered by the live animal exporters and export abattoirs during purchase. The major constraints of the export abattoirs were frequent occurrence of livestock diseases, feed and water shortage along export trade routes, market intelligence and transportation. About 84% of the butcheries purchase beef cattle for slaughtering and retailing meat in their butchers. On average, carcass weight of 143.33 ± 5.27 (Mean ± SE) kilogram per head was reported by butcheries, the selling price of a kilogram of beef was 19.36 ± 0.423 ETB (Mean ± SE). However, the price of meat were significantly ($P \leq 0.05$) higher 26.00 ±2.041 (Mean ± SE) at Dukem and cattle meat yield were significantly ($P \leq 0.05$) higher 164.00 ± 8.95 (Mean ± SE) at Kara as compared to the other locations. The low demand periods for cattle meat correspond with the period of religious fasting periods by the Ethiopian Orthodox Church followers, the slaughter houses cease or minimize their services due to the fact that butcheries stop ordering cattle slaughter services. The constraints of the butcheries were high tax rates, slaughterhouses problems, high price of cattle at the markets and the illegal backyard slaughtering practices. The overall finding of the study underlined the high importance of institutional support in the areas of market oriented cattle production system, market extension, animal health services and range development in the pastoral area, development of export abattoirs facilities, reducing multiple taxes. Therefore, development interventions should give emphasis to improvement of such institutional support system between exporters, butchers and producers, so as to achieve income to these market actors.

121. Present Situation of Urban and Peri-Urban Milk Production and Quality of Raw Milk Produced in West Shoa Zone, Oromia Region, Ethiopia

Derese Teressa, Eyassu Seifu and Fekadu Beyene
Year: 2008

Abstract: The study was carried out in and around five towns (Guder, Ambo, Ginchi, Addis Alem and Holleta) in West Shoa Zone, to assess urban and peri-urban milk production systems and determine the quality of raw milk produced in the area. A total of 140 farms (70 urban and 70 peri-urban) were considered and the study was carried out from February to May 2007. Household heads or persons directly responsible for animal handling and decision making were interviewed using a semi-structured questionnaire. The information obtained through interview include household demography, herd composition, cattle type and number, sex of animals, feeds and feeding methods, housing of cattle, water resources, milking method, milk production and utilization, marketing outlets and major constraints associated with dairy production. In addition, milk from 40 farms, 20 from urban and 20 from peri-urban farms were collected for chemical composition and microbiological analysis. Both quantitative and qualitative data collected during the survey were analyzed using Statistical Package for Social Sciences (SPSS) and General Linear Model (GLM) of Statistical Analysis System (SAS) was employed to analyze the chemical composition and microbial quality data. Average (± SD) family size of urban and peri-urban households was 6.89 ± 1.88 and 7.33± 2.57, respectively while average cattle herd size in urban and peri-urban farms was 4.68 ± 3.89 and 7.57 ± 6.54, respectively. The proportion of cows in the total cattle herd reported in the current study was 52 percent. The contribution of milking cows was 71.8 and 67.5 percent of the total cows in urban and peri-urban farms, respectively. The crossbred dairy cattle were mostly Holstein Friesian crosses with different blood levels. The local cows in the urban areas had an average(± SD) calving interval, lactation length and age at first calving of 19.8 ± 1.34, 6.9± 0.94 and 46.08 ± 4.44 months, respectively, while in the peri-urban areas these values were 20.6 ± 2.22, 7.5 ± 1.27 and 48.84 ± 4.48 months, respectively. Local cows in urban areas produced an average(± SD) daily milk yield of 2.0 ± 0.44 liters and lactation milk yield of 414 liters whereas local cows in the peri-urban areas produced an average daily milk yield of 1.61± 0.45 liters and lactation milk yield of 247.5 liters. For the crossbred cows, average (± SD) calving interval, lactation length and average age at first calving were 15.2 ± 1.05, 9.97 ± 2.21 and 33.24 ± 7.8 months, respectively in urban areas, while in the peri-urban areas these values were 16.98 ± 2.45, 10.1 ± 1.78 and 31.56 ± 7.92 months, respectively. Crossbred cows produced an average daily milk yield of 9.14 ± 2.67 and 6.47 ± 2.37 liters in urban and peri-urban areas, respectively. The mean (± SD) protein, fat, total solids (TS), solids-not-fat (SNF), and ash contents of local cows' milk produced in urban farms were 3.26 ± 0.11%, 5.22 ± 0.37%, 13.66 ± 0.49%, 8.44 ± 0.39% and 0.75 ± 0.02%, while these values were 3.34 ± 0.11%, 5.06 ± 0.18%, 13.44 ± 0.43%, 8.38 ± 0.42% and 0.73 ± 0.09% in peri-urban farms respectively. The mean(± SD) protein, fat, TS, SNF, and ash contents of crossbred cows' milk produced in the urban farms were 3.67 ± 0.26%, 4.27 ± 0.35%, 13.07 ± 0.59%, 8.89 ± 0.44% and 0.70 ± 0.06%, while these values were 3.7 ± 0.25%, 4.37 ± 0.39%, 13.18 ± 0.48%, 8.78 ± 0.48% and 0.71 ± 0.06% in peri-urban farms, respectively. The overall (± SE) total bacterial count, coliform count and percent lactic acid of milk produced in the study area were 7.32 log 10 cfu/ml, 4.84 log cfu/ml, and 0.24%, respectively. This study shows that shortage of feed was the most important factor responsible for low milk yield and productivity of dairy cattle in both urban and peri-urban areas. High bacterial counts both in urban and peri-urban farms were observed as compared to the recommended international standards. Hence, concert effort is needed from all concerned Government and Non-government organizations to alleviate the problem and to take adequate sanitary measures at all stages of production chain, thereby increasing potential for investment in dairying.

122. Supplementation of Haricot Bean (*Phaseolus vulgaris*) Haulms with Mixtures of Wheat Bran and Brewers Dried Grain on Feed Utilization, Live Weight Gain and Carcass Parameters in Blackhead Ogaden Sheep

Emebet Legesse, Solomon Melaku and Mengistu Urge
Year: 2008

Abstract: The experiment was carried out at Haramaya University, using twenty-five intact male Blackhead Ogaden sheep with a mean body weight of 18.0±1.6 kg (mean±SD). The experiment was conducted with the objective of determining the impact of different mixtures of wheat bran (WB) and brewers dried grain (BDG) supplements to haricot bean haulms (HBH) on feed intake, digestibility and nitrogen balance, live weight change and carcass parameters of Blackhead Ogaden sheep. The experimental sheep were adapted to the treatment feeds for two weeks. The experiment was consisted of seven days of digestibility trial and ninety days feeding trial followed by evaluation of carcass components at the end of the trial. The animals were vaccinated against anthrax and pastreullosis, dewormed and dipped against internal and external parasites, respectively, before the start of the experiment. The experimental design used for all parameters was randomized complete block design. The experimental sheep were blocked into five blocks of five animals based on their initial body weight and randomly assigned to one of the five treatment diets within a block. The treatments included ad libitum feeding of HBH (control, T1) and supplementation with 2WB:1BDG (T2), 1WB:2BDG (T3), sole WB (T4) and sole BDG (T5), which was offered at 300 g/head/day. Water and mineral licks were offered freely at all times and the basal (HBH) diet was given ad libitum. The CP content of the HBH in the current study was 9.1% on DM basis. Control sheep consumed higher ($P < 0.001$) HBH (662.4±12.38 g/d) compared to the supplemented groups (493.5±12.38, 510.8±12.38, 492.7±12.38 and 495.3±12.38 g/d for T2, T3, T4 and T5), respectively. Higher ($P < 0.001$) total DM intake (767.2±12.38, 786.7±12.38, 764±12.38 and 773.9±12.38 g/d, respectively for T2, T3, T4 and T5) were recorded for the supplemented sheep than control (662.4±1.38 g/d). Supplementation did not improve ($P > 0.05$) digestibility of DM, OM, NDF and ADF, however, CP digestibility was increased ($P < 0.001$) due to supplementation. Supplementation increased ($P < 0.01$) N-intake and N-retention. Lower ($P < 0.01$) nitrogen intake (7.6±0.15 g/d) and retained (3.5±0.34 g/d) was obtained for control sheep than supplemented ones. Higher ($P < 0.05$) fecal and total nitrogen excretion were recorded for supplemented than control group. Generally, N-retention was positively and linearly correlated ($P < 0.001$, $r=0.95$) over N-intake. Supplementation increased ($P < 0.001$) final body weight, FCE and mean body weight gain. Those supplemented with 1WB:2BDG (T3) had the highest final weight (25.8±0.38 kg), FCE (7.1±0.38) and (56.4±3.12 g/d) as compared to the control (20.4±0.38 kg), (2.3±0.38) and (15.3±3.12 g/d) and T2 (23.7±0.38 kg), (5.4±0.38) and (41.8±3.12 g/d) as well as T4 (23.6±0.38 kg), (5.2±0.38) and (39.7±3.12 g/d) for FBW, FCE and ADG, respectively. In addition, T3 had higher ($P < 0.001$) ADG mean body weight gain (56.4±3.12 g/d) and FCE (7.1±0.38) than T5 (44.6±3.12 g/d) ADG and (5.8±0.38) FCE. Moreover, dressing percentage on slaughter weight basis and HCW were higher ($P < 0.01$) for supplemented sheep than the control. T3 had higher ($P < 0.001$) rib-eye muscle area and slaughter weight. Therefore, 1WB:2BDG (T3) supplement diet improve animal performance than the other treatments and could be used as an alternative feed supplement for low quality roughage (like haricot bean haulms) for small-scale finishing of Blackhead Ogaden sheep who have access to these feed ingredients.

123. The Effect of Supplementation with Barley Bran, Linseed Meal and Their Mixtures on the Performance of Arsi-Bale Sheep Fed a Basal Diet of Faba Bean Haulms

Ermias Tekletsadik, Solomon Melaku and Mengistu Urge
Year: 2008

Abstract: The study was carried out at Bekoji Agricultural Technical Vocational Education and Training College, Ethiopia, using twenty with mean initial body weight of 19.7 ±1.29 kg (mean±SD) and twenty five with mean initial body weight of 19.7 ±1.29 kg (mean±SD) yearling male Arsi-Bale sheep for digestibility and feeding trial, respectively. The objective of the study was to assess the effect of supplementation with barley bran (BB), linseed meal (LSM) and their mixtures at different proportions on feed intake, body weight (BW) change, apparent nutrient digestibility, feed conversion efficiency (FCE), carcass characteristics as well as economic return of the feeding regime in Arsi-Bale sheep fed a basal diet of faba bean haulms. The sheep were quarantined for two weeks, vaccinated against pasteurellosis and sheep pox, de-wormed against endo-parasites and sprayed against ecto-parasites before commencing the study. A complete randomized block design consisting of five treatments and four blocks in the digestibility trial, and five treatments and five blocks in the feeding trial was used. The sheep were blocked based on their initial BW and they were randomly assigned to one of the five treatment feeds within a block. The sheep were adapted to the treatment feeds for two weeks followed by seven days of digestibility trial. The feeding trial was conducted for ninety days and carcass parameters were determined at the end of the study. The treatments consisted of ad libitum feeding of faba bean haulms (control, T) and supplementation with 300 g/head/d sole barley bran (BB) (T2), 2BB:1LSM (T), 1BB:2LSM (T4) and sole linseed meal (LSM) (T) in DM basis. The basal diet was offered at 40-60% (an average of 50%) refusal. Water and common salt block lick were available to the animal all the time. Faba bean haulms had 7.7% CP, 48.0% NDF and 43.8% ADF in DM basis. Barley bran had 9.7% CP, 42.3% NDF and 15.5% ADF in DM basis. Linseed meal had 24.6% CP, 23.1% NDF and 19.9% ADF in DM basis. Supplementation improved both DMI and apparent nutrient digestibility. Supplemented treatments had higher ($P < 0.001$) total DMI (663-753.3 g/head/d) than the control (434.8 g/head/d). Apparent nutrient digestibility was higher ($P < 0.001$) for supplemented treatments than the control treatment. Sheep fed sole basal diet lost a BW of 15.6 g/d, while the supplemented sheep gained BW within the range of 55.6-87.8 g/d with no significant difference ($P > 0.001$) among T53, T4 and T. Among the supplemented treatments, the highest FCE (0.12) and FCR (8.2) were recorded in those sheep supplemented with LSM alone (T55). Supplemented sheep had better carcass characteristics than the control. Sheep fed faba bean haulms alone had lowest net return (-14.3 ETB) and had lowest ($P < 0.001$) values for carcass parameters than the supplemented treatments. Sheep supplemented with 2BB:1LSM (T) had the highest net return (88.6 ETB), highest ΔNR (102.9) and optimum MRR (2.2) compared to the other supplemented treatments. There were no significant differences ($P > 0.001$) in mean daily BW gain, FCE, dressing percentage and TMCC among T3, T4 and T53. Thus, it is recommended that supplementation with 2BB:1LSM is feasible for faba bean haulms based small scale sheep fattening schemes. Furthermore, the basal diet alone could not support maintenance level of the animal and cannot be used as a sole diet.

124. Effect of Smoking and Scrubbing Milk Containers with Selected Plant Materials on the Microbiological and Sensory Qualities of Ergo in Western Shoa Zone of Oromia, Ethiopia

Feyissa Kera, Eyassu Seifu and Gobana Ameni
Year: 2008

Abstract: This study was undertaken with the aim to assess the preservative effect of smoking and scrubbing milk containers with selected plant materials on the rate of acid development in fermenting milk during Ergo formation, and on the microbiological and sensory qualities of the final product Ergo. Ergo was prepared from fresh cows' milk in laboratory by simulating the traditional methods of preparation. Data for the effect of container smoking mean analysis and comparisons were done between samples of Ergo prepared in containers smoked with plant materials such as Olea africana (T_1), Heeria reticulala (T_2), Olinia rochetina (T_3) and control(C). For the effect container scrubbing, mean analysis and comparisons were done between between samples of Ergo prepared in containers scrubbed with Lantana trifolia ($T_{1)}$, Ocimum hardiense (T_2) and control(C). However, for the effect of container smoking and scrubbing combination, mean analysis and comparisons were done between samples of Ergo prepared in containers treated by considered combination T_1(OA+OH), T_2 (HR+OH),T_3(OR+OH) and Tc (control). A total of 75 (fresh milk = 9 and Ergo=66) samples were analysed for the determination of their microbial quality. Standard plate, lactic acid bacteria (LAB), nonlactic acid bacteria, and yeast and mould counts of the samples were made. Isolation and characterization of the general microflora and LAB of the raw milk and Ergo samples used were done by using different cultural and biochemical tests. The change in pH and titratable acidity (% lactic acid) of the fermenting milk from each treatment category were also determined at 0, 2, 4, 6, 8, 12, 16, 24, 36, 48, 60 and 72 hours of the incubation period. The sensory test of Ergo samples was conducted in a well illuminated and ventilated room. Smoking milk container shown to be significantly lower ($P < 0.05$) the SPC and development mould in Ergo samples used in the present work suggesting that smoking of milk countainers has bacteriostatic effect on the growth of milk flora. Mould was not detected in the raw milk in the present work as it opposed to present in product Ergo formed indicating that the post-harvest contaminations of the fermenting milk with spoilage microorganisms such as moulds could be occurred during fermentation time at ambient temperature. Milk container scrubbing was shown to be significantly ($P < 0.05$) lowered the growth of moulds in Ergo samples made in scrubbed containers as well attributed to the scrubbing plants used in this study exert inhibitory effect on the growth of moulds in Ergo samples. Significantly higher ($P < 0.05$) LAB and Yeast count were observed in Ergo made in scrubbed containers as compared to Ergo made in unscrubbed containers (control). Combination of smoking and scrubbing was observed to be increases the level of microbial count in Ergo samples when compared with the Ergo samples prepared in container treated by smoking alone in most cases. On the contrary, the number of mould count was shown to be significantly decreased in Ergo samples made in containers smoked and scrubbed combination. It was observed that milk container smoking has significantly ($P < 0.05$) lower the of rate acidification in the fermenting Ergo especially after 48 hours of incubation periods. Smoking of milk containers with Olea africana or heeria reticulala then scrubbing them with Ocimum hardiense could significantly slow down the rate of pH drop in fermenting Ergo especially towards the end of the fermentation process. The pH and % lactic acid in the final product Ergo formed at 72 hours of incubation period at ambient temperature (≈18-21 ^oC) ranged from 4.43 to 4.53 and 0.99 to 1.28% lactic acid, respectively. The appearance of Ergo was observed to be unaffected by the practices of container smoking. The appearance of Ergo made in containers scrubbed with Lantana trifolia had lower acceptability as compared to the control Ergo sample. Ergo samples made in scrubbed containers had shown lower mean score value as compared to the flavor of untreated (control) Ergo samples. On the other hand, container smoking significantly ($P < 0.05$) increased the mean score of flavor of Ergo. The combination of smoking with scrubbing milk containers has not improve the sensory quality of the final product Ergo rather it was observed to be the potential sources of contamination of the milk. The mean score of sourness of Ergo made in smoked and scrubbed containers was found to be significantly ($P < 0.05$) lower and

higher, respectively as compared to the sourness of the control Ergo samples. The genera Staphylococcus, Aeromonas, Pseudomonas, Enterobactericeae, Bacillus, Stereptococcus, Corynebacteria, and actinobaccillus were bacterial microorganisms isolated from raw cows' milk in the present study; this may be of great public health concern. From the bacteriological quality point of view, scrubbing of milk containers by either Lantana trifolia or Ocimum hardiense had no added advantage in improving the quality of Ergo; rather scrubbing milk containers seems to be potential source of pathogens in milk and Ergo. It seems that smoking milk containers both by Olea africana and Heeria reticulala combination, it might be possible to get rid off the most pathogenic bacterial genera such as Staphylococcus, Corynebacterium , Streptococcus and Actinobacillus spp. from Ergo; however, this requires further investigation. Lactococci and lactobacilli were the dominant generaof LAB isolated from raw milk and Ergo, respectively. Leuconostocs spp. was not found at detectable level in raw milk and the control Ergo samples. The present result suggests that milk container smoking using Olea africana and Heeria reticulala has promising potential in minimizing the post-harvest losses and improving the microbiological quality and sensory characteristics of Ergo. Therefore, smoking of milk containers by combining of different container smoking plant species would help to reduce the microbial load of milk and Ergo especially in smallholder dairy farming system in rural areas where cooling system is not feasible and preservatives are not readily available.

125. Effect of Supplementation of Simada Sheep with Graded Levels of Concentrate Meal on Feed Intake, Digestibility and Live Weight Parameters

Jemberu Dessie, Solomon Melaku and Firew Tegegne
Year: 2008

Abstract: The experiment was conducted at Simada Woreda, South Gondar Zone using twenty yearling male Simada sheep with a mean initial live weight of 17.89 ± 0.81 kg. The study was conducted with the objective to study the response of Simada sheep to feed intake, digestibility and body weight parameters when supplemented with graded levels of mixtures of wheat bran (WB), noug seed cake (NSC) and safflower seed cake (SFSC). The experiment was conducted using a randomized complete block design and experimental sheep were blocked in to five blocks of four animals based on initial body weight and the four treatments were assigned randomly to each sheep in a block. The experimental sheep were fed a basal diet of hay alone (T1), and supplemented with graded levels of concentrate mixtures offered at 150 (T2), 250 (T3) and 350 g (T4) dry matter (DM)/head/day. The composition of concentrate mixtures was at the ratio of (2:1:1) of WB, NSC and SFSC, respectively. The experimental sheep were housed in individual pens and the basal diet ha was fed ad libitum and water and common salt blocks were available to the animal all the time. The experiment consisted of 7 days of digestibility trial followed by 90 days of feeding trial. The result of the current study indicated that supplementation of concentrate mixture significantly increased ($P < 0.001$) total DM and organic matter (OM) intake which was in the range of (577-744.2 g/head/day) for DM and (521.5-679.6 g/head/day) for OM, respectively than the control (569.9 g/day) except T2. In addition, supplementation of concentrate mixture significantly increased ($P < 0.001$) crude protein (CP) intake which was in the range of (56.7-100.5 g/head/day). Un-supplemented sheep consumed significantly higher ($P < 0.001$) grass hay DM as compared to the supplemented treatments. Among the supplemented sheep, T4 had higher ($P < 0.001$) total DM, OM and CP intake. Moreover, supplementation significantly improved ($P < 0.001$) CP digestibility (78-85%) compared to the control (53%). The lower CP digestibility observed in the control treatment in the current study indicated that feeding sole hay could not provide nutrients even for maintenance requirement of sheep. Dry matter digestibility was significantly higher ($P < 0.01$) in T3 and T4 than the control and low level of supplemented (T2) sheep. No significant difference ($P > 0.05$) was observed in NDF and ADF digestibility between supplemented and control groups. Hence, the result indicated that supplementation of concentrate mix had no effect on neutral detergent fiber (NDF) and acid detergent fiber (ADF) digestibility. Supplementation of concentrate mix improved ($P < 0.001$) mean daily body weight gain of sheep in the range of 26.7 to 51.1 g/day, while sheep fed on the control diet lost 7.7 g/day. Among the supplemented treatments, sheep fed with the medium (T3) and higher (T4) levels of concentrate mix gained more weight than the lower (T2) level of supplemented sheep. Similarly, the feed conversion efficiency of supplemented sheep was higher ($P < 0.001$) compared to the control ones, but there is no significant difference between supplemented treatments though numerically T4 had the highest feed conversion efficiency. Generally, supplementation of mixtures of WB, NSC and SFSC to the basal diet hay improved total DM, OM and CP intake, DM and CP digestibility, feed conversion efficiency and hence, improved growth of sheep. The partial budget analysis of the experiment showed net income (NI) of 5.10, 9.00 and 15.20 ETB/sheep with marginal rate of return (MRR) 354, 185 and 151% for 150, 250 and 350 g concentrate supplemented sheep, respectively. From biological point of view, all concentrate mixture supplement diets improved body weight of sheep hence; sheep producers can use all the supplement types in the order of priority T4, T3 and T2, respectively. With regard to the economic benefits, supplementation of 350 g DM/day (T4) with the highest NI could be recommended as profitable for the producers with no capital constraints; whereas, if capital is a constraint for the producer, 150 g DM/day supplement mixture (T2) with the highest MRR could be recommended.

126. Effect of Supplementation with Noug Seedcake, Wheat Bran and Their Mixtures on Feed Intake, Digestibility and Live Weight Change of Washera Sheep Fed Urea Treated Finger Millet Straw

Melese Gashu, Berhan Tamir and Mengistu Urge
Year: 2008

Abstract: The experiment was conducted at Burie ATVET College for 97 days (7 days digestibility trial followed by 90 days feeding trial period) with the objectives to evaluate the effect of supplementation with noug seedcake (NSC), wheat bran (WB) and their mixtures on feed/ intake, digestibility and live weight change of growing lambs, and to assess economic benefits of supplementation. Twenty five intact male Wahera lambs with initial live weight of 17.8 +1.72 and 18.5 + 1.6 (mean + SD) in digestibility and feeding trial, respectively were used. The lambs were blocked based on their initial live weight and randomly assigned to one of the five treatments, giving five animals per treatment. The basal feed used in the experiment was urea treated finger millet straw (UTFMS). Supplements consisted of NSC, WB, and their mixtures in different proportions. The treatments consisted of feeding of sole urea treated finger millet straw as control (T1) and supplementation of the basal diet with mixtures of noug seedcake and wheat bran at 100:0, 70:30, 30:70 and 0:100% for T2, T3, T4 and T5, respectively. The level of supplementation was 300 g/d on dry matter (DM) bases. Supplementation of NSC, WB and their mixtures significantly increased ($P < 0.001$) the intakes of total DM (743-843 g/d) and total CP (99–134.34 g/d) when compared to total DMI (589.49 g/d) and CPI (49.4 g/d) of unsupplemented lambs. Unsupplemented lambs consumed significantly higher ($P<0.001$) urea treated millet straw DM (589.49 g/d) as compared to the supplemented treatments (443-543 g/d). Among supplemented lambs, T2 had significantly better ($P < 0.05$) CPI (134.34 g/d) than the others, which varied between (99–101.32 g/d). Supplementation also improved ($P < 0.001$) the apparent digestibility of DM, OM, CP NDF, and ADF. Comparing the supplemented groups, T5 had significantly better ($P<0.05$) apparent DM and CP digestibility than the other supplemented groups. Feeding with sole urea treated millet straw (T1) resulted in mean daily live weight gain of 5.56 g/d, however, supplementation of urea treated millet straw with concentrates (T2-T5) promoted higher ($P < 0.001$) daily weight gain which ranged b/n 50.2-71.3 g/d with higher feed conversion efficiency (FCE). Among the supplemented treatments, lambs supplemented with the higher proportion of WB (70%) in T4 and sole WB (100%) in T5 gained more weight ($P < 0.05$) than the lambs in T2 and T3. Based on partial budget analysis, supplementation of concentrate mixtures at (70% WB + 30%NSC) (T4) at a level of 300 g DM/d could be recommended as profitable for producers with no capital limitation. However, for those with limited capital, supplementation of 300 g DM/d sole WB (T5) could be recommended as economically profitable. Therefore, it could be concluded that supplementation of sole WB (T5) and mixtures of 70% WB + 30% NSC (T5) could be recommended as optimal level than other treatments for better utilization of nutrients, animal performance and profitability in Dangila lambs fed urea treated millet straw basal diet.

127. Effect of Supplementation with Graded Levels of Wheat Bran and Noug Seed Cake Mixtures on Feed Utilization of Arsi-Bale Sheep Fed Urea Treated Maize Cob Basal Diet

Tesfaye Negewo, Solomon Melaku Adugna Tolera
Year: 2008

Abstract: The experiment was conducted at Alage Agricultural Technical Vocational and Educational Training (ATVET) College, using twenty yearling intact male Arsi - Bale sheep with a mean body weight of 20.56± 0.45 (mean ± SD). It was conducted with the objective of investigating the influence of graded levels of wheat bran (WB) and noug seed cake (NSC) mixtures on feed intake, digestibility, live weight change, carcass parameters, and economic benefit in urea treated maize cob (UTMC). The experimental sheep were acclimatized to the treatment feeds for two weeks. The experiment consisted of seven days of digestibility trial and ninety days of feeding trial followed by evaluation of carcass components at the end of the trial. The sheep were vaccinated against common infectious diseases of sheep, dewormed and disinfected against internal and external parasites, respectively before the commencement of the experiment. The experimental design used for all parameters was randomized complete block design. The experimental sheep were blocked into five blocks of four animals based on their initial body weight and randomly assigned to one of the four treatment diets within a block. The treatments included ad libitum feeding of UTMC (control, T1) and supplementation with mixtures of WB and NSC at a ratio of 2WB:1NSC which were offered at 150 g (T2 low), 250 g (T3 medium) and 350 g DM/head /day (T4 high). Water and mineral salt were offered freely at all times and UTMC diet was given ad libitum. The CP content of the UTMC in the current study was 9.3% on DM basis. The daily DM intake of UTMC was higher ($P < 0.001$) for T4 (614.6 g) compared to the T1 (505.1 g), T2 (538.9 g) and T3 (590.3 g). Total DM intake was higher ($P < 0.001$) for supplemented treatments T2 (688.4 g), T3 (844.1 g) and T4 (966.9 g) compared to T1 (505.1 g). Supplementation did not improve ($P > 0.05$) digestibility of DM, OM, NDF, and ADF, however, CP digestibility was increased ($P < 0.001$) due to supplementation. Supplementation increased ($P < 0.001$) final body weight (FBWT), feed conversion efficiency (FCE) and mean daily body weight gain (DWTG). The group supplemented with 350 g of concentrate mixture (T4) had the highest final body weight (28.6 ±0.95 kg), FCE (8.6 ±0.04) and mean daily body weight gain (80.8 ± 7.74 g/d) as compared to the control (T1), T2 as well as T3. There was no significant difference ($P > 0.05$) between T2 and T3 in FBWT and DWTG. Dressing percentage on slaughter weight (SWT) and hot carcass weight (HCW) basis were higher ($P < 0.001$) for supplemented sheep than the control. Similarly, rib eye muscle area was also higher ($P < 0.001$) in supplemented sheep than the control. The highest total return, net income and marginal rate of return was observed in higher level supplemented sheep than the control animals. Therefore, T4 improved animal performance and marginal rate of return than the other treatments and could be used as an alternative feed supplement in UTMC based feeding of Arsi-Bale sheep.

128. Isolation of Lactic Acid Bacteria from Fermented Camel Milk and Evaluation of Their Suitability for the Production of Cultured Ergo

Araya Abraham, Eyassu Seifu, Mohammed Yusuf and Zelalem Yilma
Year: 2009

Abstract: This study was aimed at isolation and characterization of lactic acid bacteria (LAB) from traditional fermented camel milk (Ititu) and evaluating the suitability of the isolates for the production of cultured Ergo. A total of 20 fermented camel milk (Ititu) samples that aged 3 days were obtained from individual camel herders from Kereyu area. The chemical composition result indicated that Ititu had average values of 5.99 ± 0.29, 0.91% ± 0.14, 4.9% ± 0.89, 3.0% ± 0.32, 12.8% ± 1.91, 7.9% ± 1.48 and 0.8% ± 0.10 for pH, titratable acidity, fat, protein, total solids, solids-not-fat and total ash, respectively. The results of the microbial count showed that Ititu had an average (log_{10} cfu/ml) of 9.7 ± 0.19 aerobic mesophilic bacteria count (AMBC), 6.7 ± 0.21 coliform counts (CC) and 6.0 ± 0.34 yeast and mould counts (YMC). For isolation of LAB from Ititu samples, a total of 267 colonies were picked up from MRS and M_{17} agar medium initially and subjected to various morphological and biochemical tests. Based on preliminary screeing tests, 146 colonies were identified as presumptive LAB and were classified to genus level based on physiological tests and grouped to the genera Lactobacillus (85), Lactococcus (36) and Enterococcus (25). The isolates were then further identified to species level based on their carbohydrate fermentation profile. The species of LAB isolated from the traditional fermented camel milk Ititu were Lactobacillus plantarum (9%), Lactobacillus delbrueckii subsp. bulgaricus (17%), Lactobacillus salivarius (32%), Lactococcus lactis subsp. lactis (18%), Lactococcus lactis subsp. cremoris (7%) and Enterococcus faecalis (17%). All the species that belong to the genus Lactobacillus showed medium acidification activity as compared to those species that belong to the genera Lactococcus and Enterococcus. Among the isolated LAB species, Lactobacillus salivarius showed higher acid production rate as compared to others. Each of the isolated LAB were used as starter culture for the production of cultured Ergo from camel milk and the composition, microbial load and sensory quality of the laboratory made Ergo samples were determined following standard procedures. Cultured Ergo sample made using Lactobacillus salivarius as a starter showed rapid reduction of the pH of Ergo samples and produced higher amount of acid (1.45% lactic acid) at the end of the 72 h fermentation period as compared to cultured Ergo samples made using the other isolates. At any given time, the pH values of all cultured Ergo samples were lower than that of the control Ergo. In addition to higher acid production rate, Lactobacillus salivarius significantly reduced ($P < 0.05$) the growth of yeasts and moulds in cultured Ergo samples. On the other hand, Lactobacillus delbrueckii subspecies bulgaricus significantly suppressed ($P < 0.05$) the growth of coliforms as compared to other isolates. No significant difference ($P > 0.05$) in AMBC was observed between the cultured Ergo samples and the control. However, the average (log_{10} cfu/ml) microbial counts (CC and YMC) of all cultured Ergo samples were significantly lower ($P < 0.05$) than that of the control. Sensory analysis result showed no significant variation ($P > 0.05$) in aroma and sourness between the different Ergo samples; however, significant differences ($P < 0.05$) in mean scores of appearance and taste were observed between cultured Ergo samples and the control. The mean scores of taste and appearance of the control Ergo samples were higher than that of cultured Ergo samples. The results of the present study suggests that among the isolated LAB species, Lactobacillus salivarius, Lactobacillus delbrueckii subsp. bulgaricus and Lactococcus lactis subsp. cremoris can be used as potential starter cultures for the production of fermented camel milk products in the future. Moreover, the present study indicated that the isolated LAB did not improve the overall sensory quality of the cultured Ergo samples when used individually. Thus, research is needed to evaluate the effect of use of multiple (mixed) cultures of the isolated LAB species on the quality of cultured Ergo made from camel milk.

129. Assessment of Village Rhode Island Red Chicken Management Practices in Cheha Woreda and Evaluation of Different Levels of Brewers Dried Grain on Growth Performance of the Chicks

Dirsha Demam, Mengistu Urge and Solomon Melaku
Year: 2009

Abstract: In part one, assessment of management practices and productivity of Rohde Island Red (RIR) and constraints of poultry production were conducted at 3 peasant associations through a structured survey by involving 45 households. In part two, 10 weeks feeding trial was undertaken to evaluate the nutritive and supplementary value of brewers dried grains (BDG) on the growth performance of RIR chicks. The experimental rations consist of diets containing T1 (0%, control ration), T2 (25%), T3 (30%), T4 (35%) and T) (40%) brewers dried grain (BDG). The rations were formulated on an isonitrogeneous and isocaloric basis containing approximately 20% CP and 2.9 Mcal ME/kg DM. The objectives of production of the RIR chicken in order of importance were: to improve family nutrition, to generate income, to create additional (part-time) job opportunity and to create new (full-time) job opportunity, respectively. The overall flock size was recorded to be 5.6 per household. The minimum and maximum RIR chicken possessed by the respondent households was 1 and 12, respectively with average holding of 3 chicks. Among the surveyed households, only 17 (37.78%) constructed separate poultry house for day and night shelter. The primary feed resource for the flock was reported to be scavenging materials from the immediate environment. Maize, milling by-products and Kocho (product of Enset) were the most commonly used supplementary feeds by the households. The major constraints to poultry production in the region as perceived by the households were shortage of supplementary feed, lack of improved (RIR) chickens, and lack of extension services, disease and predators. The average number of eggs produced by the RIR chicken per year was 225.78 ± 11.58 eggs. The average age of female birds at first lay was reported to be 6.34 ± 0.46 months and the average weight of male and female birds at sexual maturity were 2.3 ± 0.18 kg and 1.78 ± 0.21 kg, respectively. Mean daily dry matter intake was statistically similar ($P > 0.05$) between the different treatments. However, the mean daily dry matter intake of chicks fed rations containing BDG were numerically slightly less than those groups of chicks fed on the control ration. There was no significant difference ($P > 0.05$) in mean daily body weight gain (MDBWG) between the groups fed treatment rations containing 0% and 25% BDG. But, ,MDBWG was significantly higher ($P < 0.05$) in chicks fed 0% BDG ration than those fed on rations containing 30%, 35% and 40% BDG. MDBWG among groups of chicks fed on diets containing BDG were not significantly different ($P > 0.05$). The result of dry matter efficiency ratio (DMER) indicated that T1 and T2 have gained more weight ($P < 0.01$) per unit of feed consumed as compared to T3 and T5. No significant difference was observed among the groups of chicks fed T1, T2 and T4, between T3 and T4 and between T3 and T5 rations. There was significant difference ($P < 0.01$) in chick sale to feed cost ratio. Treatment ration of T5 was the low cost ration followed by T2, T3 and T4. However, there was no significant difference among treatments containing different levels of BDG. Even though T5, T4 and T3 were found to be of the low cost rations, chicks fed on these rations had lower MDBWG and DMER when compared to the control treatment. In conclusion, the current study revealed that the respondent households had an increased interest in the production and expansion of RIR chicken, which was attributed to the better production and productivity of the breeds when compared to the local chicken and increased demand and price of the poultry products. Therefore, to increase the benefits from poultry production in general and that of RIR in particular to the rural population, provision of additional inputs such as appropriate feeding package, housing and disease prevention mechanisms are important. The result of the feeding trial of brewers dried grain showed that RIR chicks can attain acceptable growth performance when fed on ration containing up to 35% BDG between the ages of 0 to 10 weeks, but the biological maximum is 25% (T2) BDG inclusion which confirmed the previous findings. Therefore, T2 could be the recommended treatment ration to be used for rearing of chicks from day old to ten weeks of age.

130. Supplementation with Graded Levels of Alfalfa (*Medicago sativa*) Hay on Feed Intake, Digestibility, Live Weight Change and Carcass Characteristics of Tikur Sheep Fed Teff(*Eragrostis tef*) Straw

Fitsum Berhe, Berhan Tamir and Mengistu Urge
Year: 2009

Abstract: The experiment was conducted at Mersa Agricultural Technical Vocational Education and Training (ATVET) College, North Wollo, Ethiopia using twenty yearling intact male Tikur sheep with a mean initial body weight of 17.9 ± 1.07 kg (mean ± SD). The objective of the experiment was to evaluate the effect of graded levels of alfalfa supplementation of *teff* straw on feed intake, nutrient digestibility, body weight gain and carcass parameters of Tikur sheep. The experiment consisted of 7 days of digestibility trial and 90 days of feeding trial followed by evaluation of carcass parameters at the end of the experiment. The experimental design was RCBD. The experimental sheep were blocked into 5 blocks of 4 animals based on initial body weight and randomly assigned to one of the four treatment diets. Dietary treatments consisted of *teff* straw offered ad libitum (T_1) and alfalfa hay supplement at levels of 100 (T_2), 200 (T_3) and 300 (T_4) g/head/d on as fed basis. The contents of CP, mineral and ME were higher in alfalfa hay, but the fiber fractions were markedly higher in *teff* straw than in the supplement. Alfalfa supplementation promoted dry matter intake (DMI) of basal feed ($P < 0.001$) across all levels of supplementation. Total DM (419 in T_1 vs 760 g/d in T_4), OM, CP and ME intakes increased ($P<0.001$), whereas tef straw DMI showed a decreasing trend with increasing level of supplementation. Significantly higher ($P < 0.05$) DMD (42.3 in T_1 vs 47.1 to 60.6% in supplements) OMD, NDFD, ADFD and CPD (45.0 in T_1 vs 52.3 to 65.1% in supplements) ($P < 0.001$) was observed in alfalfa supplemented sheep than the control ones. Medium level (T_3) and lower level (T_2) supplemented sheep did not differ ($P > 0.05$) in DMD, OMD, CPD and fiber digestibility. Alfalfa supplementation resulted in significantly higher ($P < 0.05$) final body weight and average daily gain (-3.1 in T_1 vs 49.1 g/d in T_4) ($P < 0.01$) than sheep in the control treatment. Supplemented sheep had heavier slaughter weight (SBW) ($P < 0.05$), carcass weight (HCW) and empty body weight (EBW) ($P < 0.001$), higher dressing percentage (DP) on SW basis ($P < 0.001$) and larger rib-eye area ($P < 0.05$) than unsupplemented sheep. Among the different levels of supplementation, 300 g alfalfa resulted in better DMI, nutrient digestibility, ADG and carcass characteristics. Therefore, daily supplementation of alfalfa hay at 300 g appears to be the best level for Tikur sheep under the feeding practice experienced in this study.

131. Effect of Feeding Different Forms of Khat (*Catha edulis*) Leftover on Feed Intake, Nutrient Digestion and Growth Performance of Hararghe Highland Goats

Misganaw Walie, Yoseph Mekasha and Mengistu Urge
Year: 2009

Abstract: This study was conducted to investigate effects of feeding different forms of *khat* (*Catha edulis*) leftover on nutrient intake, digestibility and nitrogen balance under on-station and growth performance under two management systems (on-station and on-farm). On-station experiment was conducted at Haramaya University using 24 Hararghe highland male goats with average initial body weight of 18.3 ± 0.37 kg (mean ± SEM). Experimental goats were acclimatized to treatment diets for two weeks. The experiment consisted of 90 days of feeding followed by 7 days of digestion trial. The experiment employed randomized complete block design with six blocks and four animals per block. Treatments were feeding grass hay alone (T1; control) ad libitum, grass hay ad libitum + fresh *khat* leftover (FKL) at 1.5% BW on DM basis (T2), grass hay ad libitum + dried khat leftover (DKL) at 1.5% body weight (BW) on DM basis (T3) and grass hay ad libitum + ensiled khat leftover (EKL) at 1.5% BW on DM basis (T4). Water and mineral blocks were offered freely. The on-farm experiment was conducted at Haramaya Woreda at two peasant association (PA) (Ifa-Haramaya and Tuji Gebisa) using 32 Hararghe highland male goats with initial body weight of 18.8 ± 0.40kg (mean ± SEM). For on-farm experiment, four farmers group were identified per PA, each provided with four goats. The experimental diets comprised of gazing/browsing alone (T1; control), grazing/browsing and supplemented with either one of the different forms of *khat* leftover at 1.5% BW on DM basis (T2-T4) similar to on-station study. The CP content of hay, FKL, DKL and EKL used in the on-station experiment was 7.4, 11.5, 11.1 and 11.3%, respectively. The daily basal dry matter intakes were 527.7, 357.9, 386.9 and 368.4 g/day for T1, T2, T3 and T4, respectively and was higher ($P < 0.001$) for T1 compared to T2-T4. The daily dry matter intake of FKL was higher ($P < 0.05$) compared to DKL, but was no significant ($p>0.05$) different with EKL. Daily total DM intake and OM intake was higher ($P < 0.001$) insupplemented goats than the control. Total CP intake was affected by supplementation and was higher ($P < 0.001$) for supplemented goats as compared to control group. However, NDF intake was similar ($P > 0.05$) between supplemented and non-supplemented treatment groups. Nutrient digestibility was improved in all supplemented goats as compared to control groups. Digestibility of DM and OM was higher ($P < 0.001$) in supplemented as compared to control group, though, non-significant difference was found between supplemented groups. However, CP digestibility was significantly different ($P < 0.05$) for FKL and DKL supplementation as compared to control. Supplementation had higher ($P < 0.001$) final body weight (FBW), feed conversion efficiency (FCE) and average daily gain (ADg) under on-station as compared to the control. Under on-farm experiment ADg was higher ($P < 0.05$) for supplemented treatments (T2-T4) as compared to control (T1). Body length (BL) and heart girth (HG) was not different ($p>0.05$) among treatments, however, height at wither (HW), scrotal circumference (SC) and body condition score (BCS) was significantly differ among treatments. Goats under grazing/browsing management had better ADg than on-station. In conclusion, supplementation of Hararghe highland goats with different forms of *khat* leftover improved feed intake, digestibility of nutrients, BW gain under on-station and BW gain and body measurements under on-farm experiment. Moreover, this study demonstrated that *khat* leftover can be conserved as hay or silage and could contribute towards combating the challenges of feed shortage, both in quality and quantity

132. Effects of Supplementation with Maize Bran, Noug Seed (*Guizotia abyssinica*) Cake and Their Mixtures on Feed Utilization and Carcass Characteristics of Washera Sheep Fed Hay

Simachew Gashu, Solomon Melaku and Mengstu Urgie
Year: 2009

Abstract: The experiment was carried out at Burie ATVET (Agricultural Technical Vocational Educational and Training) College, West Gojjam, Ethiopia, using twenty-five yearling Washera sheep with initial body weight of 16.9 ± 1.27 (mean ± SD) kg, and 17.6± 1.2 (mean ± SD) kg in the digestibility and feeding trial, respectively. The objectives were to evaluate feed intake, digestibility, body weight gain and carcass parameters as well as profitability of Washera sheep fed hay and supplemented with maize bran (MB), noug seed cake (NSC) and their mixtures. The experimental sheep were acclimatized to the treatment feeds for two weeks. The experiment consisted of seven days of digestibility trial and ninety days of feeding trial followed by evaluation of carcass components at the end of the trial. The sheep were drenched with a broad spectrum anthelmentic drug against internal parasites and sprayed with accaricide against external parasites. They were vaccinated against common diseases during the fifteen days of quarantine period at the experimentation site. The experimental design used for all parameters was randomized complete block design. The experimental sheep were blocked into five blocks of five animals based on their initial body weight and randomly assigned to one of the five treatment diets within a block. The treatments included ad libitum feeding of hay allowing a minimum of 25% refusal daily (control, T1) and supplementation of hay with 300 g/ head/day dry matter (DM) sole MB (T2), 2MB: 1NSC (T3), 1MB: 2NSC (T4) and sole NSC (T5). Water and common salt were available all the time during the experiment. The supplements were offered twice daily at 0800 and 1600 hours. Non-supplemented sheep consumed higher ($P < 0.001$) grass hay DM (427.4 g/head/day) as compared to the supplemented treatments (303.7-406.5 g/h/d). Supplementation of NSC, MB and their mixtures increased ($P < 0.001$) total DM (603.7-706.5 g/head/day) and crude protein (CP) (56.5-117.8 g/head/day) intake. Similarly supplementation improved ($P < 0.001$) the apparent digestibility coefficient of DM (0.61-0.64) OM, CP (0.64-0.83), NDF and ADF. Higher daily body weight gain (25.5-55.6) g/head/day and feed conversion efficiency was recorded in supplemented groups as compared to unsupplemented sheep ($P<0.001$) but unsupplemented sheep lost weight by 1.1 g/head/day. Among the supplemented treatments, sheep in T3 (2MB+1 NSC) and T4 (1MB+2 NSC) gained more weight ($P < 0.05$) than in T2 and T5. Moreover, dressing percentage on slaughter weight basis, hot carcass weight, rib eye muscle area were higher ($P<0.001$) for supplemented sheep than the control. In general, supplementation improved feed intake, body weight gain, nutrient digestibility and carcass characteristics and its effect was more pronounced in sheep supplemented with higher proportion of MB (T3 ,2MB+1 NSC) than in the other treatments. The result of partial budget analysis also indicated that T3 to be a more profitable feeding regimen. Therefore, T3 is recommended as biological and economically efficient level of supplementation for sheep feeding in areas where the indicated agro-industrial by-products are available.

133. Effects of Different Levels of Protein on Body Weight and Carcass Characteristics of Indigenous Chicken and the Chicken Production and Marketing Practices at Worabe, Silte Zone

Abase Abdu, Mengistu Urge and Mohammed Yusuf
Year: 2010

Abstract: This study was conducted to study the Effects of Different Levels of Protein on Body Weight and Carcass Characteristics of Indigenous Chicken and the Chicken Production and Marketing Practices at Worabe, Silte Zone. A total of 72 households were participated in the surveying part of the study. The objectives were to assess the sites' chicken marketing practices and productivity. The study was conducted between October and November 2009. The study revealed that, the overall mean flock size per household were 8.39 ± 0.50 of which 7.43 ± 0.45 were local chicken. The overall average age at laying, and clutch cycle/bird/year was found to be 6.69 ± 0.07 months and 3.67 ± 0.08 cycle/year, respectively. Majority of the households provided water and supplementary feed (100%) to their chicken. Maize or mixture of sorghum and maize and " tikur kocho" (*Ensete ventricosum*) were the common feeds for supplementation. Source of supplementary feed was both household harvest and purchase (75.2%). Women were mostly responsible to make decision on off take of egg (95.2%) and chicken (94.2%) and own the income from sale. About 43.1 percent households select breeding cock based on body size, color, double comb, yellow smooth shank and activeness. Past hatching performance was the main selection criteria while mothering ability was also considered. Mostly eggs and birds were used for sale and replacement, respectively. About 55.8, 34.9, 9.3 percent of eggs produced were used for sale, hatching and consumption, respectively. Eggs were sold only for money by 53.5 percent of respondents and other methods were for money and exchange for consumables in the same village shops and sold for money similar village. Predation and disease were the main constraints of chicken production. About 90.8, 9.2 percent of respondents indicated number of birds population decreased and increased, respectively. Different levels of protein, 7.93(T_1), 16.8% (T_2) and 19.05% CP (T_3) were studied to assess its effects on dry matter intake, growth performance and body weight gain as well as carcass characteristics. Cost-benefit analysis for finishing indigenous male chicken on diets containing different level of protein was also undertaken. Seventy two indigenous male chickens with an average body weight of 1397.93 ± 2.5 g were used for the feeding trial. The experiment was designed in CRD with three dietary treatments each with three replications. The results of the experiment showed that the mean dry matter intake, cost of feed per kg live weight gain and mean weights carcass of parts did vary ($P < 0.05$) among the different levels and maize grain only dietary treatments. T_3 (the highest CP % level) by partial budget analysis method appear to be cheaper ration which can be used in indigenous male chicken finishing.

134. Evaluation of Locally Produced Fish By-Product Meal on Performance and Carcass Characteristics of Broilers in Ethiopia

Biazen Abrar, Mengistu Urge and Berhan Tamir
Year: 2010

Abstract: The effect of feeding different levels of locally processed fish byproduct meal (FBM) was tasted at Alage ATVET College using 300 as hatched Cobb 500 broiler day old chicks with a mean initial body weight (BW) of 42.9 ± 0.14 g (mean ± SD). The experiment lasted for 21 days of starter and 41 days of finisher phase. The treatments consisted of five broiler starter and five broiler finisher diets containing 0% (T1), 10% (T2), 15% (T3), 20% (T4) and 25% (T5) fish by-product meal. A group of chicks reared during the starter phase (phase one) on the diet with the same level of fishmeal were used in the finisher phase (phase two) of the experiment. Treatment differences were measured by comparing daily dry matter (DM) and nutrient intake, average daily gain (ADG), feed and nutrient conversion ratio and feed cost per gain for the starter and finisher phase as well as the entire experimental period. At the end of the feeding trial, eight broilers (4 males and 4 females) from each treatment were slaughtered for measurement of carcass characteristics and meat flavor. The daily DM, crude protein (CP) and metabolizable energy (ME) intake of broilers on diet containing FBM were significantly higher ($P < 0.001$) than the control for the starter and finisher phase as well as the entire experimental period. Broilers receiving T5, T4 and T3 rations had significantly higher ($P < 0.05$) daily DM intake during the starter phase, T5 and T4 during the finisher phase and T5, T4 and T3 during the entire experimental period. The daily CP intake of broilers in T5 were significantly higher ($P < 0.05$) than others during the starter phase. However, during the finisher phase and the entire experimental period, broilers in T5 and T4 had significantly higher ($P < 0.05$) CP intake than T2. Significantly higher ($P < 0.05$) ME intake were observed in T5 and T4 during the starter phase and in T5, T4 and T3 during the finisher phase and the entire experimental period compared to T2. The daily BW gain of broilers on diet containing FBM were significantly higher ($P < 0.001$) than the control for the starter and finisher phase as well as the entire experimental period. Comparison among the level of inclusion of FBM showed that the BW gain of T5, T4 and T3 were significantly higher ($P < 0.05$) during the starter, finisher phase and entire experimental period as compared to T2. Feed conversion ratio, CP and ME efficiency of broilers on diets consisting FBM were significantly higher ($P < 0.001$) than the control for the starter phase of the experiment. During the finisher phase and for the entire experimental period, no significant difference in FCR, CP and ME efficiency of broilers were detected. Slaughter weight, eviscerated carcass weight and percent eviscerated carcass of broilers were significantly higher ($P < 0.001$) for diets consisting FBM treatment groups compared to the control. Significantly higher slaughter and eviscerated carcass weight were obtained in T5 and T4 than T3, T2 and T. Higher percent eviscerated carcass weight was observed in T5 than T3 and T2. Broilers receiving T5 and T4 diets were higher in breast meat and drumstick-thigh weight than T2 and T3. In the current experiment, no significant effect on abdominal fat weight and percent and drumstick- thigh percent were detected among the different diets tested. Total giblet, liver weight, heart weight and percentage gizzard of broilers were significantly higher for fishmeal supplemented treatment groups compared to the control. No significant difference in percent giblet, percent liver, percent heart and gizzard weight were detected. Feed cost per gain was significantly lower ($P < 0.01$) for broilers supplemented with FBM compared with the control in both starter and finisher phase and the entire period. In the starter phase inclusion of 25% FBM in the diets of broilers has resulted in significantly lower feed cost per kg of BW gain than T3, T2 and T1. Partial budget analysis indicated that the highest net return (NR) and marginal rate of return (MRR) was observed in broilers supplemented with 20% FBM. A subjective flavor score of meat samples obtained from broilers fed different levels of fish by-product meal were 5.0, 3.8, 3.4, 3.6, and 3.47 in T1, T2, T3, T4, and T5, respectively. The result indicated that a slight fishy flavor which was not objectionable by consumers is detected in broilers meat fed diets containing FBM. Therefore, FBM can be incorporated up to 20 % in the diets of broilers without causing objectionable flavor in the cooked broiler meat.

135. Effect of Supplementation of Malt Barley By-Product, Wheat Bran and Their Mixtures on Feed Intake, Digestibility, Body Weight Change and Carcass Parameters in Field Pea Haulms Based Feeding of Arsi-Bale Sheep

Birhanu Mamo, Solomon Melaku and Mengistu Urge
Year: 2010

Abstract: The study was carried out at Adama University, Asella School of Agricultural Campus, using twenty five male Arsi-Bale sheep with initial mean body weight (BW) of 20.2± 1.65 kg (mean ± SD). The experiment was carried with the objective of investigating the effect of supplementation with malt barley by-product (MBP), wheat bran (WB) and their mixtures on feed intake, digestibility, BW change, carcass parameters and economic benefit in field pea haulms based feeding of Arsi-Bale sheep. The experimental sheep were adapted to the treatment feeds for two weeks. The experiment consisted of seven days of digestibility trial and ninety days of growth trial followed by evaluation of carcass components at the end of growth trial. The sheep were vaccinated against common infectious diseases of sheep, dewormed and disinfected against internal and external parasites, respectively before the commencement of the experiment. The experimental design used for all parameters was randomized complete block design. The experimental sheep were blocked into five blocks of five animals based on their initial BW and randomly assigned to one of the five treatment diets within a block. The treatments included ad libitum feeding of field pea haulms (control, T_1) and supplementation with mixtures of MBP and WB at 100:0, 67:33, 33:67 and 0: 100 for T_2, T_3, T_4 and T_5, respectively. The level of supplementation was 300 g/day on dry matter (DM) bases. Water and common salt block were available to the animal all the time. Supplementation of MBP, WB and their mixtures increased ($P < 0.001$) the total DMI (730.9-780.9 g/day) and total CPI (87-121.7 g/day) when compared to total DMI (411.9 g/day) and CPI (44.2 g/day) of non-supplemented sheep. Apparent nutrient digestibility was higher ($P < 0.001$) for supplemented treatments than the control treatment. Sheep fed the sole basal diet lost BW at 11.8 g/day, while the supplemented treatments gained BW within the range of 44.7-56 g/day with no difference ($P > 0.05$) among T_2, T_3, T_4 and T_5. Based on partial budget analysis, MBP supplementation (T_2) had a better net return. Therefore, it is concluded that this treatment (T_2) could be recommended for better utilization of nutrients, animal performance and profitability.

136. Survey on the Use of Cactus (*Opuntia ficus* Indica) and Browse Species in Miesso Woreda and Effect of Supplementation of Cactus and Selected Browses Mix on Feed Utilization of Somali Goats

Daniel Taddesse, Solomon Melaku and Yoseph Mekasha
Year: 2010

Abstract: This study had two parts; the first part was survey on the use of cactus and browses in Miesso woreda, West Harerghe zone, Ethiopia. The second part of study, the feeding and digestibility trial was conducted in Chiro town, West Harerghe, Ethiopia. The objectives of the study were to assess the utilization practices of cactus and browse species as livestock feed in Miesso Woreda and determine the effect of inclusion of spineless cactus (*Opuntia ficus* indica) and selected browse species mixture on feed intake, digestibility and body weight (BW) change of Somali goats. The survey was conducted in five purposively selected peasant associations. These included two from pastoral and three from agro pastoralist areas. The feeding and digestibility trials were conducted at Chiro town private farm, West Harerghe Zone, Oromiya Region with 20 intact male Somali goats with mean initial BW of 20.00±1.43 kg (mean±SD). The animals were adapted to the experimental feeds for a period of 15 days. The experiment consisted of feeding trial of 90 days followed by digestibility trial of 7 days. The feeding and digestibility trials were conducted using a randomized complete block design with five replication of four animals in each block. The dietary treatments used were hay ad libitum (T_1), hay + 300 g cactus and Acacia saligna (T_2), hay +300 g cactus and Acacia robusta (T_3) and hay + 300 g cactus and Sesbania sesban (T_4) on dry matter (DM) basis at 1:1 ratio; water and common salt were available free of choice. Data were recorded on daily feed intake and BW at 10 days interval throughout the experiment. The results of the survey showed that cactus introduction in Miesso wereda linked with the emergence of Ethio-Djoubuti rail way construction. Farmers allow their animals to graze cactus alone or feed in combination of crop residues, grass hay and browses during dry season and drought period. Animals consumed little drinking water after cactus feeding. However, feeding cactus is associated with bloating, soreness around mouth, loss of teeth and damage on eye and skin of animals. To alleviate these problems, farmers use various traditional prevention and treatment measures such as restricting the amount consumed, feeding crop residues before and after cactus, migration to areas where less cactus invasion and preventing animals from cactus feeding and the treatment measures like removing accumulated cactus from throat area by hand specially from cattle, drenching with pepper, salt solution, coca cola, gasoline, chasing animals and using nearby vet clinics. Browse trees were also very valuable as animal feed to the farmers/pastoralists of Miesso woreda. Therefore, in addition to the indigenous knowledge the farmers/pastoralists have, efforts of different organizations working in the agriculture sector in the area should focus on use feeding systems like burning the spines of cactus, chopping and drying cactus, provision of grass hay, maize/sorghum stover before cactus feeding and propagation of the spineless cactus species, banning the excessive use of browse trees for charcoal making and fuel wood through education and introducing improved forage species adaptable to the area are recommended. The results of the feeding and digestibility trial showed that hay intakes were 560.7 g/day, 376.3 g/day, 447.1 g/day, 475.0 g/day for T_1, T_2, T_3 and T_4, respectively and was significantly higher for T_1 ($P < 0.001$) compared to T_2, T_3 and T_4. Total DM intake (676.3-775.0 g/day) was higher ($P<0.001$) in supplemented goats than the control (560.74 g/day). Supplementation favored ($P < 0.001$) the CP intake of T_2, T_3, T_4 (49.53-80.42 g/day) more than the control (41.62 g/day). Nutrient digestibility for DM, OM and CP were higher ($P < 0.001$) for supplemented than the control goats. This was due to the amount of dietary protein present in the diet of the different treatment feeds. However, no significant difference was observed in the digestibility coefficient of T_1 and T_2 for the same parameters. Nutrient detergent fiber and acid detergent fiber digestibility ($P < 0.5$) and ($P < 0.01$), respectively were higher among the supplemented goats. Similarly, there was higher ($P < 0.001$) daily BW gain (16.67-33.22 g/day) in the supplemented than in the non-supplemented goats (-14.67 g/day). In addition, feed conversion efficiency and feed conversion ratio ($P < 0.001$) were improved among the supplemented goats compared to the control ones. Average daily BW gain was positively correlated ($P < 0.01$) with DM, OM, and CP intake and digestibility, respectively. However, the correlation of average daily BW gain with NDF intake and digestibility and ADF digestibility was positive, but not significant ($P > 0.05$). In general, supplementation improved feed intake, nutrient digestibility and BW gain and better result was obtained in T_4. From the results of the study, it is concluded that mixtures of chopped and dried cactus and the browse species reversed body weight loss of goats in the dry season. Among the mixtures of cactus and the browse species, the cactus and sesbania mix could be recommended for a better body weight gain. Propagation of the spineless cactus and sesbania sesban which have high feeding value and drought tolerant and their use in mixture of dried form should get prior attention in Miesso wereda.

137. The Effect of Feeding Different Proportions of Maize Stover and Haricot Bean (*Phaseolus vulgaris*) Haulms Supplemented with Concentrate Mix on the Performance of Hararghe Highland Goats

Dejene Alemu, Mengistu Urge and Solomon Melaku
Year: 2010

Abstract: The experiment was conducted to assess feed intake, digestibility, BW change, carcass characteristics and diet profitability in Hararghe Highland goats fed different proportions of maize stover (MS) and haricot bean haulms (HBH) supplemented with 300 g concentrate mix (CM) consisting of wheat bran (WB) and noug seed cake (NSC) at the ratio of 2:1 at Haramaya University. Thirty yearling intact male Hararghe Highland goats with initial mean body weight (BW) of 16.5 ± 0.18 kg (mean ± SD) in digestibility trial and 17.2 ± 0.25 (mean ± SD) in feeding trial were used in the study. The experiment consisted of 7 days of digestibility trial and 90 days of feeding trial followed by evaluation of carcass parameters at the end of the feeding trial. The experimental design used for all parameters was randomized complete block design. The experimental animals were grouped in to six blocks of five animals based on their initial BW and each animal within each block was randomly assigned to one of the five treatment diets; namely, 100% MS ad libitum + 300 g DM CM (T1), 75% MS : 25% HBH ad libitum +300 g DM CM (T2), 50% MS : 50% HBH ad libitum + 300 g DM CM (T3), 25% MS : 75% HBH ad libitum + 300 g DM CM (T4) and 100% HBH ad libitum + 300 g DM CM (T5). Water and mineral lick were available free of choice. The experimental goats were acclimatized to the experimental feeds for 15 days. The result of the current study indicated that the crude protein (CP) content of the mixtures diet improved by 0.5, 1.7 and 2.6% DM for 75% MS: 25% HBH, 50% MS: 50% HBH and 25% MS: 75% HBH, respectively. Wheat bran, NSC and the mixtures contained 18.2, 31 and 20.1% CP, respectively. The daily basal and total DM intake was higher ($P< 0.001$) for T3, T4 and T5 as compared to T1 and T2. The intake of CP increased ($P < 0.001$) with increasing level of HBH in the mixtures. Apparent DM digestibility of T4 and T5 were higher ($P < 0.01$) than T1, however no difference were observed between T1, T2 and T3. Apparent CP digestibility of T3, T4 and T5 were higher ($P < 0.001$) than T1 and T2. No significant difference ($P > 0.05$) was observed in NDF, and ADF digestibility between treatments. Goats in T3 and T5 had higher ($P < 0.001$) daily BW gain (55.6 g/day) and (60.2 g /day), respectively than goats in T1 (31.5 g/day) and T2 (31.5 g/day), whereas, goats in T4 (52.6 g/day) did not differ from the other treatment groups. The hot carcass weight of T3 and T5 were higher ($P < 0.01$) than T1 and T2. Blending MS with HBH at the ratio of 50:50 induced animal performance similar to that of higher ratio of HBH in a basal diet. Dressing percentage, rib eye area, carcass cut except fore- quarters and loin and total edible and non-edible offal components were not affected ($P > 0.05$) by dietary treatments. Based on partial budget analysis, T3, T4 and T5 found to be profitable for producers with no capital limitation. However, for those with limited capital, T3 with the highest marginal rate of return is the optimal level than other treatments for better animal performance and profitability under similar condition with the present study.

138. Assessment of Perceptions, Major Feed Resources and Livestock Management Practices on Grazing Lands at Different Levels of Invasion by Mesquites (*Prosopis juliflora*)(S W.) in Amibara Distr ICT of Afar Regional State, Northern Ethiopia

Dawit Terefe, Solomon Melaku and Habtemariam Kassa
Year: 2010

Abstract: This study was conducted to assess the impact of the invasive woody plant, Mesquite (*Prosopis juliflora*)(Sw.) on feed resources, livestock farming and pastoralist livelihood strategies in Amibara district of Afar National Regional State. Study on primary livelihood option as major source of household income, current livestock holding versus livestock holding 10 years ago, herd mobility, herd diversification and pastoralists' perception towards Prosopis were assessed in Halidebe, Buri and Serkamo which were non, moderate and highly Prosopis invaded kebeles, respectively. Assessment of the impact of different levels of invasion on feed resources were carried out on three land cover types -open grass land, dense shrub land, and open shrub land. To assess the impact of Prosopis on understory herbaceous species composition and biomass yield, herbaceous plants were harvested at 1 m, 3 m and outside Prosopis canopy. Comparison of browse foliage yield/tree was made between moderately invaded and non Prosopis invaded dense shrubland and between moderately and highly Prosopis invaded open shrub land. Then, leaves and twigs sample of five major grasses and six browse were taken and chemical composition of each species were analyzed. The socio-economic study revealed changes in major r livelihood means of pastoralists in Amibara. Significant difference ($P < 0.05$) were observed in the primary livelihood means in the three kebeles. Significant differences ($P < 0.05$) were also observed in livestock holding per household across the three kebeles. The livestock per capita in tropical livestock unit were found to be 3.9, 4.5 and 1.9 for non, moderate and highly Prosopis invaded kebeles, respectively. Study on herd diversification showed the herd composition is dominated by goat in the highly Prosopis invaded kebele with a Simpson index (SI) of 0.33 whereas in the non and moderately Prosopis invaded kebeles the SI value was 0.30 indicating better livestock diversification. Farmers and experts differed on their perception about Prosopis and on the effectiveness of its control measures. Pastoralists have similar perception towards Prosopis invasion and in this study, 100% of the respondents opted for complete removal of Prosopis from their district. Majority of the Pastoralists (83%) resident in the highly Prosopis invaded do not agree on the effectiveness of Prosopis controls endeavors. Based on Pastoralists' perception the Prosopis seed is mainly dispersed mainly by livestock (83.3%) and flood (10%). With regards to impact on feed, the highest Prosopis density (4028 trees/ha) was obtained in open grassland and the least (366.7 trees/h) in dense shrubland. Differences were observed on available feed resources. The number of herbaceous species used as livestock feed (grasses and browses) in open non invaded grass land was 40 whereas in moderately invaded open grass land it was 10. Grass species composition and biomass yield under and out of Prosopis canopy showed significant difference ($P < 0.05$), whereas non-significant difference ($P > 0.05$) was observed on non-grass species composition and biomass yield. Comparison made between browse foliage yield/tree on moderate and non-invaded open shrub lands didn't show significant difference ($P > 0.05$). The highest (695.83 kg/tree) fodder yield was obtained in moderately invaded shrubland from Acacia nilotica. The result of chemical analysis shows that the CP content of composite samples out of, at 1 m and 3 m radius of Prosopis tree were 6.3%, 6.5% and 6.6%, respectively. The ash content and ADL values were also found to be higher within Prosopis canopy. The nutritional quality determination of five major plants which were harvested at full flowering stage showed, the range in CP values were 3.2% in Sporobolus panicoides and 5.4% in Ischaemum afrum. Among the six browse samples evaluated for their nutritional quality, higher CP value (18%) were obtained in Acacia melifera and lo w CP content (5.2%) was obtained in Balanites aegyptiaca. The highest ADL content was found in Dobera glabra (12.3%) whereas the lowest was obtained from Acacia melifera (4.2 %). The current average feed biomass yield from a hectare of grazing land in the district is equal to 1307.8 kg DM/ha, this means that it can only support 0.2 TLU/ha/yr. However, a hectare of grazing land currently holds 3.6 TLU/ha. This implies vulnerability of grazing areas to degradation due to overstocking. The study clearly showed that by and large Prosopis has negative impact on feed resources availability, on livestock mobility, and health and on pastoral community whose primary source of livelihoods is livestock rearing. The findings of this study suggest the need for further research on the use of rehabilitation of degraded grazing lands and forage development programs to curb Prosopis expansion into new areas as well as to mitigate the negative effects of Prosopis invasion on livestock performance and livestock products quality.

139. Feed Intake, Digestibility, Body Weight Gain and Carcass Characteristics of Farta Goats Fed Hay and Supplemented with Dried Foliages of Kosheshila (*Xanthium spinosum*), Wheat Bran and Their Mixture

Endalew Walelign, Yoseph Mekasha and Getachew Animut
Year: 2010

Abstract: The study was conducted in Farta woreda in South Gondar Administrative Zone of Amhara National Regional State. The objectives of the study were to determine the effect of supplementing with dried foliages of kosheshila (*Xanthium spinosum*), wheat bran and their mixture on feed intake, digestibility, body weight change and carcass parameters in Farta goats fed on a basal diet of hay. Twenty intact male yearling Farta goats with initial mean body weight of 18.4±1.48 kg (mean ± SD) were used. The goats were quarantined for 2 weeks and accustomed to the dietary treatments for additional 2 weeks before the actual feeding trial. The experimental goats were blocked into five based on their initial body weight and the experiment was laid down in randomized complete block design. The dietary treatments used in the study were hay fed ad libitum (T1), hay ad libitum + 300 g DM *Xanthium spinosum* (T2), hay ad libitum + 300 g DM *Xanthium spinosum* x WB (T3) and hay ad libitum + 300 g DM WB (T4). Common salt and water were provided free choice. The supplements were offered twice a day at 800 and 1600 hours. During the digestibility trial (7 days) and feeding trial (90 days) the animals were housed individually in pens. Non-supplemented goats (T1) consumed significantly higher ($P < 0.01$) hay DM (546.46 g/head/day) compared to supplemented treatments (451.5-459.8 g/head/day). However, supplementation with Xanthium spinosum, WB and their mixture significantly increased ($P < 0.001$) total DM intake over the control treatment. Similarly OM, CP and NDF intake were also higher the supplemented group compared to the control. Supplementation improved ($P < 0.001$) digestibility of DM (61-65%), OM (65-68%), CP (66-72%) and NDF (52-56%) compared to the control treatment (53, 57, 57 and 48%, respectively). Besides, all forms of supplementation increased the digestibility of nutrients significantly ($P < 0.001$). Final body weight, average daily weight change and feed conversion efficiency were significantly higher ($P < 0.001$) for supplemented goats compared to the control treatment. The average daily weight change of Farta goats were -12.56, 38.56, 33.44 and 25.33 g/head/day for T1, T2, T3 and T4, respectively. Slaughter weight, empty body weight, hot carcass weight, rib eye muscle area and dressing percentage (slaughter weight bases) were significantly higher ($P < 0.01$) for the supplemented treatments than the control ones. Generally, supplementation with Xanthium spinosum, wheat bran and their mixtures improved feed intake, digestibility, and body weight change and feed conversion efficiency of Farta goats fed on hay. However, Goats supplemented with Xanthium spinosum had returned high net income compared to the control treatments. Thus, supplementation of low quality basal diet with Xanthium spinosum could be considered as biologically and economically optimum strategy to improve productivity of goats fed under small holder farming system.

140. The Effect of Substitution of Dry Bamboo Leaves at Different Proportions with Concentrate Mix on Feed Intake, Digestibility, Live Weight Gain and Carcass Characteristics of Local Sheep Fed *Teff* Straw

Eyob Gebregziabhear, Solomon Melaku and Mengistu Urgie
Year: 2010

Abstract: A feeding and digestibility trials were conducted at Assosa ATVET college, Benishangul-Gumuz Region, Ethiopia, using twenty five yearling local sheep weighing on average 18.7 $\pm$ 2.12 (mean $\pm$ SD) kg, to investigate the effect of substituting dry bamboo leaves in a concentrate mix on feed intake, digestibility, body weight (BW) gain and carcass parameters of sheep. A randomized complete block design with five treatments and five replications was used to conduct the experiment. The treatments included feeding a basal diet of *teff* straw alone (T1, control), and supplementation with dry bamboo leaves at 100% (T2), 67% bamboo leaves hay and 33% concentrate mixture (T3), 67% concentrate mixture and 33% bamboo leaves hay (T4) and 100% concentrate mixture (T5).The supplements were given at 300 g DM/head/day The concentrate mixture consisted of wheat bran (WB) and noug seed cake (NSC) at the ratio of (2:1). The animals were housed in individual pens and daily offered *teff* straw, allowing 35% refusal. Water and salt block comprising of sodium chloride were available free choice. The results indicated that there were higher ($P < 0.001$) total DM intake in the supplemented (775.2-798.5 g/head/day) than the control (502 g/head/day) treatment. The group that consumed *teff* straw alone and those supplemented with 67:33 concentrate to bamboo mix (T4) consumed more ($P < 0.001$) basal diet than the other treatments Sheep supplemented with the dry bamboo leaves and concentrate mix at different proportions had higher ($P < 0.001$) CP intake than the control ones. The CP intake was 40.9, 100.9, 96.2, 93.9 and 88.5 g for T1, T2, T3, T4 and T5, respectively. Similarly, there was higher ($P < 0.001$) daily BW gain in the supplemented sheep (14.4-36 g/head/day) than in the control (-37 g/head/day) ones. The digestibility of CP ($P < 0.001$) DM and OM ($P < 0.001$) were higher in the supplemented than in the control treatment. The mean slaughter weight, empty BW, hot carcass weight, dressing percentage, rib-eye muscle area, total edible offal components (TEOC) and main carcass components were higher ($P < 0.001$) for supplemented sheep compared to the control ones. The result of the partial budget analysis also indicated that sheep fed 67% concentrate mix and 33% bamboo leaves (T4) returned a higher net income (140.53 ETB/sheep) as compared to the other supplemented and control groups. On the other hand, sheep fed sole *teff* straw diet (T1) loss of -5.7 ETB/sheep. Therefore, it was concluded that supplementation of *teff* straw with 67% concentrate mix and 33% bamboo leaves used in this study is potentially more profitable and economically recommended to fatten local sheep.

141. Supplementation with Different Forms of Lupin (*Lupinus albus*) Grain in Hay Based Feeding of Washera Sheep: Effects on Feed Intake, Digestibility, Body Weight and Carcass Parameters

Gebru Tefera, Solomon Melaku and Firew Tegegne
Year: 2010

Abstract: The experiment was carried out at Wetet Abay in Mecha Woreda, West Gojjam, Ethiopia, using twenty-five yearling Washera sheep with initial BW of 16.26± 1.41 kg (mean ± SD). The objectives were to evaluate feed intake, digestibility, body weight gain and carcass PARAMETERSs as well as profitability for Washera sheep fed hay and supplemented with raw lupin grain (RaLG), raw soaked dehulled lupin grain (RaSDLG), roasted lupin grain (RoLG) and raw soaked lupin grain (RaSLG). The experimental sheep were acclimatized to the treatment feeds for two weeks. The experiment consisted of seven days of digestibility trial and ninety days of feeding trial followed by evaluation of carcass components at the end of the trial. The sheep were drenched with a broad spectrum antihelmentic drug against internal parasites and sprayed with accaricide against external parasites. They were vaccinated against common diseases during the fifteen days of quarantine period at the experimentation site. The experimental design used for all PARAMETERSs was randomized complete block design. The experimental sheep were blocked into five blocks of five animals based on their initial BW and randomly assigned to one of the five treatment diets within a block. The treatments included ad libitum feeding of hay allowing a minimum of 30% refusal daily (T1, control) and supplementation offered 300 g/h/d grain lupin for each supplementation groups of hay with intake 133 g DM RaLG T_2; 159 g DM RaSDLG T_3; 192 g DM RoLG T_4 and 152 g DM RSLG T_5 per head per day. Water and common salt were available all the time during the experiment. The supplements were offered twice daily at 10:00 and 16:00 hrs. Non-supplemented sheep consumed higher ($P < 0.001$) grass hay DM (414 g/h/d) as compared to the supplemented treatments (356 -366 g/h/d). Supplementation also improved ($P<0.001$) total DM (500-557 g/head/day) and CP (88.5-128 g/head/day) intake. Similarly supplementation improved ($P < 0.05$) the apparent digestibility of DM ($P<0.01$) OM ($P<0.001$) CP. Higher ($P < 0.001$), daily BW gain (16.44-25.33 g/h/d) and feed conversion efficiency was recorded in supplemented groups as compared to unsupplemented sheep and the later lost weight by 22 g/head/day. Among the supplemented groups those offered traditionally treated lupin seed in the order of T4 (RoLG)) gained more ($P < 0.05$) BW than those supplemented with T2 (RaLG). Moreover, dressing percentage on slaughter weight basis, hot carcass weight, rib eye muscle area were higher ($P<0.001$) for supplemented sheep than the control. In general, supplementation improved feed intake, BW gain, nutrient digestibility and carcass characteristics and its EFFECTS was more pronounced in sheep supplemented T4 RoLG than in the other treatments**.** The result of partial budget analysis also indicated to be a more profitable feeding regimen for T4. Therefore, T4 is recommended as biological and economically form efficient level of supplementation for sheep fattening in areas where the lupin are produced and available.

142. Effects of Urea Treatment and Concentrate Mix Supplementation on Feed Intake, Digestibility, Weight Gain and Carcass Characteristics of Horro Sheep Fed Maize Husk

Girma Defar, Solomon Melaku and Mengistu Urgie
Year: 2010

Abstract: The experiment was conducted at Bako ATVET College, West Shoa, Ethiopia using twenty five yearling intact male Horro sheep with a mean initial body weight (BW) of 20.42 ± 0.35 kg (mean ± SD). The objectives of the study were to evaluate the response of Horro sheep in feed intake, digestibility, BW gain and carcass characteristics when fed sole untreated maize husk (UMH), urea treated maize husk (UTMH) and UMH supplemented with different levels of concentrate mix consisting of wheat bran (WB) and noug seed meal (NSM) at a ratio of 1:1 and to assess the economic benefit of urea treatment and concentrate supplementation with maize husk fed to Horro sheep. The treatments were UMH alone as control (T1), UTMH alone (T2), UMH + 200 g concentrate mix (T3), UMH + 300 g concentrate mix (T4) and UMH + 400 g concentrate mix (T5) on dry matter (DM) basis per head/day. Water and mineral salt were available all the time and UMH and UTMH diet were offered free choice. The experimental sheep were acclimatized to the treatment feeds for fifteen days. The experiment consisted of seven days of digestibility trial and ninety days of feeding trial followed by evaluation of carcass parameters at the end of the trial. The experimental design used for all parameters was randomized complete block design. The experimental sheep were blocked into five blocks of five animals based on their initial BW and randomly assigned to one of the five treatment diets within a block. Total DM intake during the first 60 days was higher ($P < 0.001$) for the supplemented treatments compared to the control and UTMH group. The DM intake of UMH group sharply decreased ($P < 0.001$) over the experimental period of the first 60 days. This might be due to the low palatability, coarse texture and sharp edge of the maize husk and it might have been aggravated by the increased ambient temperature and relative humidity of the area that cause death due lose in BW. Apparent digestibility of nutrients, final BW, average daily BW gain, feed conversion efficiency (FCE), slaughter BW, empty BW, hot carcass weight, dressing percentage and rib-eye muscle area were higher ($P < 0.001$) for supplemented sheep than for sheep on UTMH. Sheep in T5 had the highest final BW (28.7 kg), mean daily BW gain (91.1 g/d) and FCE (0.11) as compared to T2, T3 and T4. The highest total return (153.00ETB), net income (50.03ETB) and marginal rate of return (1.49) were observed in the higher level supplemented sheep group. Therefore, T5 is superior in both biological performance and profitability over the other treatments, and it could be used as an alternative feed supplement when UMH is used as a basal diet for fattening of sheep.

143. Assessment of Camel Production Practices in Berhale Woreda, Afar Region

Kassahun Ahmed, Mohammed Yusuf and Mengistu Urge
Year: 2010

Abstract: Assessment of camel production practices in Berhale Woreda, Afar Region was carried out in 5 kebeles through a structured questionnaire by involving 90 households (HHs) for the survey and 20 for monitoring with the objective of assessing the existing camel production practices. The HHs were randomly and purposively selected for the survey and monitoring study, respectively. The primary objective of camel rearing of the HHs is income generation. Most of the activities related to camel production were done by adult male. Majority of the HHs (70 %) has camel and goat. All HHs are transhumance and practices seasonal migration. Major source of feed of camels is browsing tree. Half of the HHs (52.2%) use river as a water source. All HHs practices camel identification. The total numbers of animals of the monitored HHs were decreased by 4.6 %, with in the monitoring period. The monitored HHs practiced separated class browsing management for the females and males camels. All of the monitored HHs does not provide supplementary feed for their camels. The entire monitored HHs prepared fenced house for calves but not for the adult camels. In the current study area, during monitoring the camel takes long time in browsing the plant species of "Merkato" (Acacia melifera), "Mederto" (Cordia sinensis) and "Garmo" (Acacia nubica) trees. On average a camel can drink 52.6 $\pm$ 1.91 and 71.6 $\pm$ 3.07 liter of water with in 3 and 5 days gap, respectively. On average, a camel takes 0.27 $\pm$ 0.02 kg of salt once during the monitoring period. In the current study area, there are one local and one well-structured recently build functional livestock market centre. On average in one marketing day 9.5 $\pm$ 1.18 camels were available in the market during the monitoring period. From this 7.7 $\pm$ 0.71 are males and the 2.8 $\pm$ 0.48 are female camels. The gross camel off take rate within monitoring period is 9.3%. On average the highest and the lowest price of female camel is 6025 $\pm$ 366 and 4125$\pm$ 383 birr, respectively and 4933$\pm$ 249 birr is the maximum and 3066 $\pm$ 249 birr is the minimum price of the male camel. On average a camel weight 412.3 $\pm$ 10.14 kg. Averagely a camel takes 23$\pm$ 1.87 minutes for one mating. All of the monitoring HHs allows the calves to suckle colostrum and provides cutting tree leaves of "Merkato" (Acacia melifera) to the calves. Pneumonia "Buhu" the only disease occurred during the monitoring period. Seventy-five percent of the monitored HHs practiced milking during morning and evening period. On average the camel owner obtained 7.13 $\pm$ 0.52 liters of milk per day from a camel (early lactation). All of the HHs strongly believed that camel milk and meat have great medicinal value for different disease. The entire HHs not practiced processing of camel milk. All of the monitored HHs preserves camel meat using sun drying method. During the monitoring period confirmed that a camel can carry 247.5$\pm$ 9.92 kg of wheat or locally 24$\pm$0.66 number of salt ('ganfure') and camels travel 50 km and 75 km/day with and without load, respectively (8 hour travel/day). Indigenous knowledge and strong tie of their life with the camels have positive impact for camel production improvement programme. However, some of the traditional harmful practices have negative impact on the camel production practice in the present study area and need to be corrected. Drought, disease, recurrent feed shortage, and water are basic constraints. Subsequently, the number of camel population in the study area decreased in a dramatic manner. So, applying appropriate management practices and give great consideration to raise the awareness of the camel owner is crushable.

144. Assessment of Quality and Quantity of Feed Resources and Feeding Practices in Miesso District of West Hararghe Zone, Ethiopia

Kassahun Gurmessa, Mengistu Urge and Solomon Melaku
Year: 2010

Abstract: The study was conducted in Miesso district of West Hararghe Zone of Oromia Regional State. The study was designed with the objectives to assess the dominant feed, to define livestock feeding management practiced and to estimate feed quality and quantity, as well as feed balance at household level in the study area. For the study, the district was stratified in to two based on the two production systems of livestock. Sixty and seventy-two respondents from pastoral and agro-pastoral areas were selected respectively. The kebeles from the two production systems were selected purposively according to their accessibility and representativeness. Informal discussions were held with group of pastoralists and agro-pastoralists as well as with the development agents working in the localities. The survey result showed that all households of agro-pastoral areas cultivate crops; while 60% of the pastoralists have started cultivation and only 40% of the pastoral area of the district depends on livestock rearing only. Total cultivated land and private grazing land were significantly higher ($P < 0.001$) in agro-pastoral (2.4+0.14 ha) than pastoral (1.09+0.15 ha) areas. Livestock holding per household was significantly higher ($P < 0.001$) in pastoral (24+2.24TLU) as compared to agro-pastoral (8.5+0.82 TLU) areas. As per the respondents response, mean age at first calving was significantly higher ($P < 0.05$) in pastoral (55.5+0.75 month) as compared to agro-pastoral (51+1.4 month) areas, and the difference was insignificant for sheep, goats, donkeys and camels ($P > 0.05$). Mean offspring born per normal and healthy cattle, sheep and donkeys in pastoral and agro-pastoral areas were not significantly different ($P > 0.05$). The mean offspring born per life of goats and camels were significantly higher ($P < 0.05$) in pastoral as compared to agro-pastoral areas. Mean parturition interval for cattle, sheep, goats, and camels was not significantly different ($P > 0.05$) between the two production systems. Mean weaning age for calves, kids, and camel calves was not significantly different ($P > 0.05$) between the two production systems. Mean Weaning age for lambs was significantly higher ($P < 0.01$) in agro-pastoral as compared to pastoral areas of Miesso district. Mean milk yield of cows and camels was not significantly different in both production systems ($P > 0.05$). Natural pasture, browse plants and crop residues were the major feed resources of the area. During the study 28 species of grasses 3 legumes, 6 forbs and 28 species browse used for animal feed were identified. Among the respondents of agro-pastoral (68.06%) and of pastoral (27.12%) had private grazing land. Grazing land of both areas are majorly bushy/shrubby type (86.15%). The mean DM obtained from natural pasture and browse species was significantly higher ($P < 0.05$) in pastoral as compared to agro-pastoral areas, while mean DM obtained from crop residues was significantly higher ($P < 0.001$) in agro-pastoral as compared to pastoral areas. Mean CP content of grasses harvested during the early growth stage was significantly higher ($P < 0.01$) as compared to the second harvest while there was no significant difference between pastoral and agro-harvests of livestock production systems. The mean CP content of browse species at both harvesting time and between pastoral and agro-pastoral production systems were not significantly different ($P > 0.05$). NDF and IVDMD at both times of harvest did not show significant difference ($P > 0.05$) for both grasses and browses harvested from pastoral and agro-pastoral areas of the district. ADF at first harvest was significantly higher ($P < 0.05$) for both grasses and browses as compared to the second harvest while the difference was not significant among the livestock production systems. ADL at second harvest was significantly higher ($P < 0.01$) for grasses as compared to the first harvest while the difference between the pastoral and agro-pastoral livestock production systems was not significant ($P > 0.05$). Major feed resources assessed during the study period in agro-pastoral areas contribute 27.42 and 12.84% of annual maintenance requirement of ME in agro-pastoral and pastoral areas of Miesso district, respectively. The major feed resources studied contribute 50.2 and 40.8% of annual DCP required for maintenance for livestock in agro-pastoral and pastoral areas, respectively. The major feed resources of the area also contribute 40.09 and 13.56% in agro-pastoral and pastoral production systems respectively. Hence, feed shortage was the major constraint in terms of quality and quantity in both production systems of present study area, which needs strategic intervention to improve livestock productivity.

145. Effect of Egg Storage Temperature and Fumigation on Hatchability and Post-Hatching Performance of Two Strains of Broiler Chicks Reared In Hay-Box during Starter Phase

Melaku Woldeyohannes, Mengistu Urge and Tadelle Dessie
Year: 2010

Abstract: Hatchability and post-hatching performance of Cobb 500 and Hubbard broiler strain eggs subjected to different levels of egg storage temperature and fumigation and reared in hay box during starter phase was studied at Debre Zeit Agricultural Research Center. The different egg storage and fumigation levels employed were (10 ^{0}C, 16 ^{0}C and 23 ^{0}C) and (fumigated and unfumigated) respectively. Fertility and hatchability was tested during the first phase of the experiment. Feed intake (FI) of the experimental chicks was measured daily. Body weight (BW) was measured weekly. Feed conversion ratio (FCR) was calculated from feed intake and body weight gain. All measurements were made on a pen bases and the post-hatching performance parameters were done on average daily bases. At the end of the trials (49 days), two broilers (one male and one female) were purposively selected from each replication based on closeness to the mean pen weight and slaughtered to determine carcass characteristics. Mortalities were recorded as occurred and expressed as percentage of birds in a pen at the end of each growth and entire phases of the experiment. Possibility of developing hay-box brooder for early broiler rearing was also examined by comparing hay brooder with conventional method of brooding on some post-hatching parameters of the broiler strains. Fertility is not dependent on egg storage treatments employed. Egg storage temperature at 16 ^{0}C and fumigation significantly ($P < 0.001$) improved hatchability in both breeds. Average daily feed consumption was not significantly different ($P > 0.05$) between the treatment groups during experimental period, but numerically higher amount of feed was consumed per bird per day by Hubbard strain during finisher phase. There were no significant ($P > 0.05$) difference among the main effect in average daily weight gain during starter phase. Hubbard broiler strain grew faster ($P < 0.01$) than Cobb 500 during the finisher and entire growth period. Main effects did not affect FCR. However, Cobb 500 has numerically higher FCR (less efficient) than Hubbard. During the starter period, both 2 and 3 way interaction was observed except in 2 way breed by temperature. Cobb 500 seems high in FCR in both interactions. FCR seems high ($P < 0.05$) in Cobb 500 chicks hatched from eggs not fumigated and exposed to medium pre-incubation temperature than all the rest 3 way interaction, but Hubbard showed the lowest in the same treatment combination during starter period. Carcass composition was not affected by pre-incubation storage temperature and fumigation but strain of broilers significantly affected abdominal fat, liver and breast weights ($P < 0.001$, 0.05 and 0.001 respectively). Cobb 500 has heavier breasts and liver weight, while Hubbard had heavier abdominal fat. Mean percent mortality was not affected by the treatment employed during the entire growth period, but fumigation and strain significantly ($P < 0.05$) affected mortality during starter and finisher phases, respectively. Comparing hay-box and electric groups on total weight gain and percent mortality was not yield significant difference ($P > 0.05$) in all performance parameters measured in both broiler stains. From the result of the current experiment, it was concluded that fumigation and medium temperature (about 16 ^{0}C) is important for better hatching yield and post-hatching performance regardless of the strain. Both strains have similar performance in almost all parameters measured. Furthermore, the result of the present experiment revealed that hay-box used for layers can be adopted for brooding broiler chicks with appropriate modification of dimension, which require further research.

146. Effects of Different Weaning Periods and Supplementation of Concentrates on Post Weaning Performance of Camel Calves at Errer Valley

Merga Baissa, Mohammed Yusuf and Mengistu Urgie
Year: 2010

Abstract: This experiment was conducted at Errer Valley camel research station, eastern Harrarghe zone from August 2008–August 2009. The objective of the study were to investigate practical weaning age and the effect of supplementation of concentrate ration on post weaning performance of camel calves. A total of 20 (9 female and 11 male) camel calves of 2 to 6 months of age at the start of the experiment were used. The treatments were weaning at 6(T1), 8(T2), 10(T3) and 12(T4) months of age. Treatments T1, T2, and T3 were supplemented with concentrate consisting of a mixture of 60% wheat bran and 40% noug seed cake at a rate of 1.6 kg DM per 100 kg body weight after weaning at the respective age up to 12 months of age. Average daily weight gain (ADWG), milk consumption by weigh–suckle–weigh method to weaning age, milk offtake to 12 months of lactation and mortality up to 14 months were recorded. The mean concentrate consumed by the supplemented camel calves in T_1, T_2 and T_3 were 1.61, 1.62 and 1.55 kg per day and no significant ($P > 0.05$) difference were observed among the treatments. Concentrate consumption was significantly ($P < 0.001$) higher in the dry season (1.83 ±0.03 kg/day) than in the wet season (1.36±0.04 kg/day). Overall mean post weaning ADWG was significantly ($P < 0.001$) higher for T2 (0.359±0.012 kg/) as compared to T3 (0.267±0.016 kg) and T4 (0.215±0.009 kg). No difference was observed between T1 and T2, but T4 is significantly lower than the other treatments. ADWG at 14 months of age were significantly ($P < 0.001$) higher for female (0.319±0.13 kg/day) than male (0.255±0.008 kg/day) camel calves. ADWG was significantly higher ($P > 0.001$) for the main rainy season (0.359±0.15 kg) followed by the short dry (0.278±0.016 kg) long dry (0.264±0.078 kg) and the short rainy season (0.248±0.010 kg). Average morning milk consumption estimated by weigh–suckle–weigh method for the calves to weaning age of 6 (1.05±0.15 kg/day) and 10 (1.18±0.06 kg/day) months were significantly ($P < 0.05$) higher than milk consumption to weaning age of 8 (0.88±0.07 kg/day) and 12 (0.91±0.06 kg/day) months of age. Milk consumed by the calves was higher ($P < 0.05$) in the wet season than long dry and short dry seasons of the experiment. Over all mean milk offtake recorded for the dams of the experimental calves was 2.3 l/day. Mean milk offtake was significant ($P < 0.001$) in the order T_2=T1=T4>T3. Helminthes parasites, mange mite and respiratory diseases were prevalent during the wet and the dry season of the experiment, however their prevalence were higher ($P < 0.05$) during the rainy months than during the dry months. The highest prevalence (86%) and egg per gram (EPG) of faeces (2884±0.26) were observed in May and August (rainy month), whereas the least prevalence (62%) and EPG of faeces (941 ± 0.23) were recorded in November and February (dry month). However, prevalence and faecal mean egg count were similar ($P > 0.05$) between treatments and calf sex. The mean larvae count of five types of parasites identified in November were relatively higher for T_1 (55.55%) followed by T_3 (54.17%), T_2 (37.5%) and T_4 (25%), respectively. The helminthes parasites identified were Haemonchus spp., Trichostrongylus spp, Strongyloides spp, Nematodirus spp and Trichuris spp with prevalence of 80%, 80%, 73.33%, 6.67%, 6.67%, and 6.67%, respectively. During the experimental period mortality was higher in T_3 and T_4 with 40 and 20%, respectively. This indicates that the later the age of the weaning the lesser the survivability of the calves. Thus, it was concluded that weaning camel calves at 8 months of age and supplementing to age of 12 resulted in good growth rate during post weaning period, higher survivability as measured by absence of mortality, allowing more milk offtake to the camel owners and reducing competition between the two. However, extending weaning age to 10 months and supplementing to 12 months or weaning calves at 12 months without supplementation reduced post weaning gain and survivability of calves.

147. Assessment of Some Critical Mineral Elements in Feed, Non-Conventional Mineral Supplements and Serum of Camels (*Camelus dromedarius*) in Jijiga Woreda

Temesgen Desalegn, Mohammed Yusuf and Solomon Melaku
Year: 2010

Abstract: The study was carried out in Jijiga Woreda of Somali National Regional State of Ethiopia. The objectives of the study were to assess indigenous knowledge of pastoralists on mineral nutrition of camels; to assess critical mineral contents of the camel feed, indigenous mineral sources and critical mineral concentration in blood serum of camels and to evaluate effect of season on mineral concentration of forages, indigenous mineral supplements and in blood serum. Data regarding feed resources, indigenous mineral sources, and pastoralists' perception on mineral nutrition of camels were collected from 80 households using structured questionnaires, by group discussions and visual observations. Following the survey, samples of dominant and preferably browsed forage species, mineral soils and waters and serum were collected to analyses chemical composition. The t-test was employed to see the effects of season on the mineral composition of forages and in the blood serum of camels. Two-way ANOVA was used to examine differences between season and location of indigenous mineral supplements of camels. In the study area, the major sources of camels feed are browse species. Common indigenous mineral supplements of camels in the study area are mineral soils and mineral waters in addition to table salt. The majority of the pastoralists offer camels' table salt and mineral soils during the wet season and let them drink mineral water in the dry season. The mean concentration of macro elements (%) Ca (1.91, 1.26); Mg (0.48, 0.32); K (2.03, 1.46); and micro elements (ppm) Fe (340.0, 97.6); Zn (73.6, 56.7); Mn (162.6, 82.9) and Cu (19.4, 12.2) in the sampled forages was higher than the lower recommended levels of these elements for ruminants in both the wet and dry seasons. However, the mean concentration of Na (0.12, 0.09) and P (0.12, 0.04) were lower than the recommended level for ruminants. Effect of seasons were found significant for Ca ($P < 0.05$), Mg ($P < 0.05$), P ($P < 0.001$), Fe ($P < 0.001$), Mn ($P < 0.05$) Zn ($P < 0.05$) and Cu ($P < 0.01$) with higher concentrations in the wet season. Mineral soils of both locations (Biya'ada and Golajo'o) in both seasons could not fulfil the requirements of camels for Ca, Mg, K, P, Zn and Cu. However, the mineral soils of both locations could be used as supplements for Na, Mn and Fe in the wet season. High concentration of Ca ($P < 0.001$), Mg ($P < 0.001$), K ($P < 0.01$), Na ($P < 0.001$), Mn ($P < 0.001$) and Fe ($P < 0.05$) was observed in wet season and low concentration of Zn ($P < 0.01$) and Cu ($P < 0.01$) was observed in the wet season in the mineral soils. High concentration of Na ($P<0.001$) and Mn ($P < 0.01$) was observed in mineral soil in Biya'ada. In mineral soils, the interaction effect between seasons and locations was not significant except for Ca, Na and Fe. The mineral waters of Golajo'o and Biya'ada can contribute to the daily macro minerals requirements of 410 kg camel by about 8.6 to 15% Ca, 1.3 to 1.8% Mg, 20.1 to 38.3% Na, 1.2 -1.6 to < 0.001% K and < 0.0001% P in both locations, while their contribution of trace minerals are 7.87 to 9.03% Fe, 6.12 to 18.5% Mn, 2.09 to 2.22% Zn and 8.0 to 8.7% Cu, respectively. High ($P < 0.01$) concentration of Mg was observed in mineral water during the wet season. Interaction between seasons and locations of mineral water was significant ($P < 0.05$) for Mn with higher concentration in the wet season in Biya'ada. The mean concentration (mEq/L) of macro minerals in wet and dry season (Ca (5.91, 4.79), Mg (2.29, 1.14), Na (192.31, 169.79) and K (4.79, 5.60)) and the mean (μg/dl) of micro minerals in the wet and dry season (Fe (76.0, 80.0), Zn (113.08, 92.84), Cu (75, 61.58) and Mn (30, 20)) in the serum of camels in the present study are within the ranges of the previous reports except for P (mg/dl) (1.38, 1.08), which is very low compared to values reported in other studies. This lower concentration of P in the serum of camels could be attributed to the deficiency of P in the forages and indigenous supplements of mineral salts in the study area. Correlation among, forage, indigenous mineral supplements and serum of camel are weak and insignificant in both the wet and dry seasons. It is concluded that the camels in the study area get adequate amount of the mineral elements: Ca, Mg, K, Na, Fe, Mn, Zn and Cu either from forages and /or from indigenous mineral supplements except for P. So there is a need for P supplementation to the camels in the study woreda.

148. Traditional Butter making from Soured Camel Milk by Blending It with Cow Milk and Analysis of Its Quality

Tesfemariam Berhe, Eyassu Seifu and Mohammed Yusuf
Year: 2010

Abstract: The research was conducted to evaluate the efficiency of a comparative study on traditional buttermaking in camel milk, cow milk and blends of the two and analyses of the physicochemical and microbiological properties of the butter. The experiment was laid out in completely randomized design with five treatments, i.e., T1 (100% camel milk), T2 (75% camel milk and 25% cow milk), T3 (50% camel milk and 50% cow milk), T4 (25% camel milk and 75% cow milk) and T5 (100% cow milk). After standardizing the butter making procedure in a preliminary experiment, the actual butter making experiment was conducted at a pH value of 4.10 and at a churning temperature of (22 ˚C -23 ˚C) by filling 4 liters of fermented milk into a plastic churn of 20 liters capacity and agitating the churn suspended on a pole vertically (by up and down movement). Butter yield of T1, T2, T3, T4 and T5 was 172.04 ± 3, 142.46 ± 16, 114.51 ± 9, 114.36 ± 7 and 113.27 ± 5 g, respectively. Butter yield of T1 (pure camel milk) was significantly ($P < 0.05$) higher than the other treatments. The highest (120 ± 3.0 minutes) and lowest (55 ± 3.3 minutes) churning times were observed in T1 (pure camel milk) and T5 (pure cow milk), respectively. Fat recovery efficiency of T1, T2, T3, T4 and T5 was 79.8 ± 3.4, 70.7 ± 5.7, 66.0 ± 4.0, 66.3 ± 4.6 and 65.1 ± 0.9%, respectively. The fat recovery of pure camel milk (T1) was significantly higher ($P < 0.05$) than the blends and pure cow milk. Total solids content of butter made in T1, T2, T3, T4 and T5 was 64.1 ± 5.2, 68.6 ± 3.0, 77.0 ± 4.0, 76.9 ± 5.4 and 75.4 ± 2.8%, respectively. The total solids content of T1 was significantly ($P < 0.05$) lower than the total solids contents of T3, T4 and T5. But it was similar with T2. Fat content of butter made in T1, T2, T3, T4 and T5 was 55.8 ± 1.6, 59.8 ± 2.8, 69.4 ± 5.9, 69.7 ± 4.8 and 69.1 ± 1.4%, respectively. The fat content of butter from T1 was significantly ($P < 0.05$) lower than the fat content of butter obtained from T3, T4, and T5 but it was similar with T2. Acid degree value (ADV) of butter samples was 6.7 ± 2.5, 5.6 ± 0.8, 1.7 ± 0.3, 2.3 ± 0.4 and 20.7 ± 0.7 mg KOH per g sample in T1, T2, T3, T4 and T5, respectively. The ADV of T5 was significantly ($P < 0.05$) higher than all other treatments. The pH value of butter made in T1, T2, T3, T4 and T5 was 4.90 ± 0.15, 4.47 ± 0.11, 4.58 ± 0.12, 4.5 ± 0.10 and 4.22 ± 0.14, respectively. The pH value of T1 (camel milk butter) was significantly ($P < 0.05$) higher than the other treatments. The melting point of the butter samples was 43.2 ± 0.8, 41.8 ± 0.8, 41.3 ± 0.3, 40.7 ± 0.6 and 38.5 ± 0.5 ˚C in T1, T2, T3, T4 and T5, respectively. Butter from T1 had significantly ($P < 0.05$) higher melting point than the others and butter from T5 had the lowest melting point. The refractive index (RI) value of butter samples was 1.4530 ± 0.0002, 1.4527 ± 0.0001, 1.4523 ± 0.0001, 1.4519 ± 0.0001 and 1.4516 ± 0.0004 in T1, T2, T3, T4 and T5, respectively. The RI of T1 was significantly higher ($P < 0.05$) than the other treatments, but it was similar with T2. Generally, as the proportion of camel milk in the blends decreased, the butter yield, fat recovery, pH, melting point and RI values of the butter samples decreased; but the churning time, total solids content and fat content increased. Microbial count of butter samples showed that there was no significant difference ($P > 0.05$) in coliform count (CC), lipolytic bacterial count (LBA) and proteolytic bacterial count (PBC) between treatments, but there was significant difference ($P < 0.05$) in yeasts and moulds count (YMC) between treatments. High microbial count was observed in butter samples in the present study. The LBC of butter samples was 5.6 ± 0.3, 5.3 ± 0.1, 5.2 ± 0., 5.2 ± 0.1 and 5.0 ± 0.04 $\log_{10}$ cfu/g while the PBC was 5.4 ± 0.1, 5.2 ± 0.1, 5.1 ± 0.2, 5.3 ± 0.2 and 5.2 ± 0.1 $\log_{10}$ cfu/g in T1, T2, T3, T4 and T5, respectively. The YMC was 6.8 ± 0.1, 6.2 ± 0.05, 5.7 ± 0.1, 5.7 ± 0.1 and 5.9 ± 0.1 $\log_{10}$ cfu/g in T1, T2, T3, T4 and T5, respectively. The CC was 4.3 ± 0.2, 4.2 ± 0.1, 4.2 ± 0.1, 4.1 ± 0.1 and 4.1 ± 0.04 $\log_{10}$ cfu/g in T1, T2, T3, T4 andT5, respectively. In this study, higher recovery efficiency was obtained from pure camel milk than pure cow milk and the blends of the two. Although it is possible to make butter from camel milk, it takes very long time to churn the milk. Thus research is needed in order to reduce the churning time and improve the fat recovery efficiency by optimizing the operating parameters viz., pH, and churning temperature, method of churning and volume of milk in the churn.

149. Effects of Different Levels of Methionine and Lysine Inclusion in Lohmann Silver Layers Ration on Production, Quality, Fertility and Hatchability of Eggs

Tewahdo Teshome, Mengistu Urge and Tadelle Dessie
Year: 2010

Abstract: This study was conducted to evaluate the effects of feeding of inclusion of different levels of methionine and lysine on egg production, quality, fertility and hatchability of Lohmann Silver layers. The experiment was conducted at poultry farm of Debrezeit Agricultural research centre and 360 laying hens and 54 cocks of similar age and weight group were used for this study. The birds were randomly allocated into six treatment groups of 60 birds in each treatment with three replications consisting of 20 layers each and three cocks. The birds were kept in deep litter floor housing covered with *teff* straw litter material. The treatment rations were T1= Standard layers diet without Met or Lys, T2= 0.2% Met & 0.6% Lys, T 3=Only 0.7% Lys, T4=Only 0.3% Met, T5= 0.3% Met & 0.7% Lys, T6= 0.4% Met & 0.8% Lys. The experiment was lasted for a period of 12 weeks during which dry matter intake (DMI), laying performance and egg quality parameters were measured. The eggs obtained between 8th to 11 th weeks of the experiment period were incubated for determination of fertility, hatchability, storage and incubation weight loss, embryonic mortality and chick quality. Partial budget analysis was undertaken to evaluate the economic benefits of inclusion of different levels of methionine and lysine. Data were subjected to analysis of variance for all parameters considered. The results of laboratory chemical analysis showed that the CP content of the experimental rations were 16.6, 16.9, 17.2, 17.6, 18.4 and 19.8%, respectively for T1, T2, T3, T4, T5 and T6, respectively and ME values of the experimental rations were 2876.9, 2901.4, 2864.0, 2882.2, 2853.8 and 2857.5 kcal/kg DM, respectively. The dry matter intake (DMI) of birds in T2 (93.9 ± 2.5) and the control group (T1) (92.3 ± 1.8) were significantly lower than the rest treatments groups. The average DMI of T3 (102.4 ±1.6), T4 (95.9 ±1), T5 (99.2 ± 0.4) and T6 (100.5 ± 1.4) were statistically similar. Birds in T2 and T1 recorded lower hen day egg production (HDEP),hen housed egg production (HHEP), egg mass (EM) and feed conversion ratio (FCR), respectively. Even though T3, T4, T5 and T6 had statistically similar and high HDEP, HHEP, egg mass and FCR results, T3 (81.5 ±5.2, 68.2 ± 6.9, 44.2 ± 3.2 and 2.03 ± 0.1) and T6 (79.6 ± 5.5, 71.7 ±6, 45.3 ±3.3 and 2.1 ± 0.2) resulted in numerically higher values than T4 and T5, groups. Fertility of T5 (87.7% ± 1.1) was higher ($P < 0.01$) than other treatments, but eggs of birds of T3, T4, and T6 resulted in statistically similar fertility. Percent hatchability of eggs of birds in T5 (83.5% ±1.4) and T6 (81.8% ±1.4) were higher ($P < 0.001$) than the rest treatments. Higher ($P < 0.05$) loss of weight during incubation was observed in eggs of T5 (12.7% ± 0.3) than other treatments. Better quality chicks were resulted from eggs hatched from T3, T4, T5 and T6. However, low percentages of good quality chicks were observed under T2 and the control group. The eggs of birds in T2 (8.8 ± 0.2) and the control group (9.2 ± 0.3) resulted in higher ($P < 0.05$) albumen height and higher ($P< 0.01$) albumen weight than the rest treatments. But birds in T5 (90.1±0.6) and T6 (91.1± 0.5) resulted in a higher ($P < 0.001$) HU as compared to other treatments. The yolk weight of eggs in T2 (15.4±0.1) was lower ($P < 0.05$) than the rest treatments. T3 (16.5±0.1) and T6 (16.4±0.3) resulted in numerically higher yolk weight than the rest of treatments, even though there was no statistical difference between T1, T3, T4, T5 and T6. Lower net return was resulted under T2 (8.8) and the control group (1.5). Birds in T3, T4, T5 and T6 resulted in higher net return but T3 resulted in higher NR (33.9) and MRR (5.5) than the rest treatment groups. The statistical analysis showed that body weight gain, mean percent mortality, average egg weight, embryo mortality, weight loss of egg during storage, shell weight and thickness, yolk (diameter, height index and color) did not vary ($P > 0.05$) among dietary treatments. Based on the results of this study, T3 (sole inclusion of lysine) seems more limiting amino acid than sole methionine on production performance. Sole methionine supplementation also improved production and quality parameters as compared to T1 and T2. The result indicates that in the absence of one of the amino acids, inclusion of either of them is important to improve productivity of layers. Standard level of Met or Lys or one unit above the standard level (T5 and T6) are both preferable for better egg quality such as haugh unit and for fertility and hatchability than the other treatments. No advantage was however, obtained by formulating with the amino acids above the standard level. Therefore, it is recommended that formulating layers ration (late laying phase) with the standard level of the combination of the two amino acids is economically and biologically efficient.

150. Growth Performance, Carcass Trait and Skin/Leather Quality of Indigenous and Cross Bred (Dorper X Indigenous) F1 Sheep

Tsegay Teklebrhan, Mengistu Urge and Yoseph Mekasha
Year: 2010

Abstract: An experiment was conducted to evaluate growth performance, carcass trait and skin/leather quality of local (Blackhead Ogaden and Hararghe Highland) and cross breed (Dorper x Blackhead Ogaden and Dorper x Hararghe Highland) F1 lambs at two levels of supplementation. The two diets were native grass hay ad libtum +150 g concentrate mix (D1, Wheat Bran (WB) and noug seed cake (NSC, at a ratio of 2:1) and native grass hay ad libtum + 350 g concentrate mix (D2) in stall feeding. Water and salt lick were available to the animals all the time. Twelve each cross bred lambs (Dorper x Blackhead Ogaden, Dorper x Hararghe Highland) and pure breed Blackhead Ogaden and Hararghe Highland lambs with an average of 17.53±0.48 kg (mean±SD) live weight and age of 6-8 month at the start of the experiment were used. The experiment design was a completely randomized design in a factorial arrangement (four breeds and two levels of diet). Six lambs per breed were randomly assigned to each diet. The growth trial lasted for a period of 90 days and three lambs from each treatment were randomly taken and slaughtered for carcass and skin/leather quality analysis. Pure Hararghe Highland lambs (B2) had higher ($P < 0.001$) DMI (90.04±1.37**)**, g DM/kg $W^{0.75}$ compared to Dorper x Haraghe Highland (B4). Those lambs fed D2 had significantly higher ($P<0.05$) DMI, g DM/kg $W^{0.75}$ than (D1). Feed efficiency was significantly higher ($P < 0.05$) in Dorper x Hararghe Highland compared to pure Blackhead Ogaden lamb. Lambs fed D2 were found to be more ($P < 0.001$) efficient compared to D1. Dorper x Hararghe Highland had significantly higher average daily gain (69.44±4.09 g**)**, empty body weight, hot (12.98±0.54) and cold carcass weight (12.63±0.54 kg) and dressing percentage on slaughter body weight base than pure Haraghe Highland and Blackhead Ogaden lambs. Average daily gain, slaughter body weight, empty body weight, hot and cold carcass weight and dressing percentage was significantly higher in lambs consumed D2 than D1. Carcass weight loss after chilling was significantly higher (5.72±0.33 %) ($P < 0.01$) in Blackhead Ogaden than the rest of lamb breeds. Total edible proportion (TEP) was not affected by lamb breeds as well as diet levels. Tail weight was significantly higher ($P < 0.001$) in Blackhead Ogaden compared to cross breeds. Tail weight was not significantly ($P > 0.05$) affected by diet levels. Dorper cross Hararghe Highland recorded significantly higher carcass measurements such as carcass length (CL), anterior buttock circumference (ABC) and carcass conformation, buttock width (BW) and shoulder width (SW) than both pure breed lambs. Whereas, leg length, posterior buttock circumference, thoracic circumference and chest width were statistically similar between Dorper x Hararghe Highland and pure Blackhead Ogaden. Lambs supplemented with higher level of concentrate performed significantly better than those consumed D1 in carcass measurement. Percent lean was significantly higher ($P < 0.05$) in Dorper x Haraghe Highland than Blackhead Ogaden lamb, but did not differ from Hararghe Highland lamb. Whereas no breed effect was detected on % bone. Pure Blackhead Ogaden recorded significantly higher % fat than both crosses. Both crosses had higher ($P < 0.01$) lean: fat ratio than pure Blackhead Ogaden, but did not differ from local Hararghe Highland lamb. Carcass composition was not affected by diet level. Skin grading by mass (kg) was not affected by breed. Size/Area (dm^2) was significantly higher ($P < 0.05$) in the cross breeds than the pure breeds. Skins of pure breeds and crosses were categorized in to small and medium size, respectively according to specification of Ethiopian Standard Authority. Grading by defects was affected by lamb breeds. Hence, Hararghe Highland received the highest (1) grade and Blackhead Ogaden received the lowest score (4) according to specification of Ethiopian standard authority. Chemical quality of skin/leather fat and chrome oxide content was not affected by breed as well as diet level. Physico-mechanical quality of skin/leather tensile strength, percentage elongation at break, tear load, distension and strength of grain was similar between native and cross bred. But, skin thickness was significantly higher in D2 compared to D1. The result of the present experiment suggests that crossing Dorper with pure Hararghe Highland improved growth, measurement, conformation and major carcass traits. However pure Blackhead Ogaden tended to perform similar to crosses in some parameters measured indicating the possibility of improving this breed without cross breeding. All lamb breeds produced leathers with quality parameters acceptable for industrial processing indicating that cross breeding did not affected skin/leather quality.

151. Assessment of Traditional Cattle Fattening Practices and Feedlot Performance of Hararghe Highland Cattle

Tsigereda Fekadu, Mengistu Urge and Solomon Melaku
Year: 2010

Abstract: Survey part of the study was conducted in East and West Hararghe Zones of Oromiya Region, Ethiopia, and the experiment at Haramaya University with the objectives to assess the practice of feeding and identify the major feed resource used in the traditional fattening practices, indigenous knowledge involved and major constraints of traditional cattle fattening practices, and to evaluate feedlot performance of Hararghe highland cattle using a combination of indigenous knowledge that exist, the major feed resources used in the traditional system and improved practices/supplementation. For the survey part two representative weredas were selected (one from each zone) based on the information obtained from the preliminary survey. From the two selected weredas two rural kebeles (RKs) each were selected purposively based on the history of RKs in livestock keeping and traditional fattening practices and accessibility. From these RKs 60 households (15 households from each RKs) based on who were fattening animals or who at least once fattened and sold fattened animals were selected through rapid field survey. Structured questionnaire was used to obtain information and discussion with commission agents, brokers, traders and customers for the market study. For the feeding trial twenty-four yearling intact male Hararghe highland cattle with a mean live weight of 149.46±16.08 and mean age of 3.0±0.41 years were used. The experiment consisted of ninety days of feeding trial and seven days of digestibility trial followed by evaluation of carcass parameters at the end of the experiment. Dietary treatments consisted of maize stover alone offered ad libitum, 3 kg concentrate mix of WB and NSC at a ratio of 2:1, respectively (T_1), maize stover alone offered ad libitum, 3 kg concentrate fortified with 2.6 g of yeast (T_2), maize stover alone offered ad libitum, 3 kg concentrate fortified with 3.9 g of yeast (T_3), maize Stover alone offered ad libitum, 3 kg concentrate fortified with 5.2 g of yeast (T_4), per head per day on as feed bases. The experimental cattle were blocked into six blocks of four animals based on initial live weight and randomly assigned to one of the four treatment diets. SPSS and ANOVA were used for the analysis of the data. Among the different livestock activities, selling livestock products, watering and caring for young were the responsibilities of wife among the family members. On the other hand, feeding, live animal marketing and managing fattening animals were the responsibilities of husband or household head. Herding and watering activity is mostly done by hired labour and children in both weredas. The mean total livestock holding in Habro wereda was higher ($P < 0.001$) than those in Fedis wereda. More number of bulls are owned and fattened per household in Habro as compared to Fedis wereda. From a total of households selected for the present study, 96.7% in Fedis and 93.3% in Habro were fattening cattle during the survey time. From these the majority of the farmer's fattened one cattle in both weredas. During the past five years, the farmers fattened a maximum of up to ten cattle per household. All of the farmers in Fedis wereda use draught oxen, where as farmers in Habro wereda use draught oxen and bull for fattening activity. The majority of the draught oxen are used for fattening after 1-3 years of services in both weredas. Most of the animals used for fattening in Fedis wereda (93.3%) are purchased, but both home born and purchased in Habro wereda. Most farmers in Fedis (93.3%) keep all fattening cattle in their houses together with the family. Different from Fedis, majority of the farmers in Habro wereda (96.7%) keep fattening animals in a separate barn. Majority of the farmers in Fedis wereda (96.7%) did not castrate their animal while 50% in Habro practice castration. The major livestock feed sources identified in the study areas were crop residue, natural pasture hay and commercially available industrial by products such as oil seed meal, brewery and flour milling by products. Among the crop residues, maize stover and sorghum stover score first in Habro and Fedis, respectively based on their utilization. During the survey, feed item that are not common in livestock feeding were identified in both weredas. One third of the respondent households in Fedis and nearly half in Habro wereda use either yeast, Abish flour (fenaguerk) and fermented dough or their combination for fattening purpose. Different constraints of livestock production and fattening animals were identified. Lack of feed and shortage of grazing land are reported as the major problems for cattle as well as small ruminant production in both weredas. Low selling

cost of fattened bulls/oxen mainly by respondents in Habro wereda was mentioned as constraint. Among the different supplementary feeds used, from agro industrial by products, Noug seed cake (*Guizotia abyssinica*) and by product of locally made alcohol "Areke" as a sole and in combination with others were the main supplementary feed being used by farmers in Habro wereda. Wheat bran is also frequently used in combination with others such as oil seed meals in both wereda. Majority of the farmers also planted improved forage plants like forage legume, Grasses and Browse tree to full fill the requirement of feed supply. The total Dry matter intake (TDM), Acid detergent lignin (ADL) and Ash of bulls fed maize stover and concentrate feed fortified with Saccharomyces cerevisiae yeast was significantly higher ($P < 0.01$) as compared to that for non-supplemented bulls. Acid detergent fiber (ADF) intake is also significantly higher ($P < 0.05$) in yeast group than non-yeast group. No significant difference ($P > 0.05$) was observed in apparent digestibility of Dry matter (DM), Organic matter (OM), Crud protein (CP), Neutral detergent fiber (NDF) and Acid detergent fiber (ADF) between the control and yeast group and digestibility of all DM, OM, CP, NDF, and ADF were higher numerically at 3.9 g of yeast whereas ADL digestibility was significantly higher ($P < 0.01$) for yeast group. Average daily gain was significantly higher ($P < 0.01$) in yeast group bulls but no effect was found on feed conversion ratio. There was no significant difference ($P > 0.05$) between yeast group and non-yeast group bulls in all carcasses parameters except hump, although all parameters measured are numerically by far higher in yeast than non-yeast groups.($P < 0.05$). From the result of the present experiment, it can be concluded that traditional fattening in Hararghe highland is well established being accompanied by a feeding and management practices that can be considered an indigenous knowledge. Yeast supplementation seems to be beneficial in fattening and further study is recommended by involving different forms of offer and basal diet, since the present result is not conclusive.

152. Livestock Production Systems in Relation with Feed Availability in the Highlands and Central Rift Valley of Ethiopia

Zewdie Wondatir and Yoseph Mekasha
Year: 2010

Abstract: A study was conducted to assess livestock production in relation with feed availability and quality in the Highlands and Central Rift Valley of Ethiopia. Peri-urban dairy production system from Highland and mixed crop-livestock production system from Central Rift Valley were considered for the study. The Highland peri-urban study sites were Debre Birhan, Jimma and Sebeta, while Ziway was considered from Central Rift Valley. Purposive sampling was employed to select target farms. Structured questionnaire, focused group discussions, secondary data sources and field observations were employed to generate data. A total of 60 farmers from Highland system (Debre Birhan=20, Jimma=20 and Sebeta=20) were selected for the study. The farms were further stratified into small and medium herd size. Similarly, a total of 60 livestock owners were selected from Ziway area. Samples of major feed resources were collected from both systems and their chemical composition was determined. The result of the study indicated that both natural pastures and crop residues were the main basal diets in Central Rift Valley system, while grass hay was the main basal diet in the Highland system. About 58 and 90% of the respondents face feed shortage during dry season in the Highlands and Central Rift Valley production system, respectively. Fifty percent of the respondents in Ziway area indicated feed shortage due to encroachment of crop farming into grazing lands. Among the Highland system, 60 and 40 % of the dairy farmers in Debre Birhan described that grazing lands are converted into croplands and expensive market price of concentrate feeds, respectively, as the main problems of feed supply. About 80 and 55% of the dairy farmers at Jimma and Sebeta, respectively, indicated that commercial feeds are not available sufficiently in the market. Laboratory analysis of major feed resources indicated that hay had CP content of 6.1%, grazing pasture 7.2% and crop residues varied from 3.1 to 6.7%. In addition, crop residues had lower digestibility (47%) and its energy value ranged from 6.5-7.9 MJ/kg DM. Wheat bran and molasses had ME content of 13.2 and 12.5 MJ/kg DM, respectively. Brewery wet grains had slightly lower CP (27%) than cotton seed cake (42%) and noug seedcake (35%). Annual feed balance estimation revealed that the total estimated available feed supply in the Highland production system met 83% of the maintenance DM requirement of livestock per farm per year. In the same production system, the total estimated CP and ME were 40 and 10% surplus per year per farm. On the other hand, in the CRV (around Ziway), the total annual DM met only 66% of the total livestock requirement per annum per farm. In the same way, the total yearly available DCP and ME covered only 37% and 67% of the total livestock requirement per farm per annum, respectively. The estimated mean daily milk yield varied ($P < 0.001$) among the Highland sites. In Sebeta the estimated daily milk yield (9.7±0.5 kg) per cow was higher ($P < 0.001$) than Jimma and Debre Birhan. The overall estimated daily milk yield from indigenous Arsi zebu cattle in Central Rift Valley (Ziway) was 1.5±0.3 kg per cow. The overall estimated mean lactation length of cows in the Highland production system was 296.5±8.7 days and was not different ($P > 0.05$) among sites. Estimated lactation length of 320.5±32.3 days in Central Rift Valley (around Ziway) was slightly longer. The overall estimated mean age of heifers at first service was 27.5±1.0± months and age at first calving was 36.8±1.0 months and differed ($P < 0.001$) considerably among the study sites in the Highland production system. The overall estimated mean ages at first service and calving in the Central Rift Valley (Ziway) were longer (51±5.0 and 60±5.0 months, respectively). Therefore, from the current study it was concluded that the quality of available basal roughage feeds is generally low and strategic supplementation of protein and energy rich feeds should be required. Alternative means of dry season feed production and supply should be in place with the involvement of all stakeholders and development actors.

153. Assessment of Camel Husbandry Practices, Milk Production, Handling and Utilization in Ayssayita Woreda, Afar National Regional State, Ethiopia

Seid Mohammed, Mohammed Yusuf and Yoseph Mekasha
Year: 2011

Abstract: The study was conducted in Ayssaita Woreda, Afar National Regional State, to investigate camel husbandry practices, milk production, utilization of camel milk, milk handling practices and prioritize major constraints that influence camel production in the study area. The study was undertaken in six selected peasant associations of Ayssaita Woreda. About 20 households per Kebele´s were selected by using purposive sampling methods. The total number of households included in the study was 120. Quantitative data were collected from 15 selected households from the three rural kebeles which are involved in study I and they were continually monitored to collect data on milk yield and herd dynamics. Feed DM, Ash, CP, ADF, and NDF were analyzed following standard procedures. Fifteen milking camels were monitored and measurement was done on daily milk yield, herd dynamics, physical linear measurement, reproductive performance and camel marketing. The data were analyzed using Statistical Package for Social Sciences (SPSS) version 16.The result of the study showed that, there was more number of camels (67.27%) than goats (16.26%), cattle (12.81%) and sheep (3.65%) in the study area as a whole. From all camel categories in the herd, the average number of dry camels was 15.65±11.04 followed by heifer (11.01±7.18), female calves (8.34±4.79), milking camels (6.28±4.79), male calves (4.16±2.72) and camel bull (1.73±1.04). Females are the most dominant in the herd structure in the study area. The average milking frequency in the dry season is 2.52 while 2.64 during the wet season. The majority of respondents (41.7%) indicated that lactation length of camels to be in the range of 11-15 months and it extends to 18-24 months. According to herders the estimated mean daily milk yield during early, mid and late stages of lactations were 5.88, 6.43 and 3.72 liters, respectively. The overall estimated mean camel milk yield/day at early, mid and late stages of lactations were 11.30, 12.00 and 7.62 liters for the monitored camels in selected HHs respectively. Chest girths behind breast pad (TG) of males were greater than females whereas the average means of Abdominal girth (HG) is less than females. The Shoulder height (SH) were not significantly different ($P > 0.05$) but there was significant difference ($P<0.05$) in Chest girth behind breast pad (TG) and Abdominal girth (HG) between sexes. The mean weight of matured camels for male and female camels was found to be 383.23 kg and 377.65 kg, respectively. About 60 and 40% of the camel herders prefer to consume only fresh milk and consume with muffa, respectively. The mean average shelf life of milk and soured milk was found to be 3.51 and 5.58 days, respectively. The camel owners believe that milk remains always safe and can be consumed up to 2-10 days and soured milk can stay from 3-15 days without harm for human consumption. Monitoring result shows that, the herd growth rate (% increase) was +6.76. From 16 camels died the mortality of calf, immature and adult camels was 50%, 31.25% and 18.75% respectively and the crude death rate also was 39.6%. The Average price per head of male calve, immature male, immature female, Adult male and Adult female camels was reported to be 1242.86, 3535.71, 4581.82, 5723.81 and 7000.00, respectively. The average price of camel milk per liters in dry season (12.72 Birr) was higher than wet season (11.28 Birr) in the study area. Average mean of sexual maturity was found to be 5.40 (for male) and 4.87 (for female) years. The lifetime reproduction among females as estimated by pastoralists ranges from 8 up to 15 calving (mean of 11.58). The calving interval for camels was 24 months and it extends up to 30 months, and the age at first calving of camels was 5-7 years. The gestation period of Afar camel in study site was about 12 months, with a range of 12-13 months. Most of the time the herders in the study area, keep one bull in the herd. An outstanding male camel with a breeding lifetime of 20-25 years, can serve 80–100 female camels during a successful breeding season. About 76.7 and 23.3% of camel herders used camel bull from own and neighbors for breeding purpose respectively. The newborn camel stands and suckles its dam within 2 to 3 hours but the average mean age they start solid feed was 4.24 months. The average mean of calves weaned at the age of 15.09 and 15.53 months in study area for female and male respectively. Camel owner allows the calves to suckling colostrums for 6.89 days on average. The DM content in *Acacia abyssinica* was higher (94.57%) in wet season than dry season. The Ash content in Convolvulus spps was higher (44.40%) in dry than wet season. ADF content in *Salvadora persica* was higher (27.98%) in wet season than dry season. NDF content in *Salvadora persica* was higher (47.41%) in wet season than dry season. Drought, feed shortage, diseases and disease outbreak and poor access to veterinary services were the major constraints for camel production in the study area. Marketing problems, flood of Awash River, invasion of the area by *Prosopis juliflora*, deforestation, poor road access, predators, lack of transportation to transport milk from far remote areas to the market were considered as minor problems. In conclusion, camel was one of the most important livestock for the livelihood of Afar pastoralists as source of milk for the community in the study area. Therefore, attention should be given to camel production and research and for the better camel milk production, the major constraints mentioned above should be given first priority.

154. Comparative Performance Evaluation of Hubbard Classic and Cobb-500 Commercial Hybrid Broilers Fed Ration Containing Imported or Local Protein Balancer

Zena Kidane, Mengistu Urge and Solomon Melaku
Year: 2011

Abstract: The comparative performance of Hubbard Classic and Cobb 500 broilers fed ration containing imported or local protein balancer was evaluated at Debre Zeit Agricultural Research Center. The objectives of the study were: (1) to compare the performance of Cobb 500 and Hubbard Classic broiler hybrids under intensive management and to evaluate the feeding value of locally formulated (LPB) and imported protein balancers (IPB); (2) to evaluate the effect of genotype and nutrition on growth performance and carcass characteristics; (3) to compare the costs of broiler meat production by using the two commercial hybrid broilers and locally formulated or imported protein balancers in the ration. A total of 270 (one hundred thirty five from each breed) day old unsexed chicks with uniform average group weight for each genotype were randomly distributed using CRD in to 18 pens each with 15 chicks, representing three types of experimental rations, each with three replications. The experimental rations used were control ration and rations containing LPB and IPB which were formulated to contain five percent of the total ration both during the starter and finisher phases. The experiment lasted for 49 days, during which mortality, dry matter intake (DMI) and body weight change were measured. At the end of the experiments, 4 broilers (two male and two female) from each replication were selected and humanely slaughtered for carcass evaluation. Partial budget analysis was undertaken to evaluate the economic benefits of using locally formulated or imported protein balancer in the ration of the two broiler strains. Data were subjected to analysis of variance for all parameters considered. The results obtained indicated that, Mean total and daily DM intake during the entire experimental period was significantly higher ($P < 0.05$) for the ration containing IPB (4283.1 g) as compared to those consumed the control (3920.4 g) and ration containing LPB (3915.2 g). Mean daily CP intake of the experimental chicks during the whole experimental period was significantly ($P<0.001$) higher for the birds kept on the ration containing IPB (18.8 g) as compared to those consumed the ration containing LPB (15.6 g). Although Hubbard Classic birds consumed significantly higher ($P < 0.01$) amount of DM (50.5 g/bird/day), CP (11.2 g/bird/day) and ME (174.8 Kcal/kg DM/bird/day) during the starter period, no significant ($P > 0.05$) difference was observed in the average DM, CP and ME intake among the two strains during the finisher phase as well as the entire experimental period. Average daily and total body weight gain during the entire experiment was significantly ($P < 0.001$) higher for the birds kept on the ration containing IPB (41.15 g/bird/day) as compared to that consumed the ration containing LPB (31.55 g/bird/day). Day old chicks from Hubbard Classic breeder flock had significantly ($P < 0.001$) higher initial body weight (37.36 g), although no significant ($P > 0.05$) difference in the average daily and total body weight gain was observed during the finisher and the whole period of the experiment. Birds subjected to ration containing IPB were found to be more efficient as measured by lower DM intake per unit of body weight gain. Over the course of the entire experiment, no significant difference was observed in dry matter conversion ratio among the two strains. Birds kept on the ration containing IPB produced significantly ($P<0.01$) higher dressed weight (1749.8 g) and significantly ($P < 0.001$) higher average eviscerated weight (1571.3 g). Genotype had no influence on yield and proportion of major carcass parts. The amount of money (Birr) spent for the purchase of feed required to bring about 1 kg live weight gain was significantly higher ($P < 0.05$) for the ration containing IPB (14.0). Cost of feed consumed/kg live weight gain for Hubbard Classic broiler was not significantly ($P > 0.05$) different from that of Cobb 500. Based on the results of the present study it can be concluded that the inclusion of IPB in to broiler ration might be economically considered as beneficial as compared to the LPB and the result was even more promising for the Hubbard Classic commercial hybrid broilers since the profit obtained from rearing of this breed was higher. Performance of broilers that consumed diet containing LPB is lower than the control and IPB fed chicks for most of the parameters measured.Crude protein content of LPB is high, but ration containing LPB has the least CP, for reasons we couldn't understand ,which could also partly contribute to the low performance of the broilers on the ration containing LPB. Thus, the composition and quality of LPB containing ration should be rechecked before commercialization of the formula feed.

155. Comparative Study of Egg Laying Performance, Fertility and Hatchability of Horro, Koekoek and Lohmann Silver Chicken Breeds under Intensive Management

Aregaw Abera and Mengistu Urge
Year: 2011

Abstract: A study was conducted to compare the laying performance, fertility, hatchability and egg quality characteristics of indigenous Horro (Hr) and exotic Koekoek (KK) and Lohmann Silver (LS) breeds of chickens. The study was conducted at Ethiopian Institute of Agricultural Research, Debre Zeit Center. For this study, 204 birds (180 females and 24 males at 20 weeks of age) comprising 60 females and 8 males of each breed were divided into four experimental units/pens. Each replicate was placed in a separate pen with laying box. The birds were managed under similar intensive management condition and fed ad libitum and get access to water all the time. The data on feed intake, egg weight, hen-day and hen-housed egg production, egg size, egg shell colour and time of laying were recorded daily, while the data on external and internal egg quality parameters were recorded fortnightly from 20^{th} to 44^{th} weeks of age of chickens. The eggs obtained from the birds at 41^{st} week of age were incubated for determination of fertility, hatchability, storage & incubation weight loss, embryonic mortality and chick quality. Quantitative data were subjected to analysis of variance and binary data were analyzed by logistic regression. Koekoek breed had highest ($P < 0.001$) daily feed intake (102.2 ± 1.9 g/bird), total egg production (102.1 ± 13.4/bird), hen-day egg production (55.5 ± 2.3%) and hen-housed egg production (54.2 ± 1.2%) compared to LS and Hr. But, LS had significantly more average egg weight (56.9 ± 0.8 g) and egg mass (30.1 ± 0.3 g) compared to KK and Hr. In all groups, more eggs were collected in the morning indicating that most hens lay eggs during early morning. Small size of eggs and white shell colour characterizes Hr breed. Both exotic breeds produced more medium sized eggs with small proportion of small, large and extra-large eggs. The KK breed produced egg with white shell but LS laid more eggs with deep brown with few light brown and other types of shell colors which was difficult to characterize. Lohmann Silver layers produced longer and wider eggs, heavier albumen (33.0 ± 0.2 g) and eggs with higher ratio of albumen to total egg weight (61.2 ± 0.7%) followed by KK and Hr, respectively. On the other hand, KK had significantly higher shell membrane weight, yolk weight (15.4 ± 0.4 g), yolk diameter and Haugh unit (95.6 ± 0.4) compared to LS and Hr, and LS and Hr did not significantly differ in these parameters. Higher shell ratio (9.9 ± 0.2), Roche Colour Fan reading (6.5 ± 0.5), yolk ratio (30.3 ± 0.8) and yolk to albumen ratio (0.51 ± 0.02) were recorded in Hr breeds compared to KK and LS with KK breed following the Hr, except that there is no significant difference in shell ratio between KK and LS. Both Hr and KK layers produced significantly thicker shelled eggs (0.47 ± 0.02 and 0.48 ± 0.01 mm, respectively) and higher shell membrane ratio than LS. The difference in shell membrane thickness, yolk height and yolk index was not significant among the treatments. Koekoek had higher hatchability (93.4 ± 3.2) as compared to Hr (91.8 ± 1.9) and LS (92.8 ± 1.7) on fertile egg basis. On the other hand, the difference in fertility percentage was found to be statistically non-significant among the breeds. Both storage and incubation weight loss of eggs was higher in LS than Hr and KK. Embryo mortality in all stages of development (early, mid, late and pipe stage) was not significantly different among the breeds. Lohmann Silver layers produced significantly longer chicks and heavier day old chicks compared to KK and Hr. It can be concluded that KK breed showed relatively better performance in most economically important traits compared to LS and Hr. However, it needs further evaluation of their performance at scavenging management where they are planned to be used in the country and also further studies involving genetic characterization will be necessary before distribution of breeds to the ultimate user. Selection against broody behavior may improve the production potential of Hr breed in the intensive management system.

156. Growth Performance and Carcass Characteristics of Adilo Sheep Fed Urea Treated Wheat Straw Supplemented with Enset (*Enset ventricosum*), Atella and Their Mixtures

Feleke Assefa, Mengistu Urge and Getachew Animut
Year: 2011

Abstract: The experiment was carried using twenty-five male intact yearling Adilo sheep with body weight of 16.5 ± 3.5 kg (mean ± SD), to determine effects of enset, atella and their mixture supplements to urea treated wheat straw (UTWS) on feed intake, digestibility, body weight gain (ADG) and carcass parameters. The experiment consisted of ninety days of feeding trial, seven days of digestibility experiment followed by carcass evaluation at the end. The experimental design was randomized complete block design, and animals were blocked based on initial body weight. Treatments were UTWS fed ad libitum alone (T1) or with 300 g/d atella (T2), 200 g/d atella + 100 g/d enset (T3), 200 g/d enset +100 g/d atella, (T4) and 300 g/d enset (T5). UTWS, atella and enset had a crude protein (CP) content of 6.4, 18.2 and 7.6 % and NDF content of 72, 51 and 62 %, respectively. UTWS intake (333, 356, 353, 349 and 340 (± 0.6) g/d), total DM intake (333, 626, 618, 609 and 594 (± 0.6) g/d), total CP intake (22, 78, 66, 58 and 45 (± 0.1) g/d) for T1, T2, T3, T4 and T5, respectively) were greater for supplemented than non-supplemented sheep and increased ($P < 0.05$) with increasing level of atella in the supplement. Digestibility of DM and CP was also lower ($P < 0.05$) for T1 compared with other treatments, and CP digestibility for T2 was greater than other supplemented groups. Supplemented sheep achieved greater ($P < 0.05$) ADG (-8.9, 47.8, 34.4, 30 and 24.4 (± 3.35) g for T1, T2, T3, T4 and T5, respectively). ADG was greater for T2 among supplemented groups. Hot carcass weight was 5.4, 8.2, 7.2, 6.7 and 6.6 (± 0.25) kg for T1, T2, T3, T4 and T5, respectively and followed similar trend like that of ADG. Results of this study highlighted that supplementation of urea treated wheat straw with enset and atella to have a positive effect on feed intake, digestibility, ADG and carcass parameters. However, the effect is more pronounced for atella than enset or the two mixtures possibly due to the higher CP content of atella.

157. Assessment of Livestock Husbandry Practices, Available Feed Resources and Utilization in Kebribeyah District of Somali Regional State, Eastern Ethiopia

Muhyadin Mohammed, Mengistu Urge and Solomon Melaku
Year: 2011

Abstract: The study was conducted in Kebribeyah district of Somali Regional State, with the objectives of generating base line information about the livestock husbandry practices, to identify the quality and quantity of available feed resources and to estimate the feed balance in the study area. The study was undertaken in five purposely selected rural kebeles (RKs) of the study district according to their accessibility and representativeness; a total sample size of 120 household heads were used for the study. Informal discussions were held with agro pastoralists as well as with the development agents working in the locality which was followed by semi structured questionnaires. Feed sample collection was made in dry and wet seasons and also at two different harvesting stages i.e flowering stage and maturity stage. Agro pastoralists in the study district owned diversified livestock species that includes cattle, sheep, goat, camels and donkeys. The reason for rearing a diversified mixed stocking by herders was the fact that different species have different feeding habits and enable better use of resources and has often been more profitable and means of coping with the harsh environment in the study area and also in order to secure their livelihood. The survey result revealed that the number of small ruminants is higher than large ruminants with 32.7 % and 30.3 % of sheep and goats, respectively possessed by each household as compared to cattle (25.3%) and camels (10.5%) in the study district. Agro pastoralists in the study district owned diversified livestock species that includes cattle, sheep, goat, camels and donkeys.. All respondents (100%) reported that livestock population in the study area was declining during the last two decades, due to drought (52.5%), feed shortage (26.7%), diseases (18%) and rangeland degradation (5.8%). The study result showed that the major livestock feed resources available in the study area were natural pastures, browses such as shrubs, tree leaves and pods and crop residues, which varied with seasons. The DM content of the major grasses in the study area was 92.5% and 94.5% in dry and wet seasons, respectively. Moreover, there is highly significant difference ($P < 0.01$) in DM content of the grasses between seasons. The ash contents ranged from 13.5% in wet season to 12.5 % during dry season. No significant difference ($P > 0.05$) in ash contents was observed between the grasses at different harvesting time. There is a significant difference ($P < 0.05$) in ash content of the major grasses between seasons. The CP content of the major grasses was highest in August harvest and lowest during the dry season. There is highly significant difference ($P < 0.01$) in CP content of the grasses between harvesting stages and seasons. The NDF, ADF and ADL content of the major grasses was found to be higher during the dry season and at October harvesting. Acacia bussei has the highest DM content between the sampled browses in the study area, statistically there is no significance difference ($P > 0.05$) in DM content between the browses. There is significance difference ($P < 0.001$) in ash content between the browses in the study area. The highest ash content was found in Acacia melifera and the lowest ash content was found in Acacia etbaica. The highest CP content among the browses was found in Acacia etbaica and there is no significant difference ($P > 0.05$) in CP content between Acacia etbaica and Acacia melifera. The study clearly revealed that the annual feed supply from the major feed resources on a year basis is estimated to satisfy only 44.1% of the maintenance requirement of livestock in the study district. Therefore, the study area is a livestock feed deficit. In order to increase livestock production and productivity of the district, problems related to livestock feeds and feeding systems must be solved through proper management of the rangelands, introduction of improved forage technologies and strengthening the capacity of pastoralists and agro pastoralists in feed conservation techniques.

158. Feedlot Performance, Carcass and Skin Quality Evaluation of Arsi-Bale Goat and Their 50 % Crosses With Boer Goat

Seid Mohammed, Mengistu Urge and Getachew Animut
Year: 2011

Abstract: A study was conducted using a total of 36 ten month old intact male goats (18 Arsi-Bale and 18 50 % Boer x Arsi-BaleF1 crosses) with a mean live weight of 14.00 and 20.73 kg, respectively to evaluate the comparative growth performance, carcass yield and quality and skin quality of the two goat genotypes under low (L, 150 g), medium (M, 300 g) and high (H, 450 g DM/head/day) level of supplementary concentrate feeding with a proportion of wheat bran (50%), noug seed cake (49 %) and salt (1 %) to a basal diet of grass hay. The experiment consisted of 12 weeks of feeding trial followed by evaluation of carcass and skin parameters at the end of the experiment. The experimental design was RCBD in factorial for the feeding trial and carcass characteristics analysis and CRD in factorial for skin quality determination. The crossbreed goats had higher ($P < 0.05$) DM and nutrient intakes as compared to the local goats. With the exception of hay DM intake, intakes of DM, concentrate and total nutrients significantly increased ($P < 0.05$) with increasing level of concentrate. There was a significant ($P < 0.001$) difference in the ADG and FCE between the two breeds. With regard to supplemental level, body weight change and average daily gain (ADG) increased ($P < 0.05$) with increasing level of concentrate supplementation, but similar FCE was detected between the H and M groups. A significantly greater ($P < 0.001$) body condition score (BCS) was observed for the crosses. On the other hand level of concentrate supplementation failed to bring significant effect ($P > 0.05$) on BCS. Significant and positive correlation were also observed between linear body measurements and BW. Boer crosses had significantly higher ($P < 0.01$) SW, EBW, cold carcass, dissected lean, bone and fat weights. Feeding system also affected carcass parameters with goats in H having heavier ($P < 0.05$) live and carcass weights than those in L. No significant difference ($P > 0.05$) were observed for carcass color and ultimate pH. The chemical test of the leather revealed a significantly higher ($P < 0.05$) ash content of the leather in L than H group. A significant ($P < 0.05$) genotype by supplement level interaction were found for moisture content at wet blue stage of the leather processing with no significant difference for the physical tests. From the result of this study it was concluded that Boer cross goats perform better in terms of live body weights, carcass weights and carcass tissue weights with no significant difference in skin quality. Daily supplementation of concentrate at 300 g DM appears to be an economical level for goats under the feeding practice employed in the study.

159. Effect of Inclusion of Different Proportions of Tossign (*Thymus serrulatus*) in Concentrate Mix Supplement on Feed Intake, Digestibility, Body Weight Change and Carcass Parameters of Menz Sheep Fed Grass Hay

Tewodros Eshete, Solomon Gizaw and Eyassu Seifu
Year: 2011

Abstract: The experiment was conducted with the objective to determine feed intake, digestibility, body weight change, carcass characteristics and sensory properties of Menz sheep when supplemented with a concentrate mix (Wheat bran, Noug seed cake and Areke Atella) and combinations of different proportion of tossign. Twenty intact male Menz sheep with a mean initial live weight of 18 ± 0.62 kg were used. The experimental sheep were blocked into five blocks of four animals in random complete block design based on their initial body weight and the four treatments were assigned randomly to each sheep within a block. The experimental sheep were fed a basal diet of hay alone (T1) and supplemented with 300 g concentrate mix (T2), 200 g concentrate mix + 100 g tossign (T3) and 100 g concentrate mix + 200 g tossign (T4) on dry matter bases (DM/head/day). The study had two parts, i. e., 7 days digestion and 90 days feeding trials. In both cases the sheep were housed in individual pens. The experimental feeds were analyzed for dry matter (DM) and nutrient contents. During the trial period, feed offered and refused feces and body weight change were recorded. After 90 days feeding and 7 days digestibility trials all experimental animals were slaughtered for carcass and sensory evaluation of the meat. The results of the study indicated that supplementation of tossign together with concentrate mix significantly increased ($P < 0.001$) total DM, crude protein (CP) and organic matter (OM) intakes compared to non-supplemented group. Moreover, supplementation of tossign together with concentrate mix (T3 and T4) moderately improved DM, OM, CP and neutral detergent fiber (NDF) digestibility compared to supplementation of only concentrate mix and significantly ($P < 0.001$) improved the same parameters compared to the control treatment. Tossign is not comparable to concentrate mix in supporting higher weight gain. However, supplementation of tossign with small amounts of concentrate mix (as low as 100 g) significantly improved ($P < 0.001$) daily weight gain, feed conversion efficiency and had better carcass characteristics than non-supplemented sheep. The flavor and aroma scores of the meat samples of Sheep supplemented with tossign together with concentrate mix (T3 and T4) were significantly higher ($P < 0.001$) than the corresponding variable in the other groups (T1 and T2). The scores for tenderness, juiciness and degree of marbling of meat samples of sheep were significantly higher ($P < 0.001$) in T3 and T4 compared to meat samples of sheep from T1. Sheep fed on hay alone had lowest net income (NI) (-3 ETB) and had lowest ($P < 0.001$) values for carcass parameters than the supplemented groups. Sheep supplemented with concentrate mix (T2) had the highest net income (102.3 ETB) and optimum marginal rate of return (MRR) (2.47) compared to the other supplemented treatments under feedlot condition. However, in areas where tossign is obtained a free of charge by smallholder farmers in the study area supplementation of different combinations of tossign with concentrate mix (T3 and T4) had highest MRR (3.74 and 7.2), respectively compared to the former case. Thus, supplementation of tossign with small amounts of concentrate mix (T4) is recommended for grass hay based small-scale sheep fattening schemes, where tossign is obtained free of charge and abundantly grow.

160. Feed Intake, Digestibility, Body Weight Gain and Carcass Parameters of Tigray Highland Sheep Supplemented with Acacia Pods (*Acacia seyal*) And Wheat Bran Mix in Hay Based Feeding

Weldegebriel Berhe, Kefelegn Kebede and Khushi Ram Yadav
Year: 2011

Abstract: The study was conducted with the objectives to evaluate the feed intake, digestibility, body weight gain and carcass parameters of Tigray Highland sheep supplemented with Acacia pods (A.seyal) and wheat bran mix in hay based feeding. Twenty five Tigray Highland yearling rams with initial live weight of 17.5±1.7 kg were used. The experimental sheep were divided into five groups each group of 5 rams based on their initial body weight. The feeding trial consisted of grass hay (control), supplemented Acacia seyal pods, wheat bran and their mixture. A randomized complete block design was used to conduct the feeding and digestibility trails. Carcass evaluation was done at the end of digestibility trial. Grass hay DM intake was significantly depressed ($P < 0.001$) as the result of supplementation. Total DM, OM and CP intake were significantly higher ($P < 0.001$) in supplemented groups than the control animals. There was significant difference in apparent digestibility of DM, OM, NDF and ADF among the supplemented treatments. Apparent digestibility of DM and OM was significantly improved ($P < 0.01$) with the supplemented animals. Digestibility by differences of CP was significant different ($P < 0.05$) in the supplemented diet of Acacia seyal pods but not significant in apparent digestibility. Highest daily body weight gain was recorded in animals supplemented with Acacia seyal pods (51.1 g/day) shows that Acacia seyal pods is not recommended for fattening but to lessen the body weight fluctuation and uses as supplementation in the dry season, and small average daily gain (28.4 g/day) was also observed in sheep on the control treatments. FCE was significantly higher ($P < 0.01$) among the control and supplemented animals. There was significant ($P < 0.001$) difference between treatments in rib eye area muscles. Dry matter intake was positively and significantly ($P < 0.001$) correlated with the OM intake, CP intake, NDF intake and ADG. Partial budget analysis of this experiment was based on the total variable costs, purchasing and selling prices of sheep. Highest total income was gained and economically profitable from Tigray Highland yearling rams supplemented with Acacia seyal pods.

161. Effects of Replacing Maize with Sorghum on Feed Intake, Weight Gain and Carcass Traits of Commercial Broiler Chicken

Abdo Mohammed and Mengistu Urge
Year: 2012

Abstract: The current experiment was conducted to evaluate the effect of replacing maize with sorghum on growth rate, feed conversion ratio, carcass characteristics and economics of finishing Hubbard classic broiler chicken. Two-hundred forty day-old chicks (42.5 g ± 0.25) were randomly distributed to 12 pens. 20 chicks were randomly distributed to each of the three replicates of the four treatment rations. The treatment were T_1 (100% maize used as main energy source, control), T_2 (diet consisting 15% sorghum as a substitute for maize), T_3 (diet consisting 30% sorghum) and T_4 (diet consisting 45% sorghum). The experiment consists of 28 days of starter phase and 21 days of finisher phase. Dry matter intake (DMI), body weight gain and Dry matter conversion ratio (DMCR) were recorded. At the end of the experiment, 12 broilers from each treatment (4 from each replicate) were randomly selected and slaughtered to evaluate carcass parameters. To assess net return, partial budget analysis procedure was employed. Data were subjected to analysis of variance. No significant difference were observed in daily and total DMI, DMCR and body weight gain ($P>0.05$) during starter, finisher and the entire experimental period among treatments. Slaughter weight was significantly higher ($P < 0.05$) in T_4 (1648.4±4.66) as compared to T1 (1612.4±4.66), T2 (1623.1±45.29), and T3 (1623.8±4.66). Dressed (1524.7±5.26) and eviscerated (1178±4.65) carcass weights were significantly higher ($P < 0.01$) for T4 than other treatments. Drumstick, thigh, breast meat weight was lower ($P < 0.01$) for control groups (163.7±0.74, 170.5±0.79 and 356.7±1.99, respectively) than the others. Abdominal fat was not significantly ($P > 0.05$) different among the treatments. Crop, proventriculus, small intestine and liver weight was significantly higher ($P<0.01$) in T4 as compared to T1. There was no significant ($P > 0.05$) difference in mortality among the treatments. The higher net return was detected in T_1 (57.27 birr) as compared to T4 (56.25 birr), which is attributable to the price difference among the ingredients used. Based on the current result, it can be concluded that replacement of sorghum for maize up to 45% did not affected broiler performance, and about 50:50 ratio in broiler ration seems to improve broiler carcass yield. However, with the price of the two ingredients during the experiment period, replacing maize with sorghum is not economically feasible and suggests price consideration to decide whether or not sorghum replaces maize.

162. Effect of Supplementation with Graded Levels of Concentrate Mix on Feed Intake, Digestibility, Body Weight Change, Carcass Parameters and Economic Benefit of Arsi-Bale Sheep Fed a Basal Diet of Urea Treated Barley Straw

Abebe Gemechu, Yoseph Mekasha and Mengistu Urge
Year: 2012

Abstract: The experiment was conducted in Tiyo Woreda, Arsi Zone, Ethiopia using twenty four yearling male Arsi- Bale sheep with a mean (± SD) initial live weight of 18.72 ± 0.87 kg. The objectives of the experiment were to evaluate the effect of supplementation with concentrate mix on feed intake, live weight gain, feed digestibility, carcass parameters and economic benefit of Arsi- Bale sheep fed urea treated barley straw. The experiment consisted of ninety days of feeding trial and seven days of digestibility trial followed by evaluation of carcass parameters at the end of the experiment. Dietary treatments included ad libitum feeding of urea treated barley straw alone (Treatment 1; T1), urea treated barley straw supplementation with either 200 g/d (Treatment 2; T2), or 300 g/d (Treatment 3; T3), or 400 g/d (Treatment 4; T4) concentrate mix on dry matter basis. Concentrate mix were prepared form barley bran (50%), linseed meal (16%) and malt barley by-product (34%). The experiment was laid out in a randomized complete block design using six animals per treatment. The animals were blocked based on initial body weight. Basal feed (urea treated barley straw) dry matter intake was higher ($P < 0.001$) for sheep in the control compared to supplemented group. However, there was no significant difference ($P > 0.05$) in basal dry matter intake among the supplemented groups. Supplementation, in general, improved ($P < 0.05$) total dry matter and nutrient intakes compared to the control. Among the supplemented group, sheep in T4 has the highest total feed intakes. Digestibility of DM, OM and ADF were higher ($P < 0.05$) for supplemented group (T2-T4) compared to sheep fed urea treated barley straw alone (T1). Among animals supplemented with different levels of concentrate mix, digestibility was the highest for sheep supplemented with higher level of concentrate (T4). Average daily gain (ADg) was higher ($P < 0.05$) for supplemented animals as compared to the control. Animals fed on the control diet gained 8.12 g/d, while supplemented group gained weight in the range of 48.82-74.82 g/d. Supplementation (T2-T4) improved ($P < 0.001$) slaughter body weight, empty body weight and hot carcass weight as compared to the control (T1). On the other hand, there was no difference ($P > 0.05$) in dressing percentage among the supplemented group (T2-T4). The highest net return (NR) was recorded for sheep in T4 followed by T3, while the marginal rate of return (MRR) was the highest for sheep in T3 followed by T4. In general, results of this study suggested that supplementation with different levels of concentrate mix improved nutrient utilization, resulted in higher response in live weight gains and carcass parameters in Arsi-Bale sheep fed a basal diet of urea treated barley straw. However, the response (biological and economic) due to supplementation was the highest for sheep in T4 and T3 compared to supplementation with T2 (200 g mix). Thus, if capital is not a constraint, T4 and T3 diet could be considered as a profitable and economically feasible feeding strategy for small holder farmers and sheep fattening schemes.

163. Honey Bee Production Practices and Honey Quality in Silti Wereda, Ethiopia

Alemayehu Kebede, Nuru Adgaba and Eyassu Seifu
Year: 2012

Abstract: Assessment of Honey bee production practices and honey quality were undertaken using 80 beekeeping households and 18 honey samples to identify major constraints and potentials of honey bee production practices and to determine the quality of honey produced in Silti district of Ethiopia. The households and honey samples were drawn from different locations and represented two agro-ecologies; Dega (highland) and Weyina Dega (midland). In addition to the two agro-ecologies, honey samples were collected from local honey market (Kebet). Honey physicochemical analysis was carried out at the Ethiopian Health and Nutrition Research Institute and Quality and Standards Authority of Ethiopia. For household survey, semi-structured interviews and field observations were used as a main tool for data collection method. The survey data was analyzed by using SPSS, whereas honey laboratory analysis data was subjected to statistical analysis using one way ANOVA of SAS. Beekeeping is dominantly practiced by male households in Dega (95%) and Weyna Dega (96.7%) of the study area. About 60 % of the interviewed households were literate. In the study area, three types of honeybee production practices were identified, namely: traditional, transitional and movable frame hive honeybee production practices about 87% of bee hives owned by the beekeepers was traditional hives, while the remaining 11.5 and 1.4% of hives were movable frame and top bar bee hives. The main source of bee colony for beekeepers was swarm catching. The overall mean hive bee colony holding per household was 9.10 ± 7.77. The average colony holding (10.52 ± 8.45) of Weyna Dega households was significantly ($P < 0.001$) higher than Dega (4.85 ± 2.03). Similarly, Weyna Dega respondents had the highest mean honey production of 107.67 kg per year per household than Dega (20.97 kg /year/HH). The average productivity of traditional, transitional and movable frame beehives in 2009 was 8.85, 4.5 and 14.57 kg per year, respectively. The overall average annual gross income of the studied respondents from beekeeping was Birr 2472.30 /household (Birr 272/colony/year). The major constraints to exploit the untapped potential of beekeeping activity in the district were lack/shortage of beekeeping equipment, incidence of pests and predators, agrochemical poisoning, lack of capital for improved beekeeping technological inputs, poor extension service and lack of knowledge on appropriate methods of beekeeping. All physicochemical parameters analyzed lie within limits of local and international standard. Comparison of parameters of honey samples from the two agro-ecologies and market honey samples showed that marketed honey samples had significantly ($p<0.05$) higher reducing sugars content than honey samples from the two agro-ecologies, but no significant difference ($P > 0.05$) was observed between market honey and honey samples from the two agro-ecologies for the remaining parameters. Therefore, the results suggest that beekeeping development efforts should be focused primarily in Weyna Dega area and secondarily in Dega part of the district. Practical oriented training on improved beekeeping practices should be given for the farmers and development agents to curve management and quality related issues. There is a need to enhance extension services in the area and also credit provision need to be facilitated to supply improved bee-hives and accessory equipment.

164. Butter making from Camel Milk by Blending It with Goat Milk and Analysis of Its Quality

Aleme Asresie, Eyassu Seifu and Mohammed Yusuf
Year: 2012

Abstract: In this study the efficiency of butter making from camel milk by blending it with goat milk, the physicochemical properties and microbiological quality of butter made at different blending levels were assessed. The experiment was laid out in completely randomized design with five treatments, i.e., T1 (100% camel milk), T2 (75% camel and 25% goat milk), T3 (50% camel and 50% goat milk), T4 (25% camel and 75% goat milk) and T5 (100% goat milk). The milk samples were analyzed for their physicochemical properties and microbiological quality. The fat, total solids and titratable acidity of T1 was significantly ($P < 0.001$) lower than T5 but T1 had significantly ($P < 0.001$) higher pH value than T3, T4 and T5. There was no significant ($P > 0.001$) difference in specific gravity between T1, T2, T3, T4 and T5. The total bacteria count (TBC) of T1 was significantly ($P < 0.001$) higher than TBC of T2, T3, T4 and T5. The coliform count (CC) of T5 was significantly ($P < 0.001$) higher than CC of the other milk samples and no significant ($P > 0.001$) difference was observed in CC between T1, T2, T3 and T4. The churning efficiency, physicochemical properties and microbiological quality of the butter samples were analyzed following standard procedures. The fermentation time (11.3 days), churning time (121.7 min) and churning temperature (28 ^{0}C) of T1 were significantly ($P < 0.001$) higher than the other milk samples. However, T1 had significantly ($P < 0.001$) lower churning pH (4.13) and butter yield (49.3 g/liter) than the other samples. T3 and T4 had significantly ($P < 0.001$) higher butter yield than the other milk samples. The fermentation time, churning time and churning temperature of T5 were significantly ($P < 0.001$) shorter/lower than the rest and T5 required significantly ($P < 0.001$) higher churning pH than the other milk samples. The moisture content (39.2%), melting range (42.$\pm$1 ^{0}C) and acid degree value (8.72% oleic acid) for T1 was significantly ($P < 0.001$) higher than the other butter samples and T1 had significantly ($P<0.001$) lower fat content (56.8%) than the other samples. The coliform count (CC), Enterobacteriaceae count (EBC), lipolytic bacteria count (LBC) and yeast and mould count (YMC) of T1 was significantly ($P<0.001$) higher than the other butter samples. The CC, EC and total bacteria count (TBC) of T5 was significantly ($P < 0.001$) higher than T2, T3 and T4 and it had significantly ($P < 0.001$) lower TBC than the others. The results showed that blending camel milk with goat milk improved fermentation and churning time and yield of butter from camel milk. Although butter can be made from pure camel milk, it took longer churning time and fermentation time. Thus, research is needed in order to reduce the churning time and improve the yield of butter made from pure camel milk by manipulating the operating parameters viz., pH of the milk, churning temperature, method of churning and volume of milk in the churn.

165. Effects of Supplementation with Ficus Sycomorus on Feed Intake, Digestibility, Body Weight Gain and Carcass Parameters of Washera Sheep Fed Natural Pasture Hay

Awoke Kassa and Yoseph Mekasha
Year: 2012

Abstract: The experiment was conducted to evaluate the effect of supplementations with F. sycomorus leaf, fruit and their mixtures on intake, digestibility, body weight gain and carcass parameters of sheep fed basal diet hay, and to assess the economic benefit of the supplementation using partial budget analysis. The experiment was carried out at Gish Abay in Sekela Woreda, West Gojjam Zone; using twenty intact male yearling Washera sheep with a mean (±SD) initial body weight of 17.5±0.39 kg. The animals were vaccinated against anthrax and pasteurellosis, dewormed and sprayed against internal and external parasites, respectively, before the start of the experiment. Experimental sheep were adapted for 15 days to the treatment feeds. The experiment consisted of digestibility trial of 7 days and feeding trial of 90 days followed by evaluation of carcass parameters at the end of the experiment. The experiment was laid out in a randomized complete block design (RCBD) with five blocks consisting of four animals per block based on their initial body weight. Dietary treatments were randomly assigned to one of the four treatment diets within a block. Treatments comprised of feeding natural pasture hay ad libitum (un-supplemented: T_1) or natural hay supplementation with either F. sycomorus leaf (Treatment 2: T2), or F. sycomorus fruit (Treatment 4; T4), or mixture of F. sycomorus leaf and fruit in a ratio of 1:1(Treatment3; T3). The amount of supplements offered was 300 g/day on DM basis. Water and salt were available free choice. Natural pasture hay in the current study contained 8.0% crude protein (CP), 73.1% Neutral detergent fiber (NDF) and 43.6% acid detergent fiber (ADF). Sheep in the un-supplemented treatment consumed higher ($P < 0.001$) basal dry matter intake ((581.6 g/day) as compared to supplemented group. However, total DM intake was higher for sheep in the supplemented group (T2-T4) compared to the un-supplemented (control).Supplementation significantly improved digestibility co-efficient of DM, organic matter (OM) ($P < 0.001$) and CP ($P < 0.001$). NDF and ADF digestibility were also improved ($P < 0.001$) due to supplementation as compared to un-supplemented group. Supplementation highly increased ($P < 0.001$) final body weight (FBW), feed conversion efficiency (FCE) and average daily gain (ADG). Sheep supplemented with T2 had significantly higher ($P < 0.001$) FBW (21.6 kg), FCE (0.062) and ADG (45.1 g/day) as compared to the un-supplemented treatment, which had 18.2 kg, 0.01 and 8 g/day, respectively. Furthermore, dressing percentage on slaughter weight and empty body weight basis were high for T_2 ($P < 0.01$). Sheep in T_2 had significantly higher ($P < 0.05$) rib-eye muscle area compared to the un-supplemented. Empty body weight and hot carcass weight were higher ($P < 0.01$) for sheep in T_3 (16.3 and 7.4 kg) and T_4 (16.2 and 7.9 kg) as compared to un-supplemented group (14.4 and 6.30 kg). Similar to biological performance, economic analysis also showed that supplementation with T_2 resulted in better return compared to others. Thus, it can be concluded that supplementation in general improved animal performance. Among the supplements, however, T2 is biologically optimum and economically feasible.

166. Production, Traditional Handling and Processing of Camel Milk in Gewane Woreda and Investigation of Camel Milk Clotting Activities Using Selected Plant Extracts

Asefa Woldeyes, Mohammed Yusuf and Eyassu Seifu
Year: 2012

Abstract: This study was conducted with the objectives of assessing the traditional handling, processing and utilization practices of camel milk in Gewane Woreda and assessing camel milk-clotting activities using crude extracts of selected plants. For the first objective a survey was conducted among 60 camels owning households in Gewane Woreda. For the second objective, crude extracts of five plants viz., seeds of Solanum dobium, Lepidium sativum, Trigonella foenum-graecum and leaves of Calotropis procera and Carica papaya were prepared and their effects on clotting activities of camel and cow milk were determined at six temperature levels (50, 55, 60, 65, 70 and 80 °C) and six pH level (5.0, 5.5, 6.0, 6.5, 7.0 and 8.0) using two way factorial experiment. The effect of $CaCl_2$ concentration at three levels (0.13 gm/l, 0.4 gm/l and 0.6 gm/l) on camel and cow milk clotting activities were determined using descriptive statistics. Milk clotting activities of five crude extracts on camel and cow milk was determined. The firmness of the curd measured using texture analyzer. The overall average yield of camel milk in Gewane Woreda was 5.85±1.99 liters/day/head. The mean weaning age, age at first service, age at first calving, gestation length, calving interval, number of births per reproductive period, life expectancy, and mean lactation length of camels in Gewane Woreda were 12.88±2.61 months, 43.47±6.19 months, 57.0±10.03 months, 12.40±0.49 months, 27.08±4.28 months, 10.88±5.17 calves, 33.35±9.41 years and 15.15±1.89 months, respectively. The majority of the interviewed pastoral households reported that raw camel milk is the most preferred and consumed product in the area followed by sour milk. 73.3% of the households said that they give surplus camel milk for their relatives and guests. 68.3% of the households produce sour milk called Ytiqit cana. About 38.33% of the respondents wash their milk utensils, 70% put their milk in relatively cool place, 78% of the respondents smoke utensils to maintain milk freshness. On the other hand, 40% of the households put their milk in relatively cool places, 25% smoke utensils and 88.33% and 68% households use plant parts (seeds) and starter to make camel milk sour, respectively. The majority of the respondents indicated that camel milk can be kept for about four to seven days. Significant difference ($P < 0.05$) in clotting time of cow and camel milk was observed between the different plants extracts used in this experiment. The optimum temperature and pH of crude extracts on cow milk clotting activity ranged from 55 °C – 65 °C and were 6.0, respectively, whereas the optimum temperature and pH of crude extract on camel milk clotting activity ranged from 50 °C – 65 °C and 5.0 – 6.0, respectively. A decrease in clotting time of cow and camel milk was observed with an increase in the temperature of milk. pH had significant ($P < 0.05$) effect on the clotting time of cow and camel milk by the plant extracts used in this experiment. A decrease in clotting time was observed with an increase in concentration of $CaCl_2$ and temperature levels and with decreasing pH values both in camel and cow milk for all the crude extracts used. The milk clotting activities of the five crude extracts: viz., S. dubium, C. papaya, C. procera, T. foenum-graecum, and L. sativum was in decreasing order from S.dubium to L sativum. The gel strength (load at yield) of cow milk was significantly ($P < 0.05$) higher than that of camel milk for all the coagulants used. The crude extracts of S. dubium, C. papaya, and L. sativum resulted in a gel strength which was equivalent to the gel strength attained by the control to (chymosin) in cow milk. However, the gel strength attained by the crude extracts of T. foenum-graecum and C. procera in cow milk were significantly ($P < 0.05$) lower than that attained by the control (chymosin). On the other hand, the gel strength attained by the control (chymosin) in camel milk was significantly ($P < 0.05$) lower than that attained by the five plant extract. Generally, the current result indicated the possibilities of producing soft cheese from cow and camel milk using these five crude extracts. However, further investigation is needed in the future to extract active agent of these coagulants.

167. Comparative Feedlot Performance of Washera and Horro Sheep Fed Different Roughage to Concentrate Ratio

Assefu Gizachew, Mengistu Urge and Getachew Animut
Year: 2012

Abstract: A study was conducted using thirty male intact Washera and Horro sheep (15 from each breed) with initial body weight (BW) of 19.01±0.37 kg (mean ± SD) to compare feed intake, digestibility, growth performance and carcass characteristics of the animals fed diet containing hay:concentrate ratio of 70:30 (L), 60:40 (M), 50:50 (H). The concentrate contained 30:70 (noug seed cake: wheat bran). Animals of each breed were blocked based on initial BW and were randomly assigned to the dietary treatments. The experimental design was therefore a 2*3 factorial in RCBD. The experiment had a 90 days feeding and 7 days digestibility trials and carcass evaluation at the end. The crude protein (CP) contents of the three diets were 13.7, 15.5 and 18.1% for L, M and H, respectively. Daily dry matter (DM) and CP intakes were only affected by diet ($P < 0.05$). Intake of DM (720, 812 and 859 g/day (SEM = 22.9)) was lower for L, but was similar ($P > 0.05$) for M and H. CP intake (105, 130 and 160 g/day (SEM = 3.5) was in the order of L < M < H ($P < 0.05$). The apparent digestibility coefficients of DM and CP were unaffected ($P > 0.05$) by genotype, diet or their interaction and were above 60%. Average daily body weight gain (ADG) were significantly impacted only by diet ($P < 0.05$), and ADG (37, 46, 54 (SEM = 4.0)) was greater ($P < 0.05$) for H than L with value for M being similar to L and H. Effect of genotype and diet x genotype interaction failed to be significant ($P > 0.05$) in all the main carcass parameters measured. Diet had a significant effect ($P < 0.05$) on hot carcass weight. Hot carcass weight (7.6, 8.2, 8.8 kg (SEM = 0.32)) was lower ($P < 0.05$) for L than H with value for M being similar to L and H. In conclusion this study highlighted that Washera and Horro sheep had a similar performance under the feeding regime used in this study, and it appeared that both breeds perform better in the diet containing the highest level of concentrate used in the current study.

168. Supplementing Rice Bran, Sesbania (*Sesbania sesban*) Leaf and Their Mixtures on Digestibility and Performance of Kaffa Sheep Fed Native Grass Hay

Alemayehu Worku, Getachew Animut and Mengistu Urge
Year: 2012

Abstract: The study was carried out with the objective of determining dry matter (DM) intake, digestibility, body weight (BW) change and carcass parameters in Kaffa sheep breed fed native grass hay and supplemented with *Sesbania sesban* leaf (SS), rice bran (RB) and their mixtures in different proportions. Twenty five intact male sheep with initial body weight of 17.08 ± 0.68 kg (mean±SD) were used in both the 90 days of feeding and 7 days of digestibility trials. The experimental animals were arranged into five blocks of five animals based on the initial body weight. The five treatments were assigned to each animal in a block. The dietary treatments used in the experiment were grass hay fed ad libtum alone (T1), or with 300 g RB (T2), 200 g RB+100 g SS (T3), 100 g RB +200 g SS (T4), 300 g SS (T5).The crude protein (CP) content of hay, RB and SS were 6.1, 8.3 and 27.5%, respectively. Hay DM intake was highest for T1 (526 g/day) than the supplemented groups that ranged 437-447 g/day. Total DM intake was 526, 699, 708, 707 and 712 and was in the order of T1 < T2 < T3 = T4 = T5. Digestibility of CP was lower for T1 (58%), but similar among the supplemented group (range of 75-86%), DM digestibility was greater ($p<0.05$) for T4 than T2 and T3, and values were similar ($P > 0.05$) for T4 and T5, however digestibility of NDF was greater ($p<0.05$) for T2 than for other treatments. Daily BW gain (ADG) was -5, 52, 54, 67 and 86 g/day and was in the order of T1 < T2 = T3 < T4 < T5. Hot carcass weight was in the order of T1<T2<T3=T4<T5 (5.6, 8.2, 10.6, 11.2 and 12.4 kg, respectively). Dressing percentage both on slaughter weight and empty body weight basis were in the order of T3 = T4 = T5 > T2 > T1. Net return and marginal rate of return increased with increasing supplemental level of SS. Therefore, T5 was best in terms of both biological and economic performance of animals from the feeding regime employed in this study, suggesting the better feeding value of SS than RB. However, RB can be a potential supplement to low quality forages to prevent BW loss, and for better results RB need to be supplemented with protein rich feeds

169. Evaluation of Multi-Nutrient Blocks and Activated Effective Microorganisms on Intake, Digestibility, Body Weight Changes and Carcass Parameters of Intact Horro Rams Fed Rhodes Grass Hay

Dereje Keba, Mohamed Yusuf and Getachew Animut
Year: 2012

Abstract: The experiment was carried out at Bako Agricultural TVET College campus, using twenty-five intact male Horro rams with a mean body weight of 17.32±1.99 kg (mean+SD). The experiment was conducted with the intention of evaluating multi-nutrient blocks and activated effective microorganisms (EM) on intake, digestibility, body weight changes and carcass parameters of intact Horro rams fed Rhodes grass hay. The experiment consisted of seven days of digestibility trial and ninety days feeding trial followed by evaluation of carcass components at the end of the trial. The experimental design used for all parameters was randomized complete block design. The experimental sheep were blocked into five blocks of five animals based on their initial body weight and randomly assigned to one of the five treatment diets within a block. The treatments included ad- libitum feeding of Rhodes grass hay (RGH for the control (T1) ad-libitum feeding of multi-nutrient block 1 and 2 (T2 and T3) and supplementation with 2WB:1NSC mixed with 5% EM (T4), and 2WB:1NSC without EM (T5). The daily allowance of the feeds for T4 and 5 was 300 g/head/day. Water and mineral licks were offered freely at all times and the basal (RGH) diet was given ad- libitum. Control sheep consumed higher ($P < 0.01$) RGH (477.3 g/d) compared to the supplemented groups with the exception of T4. Among the other supplemented groups, RGH consumption was higher ($P < 0.01$) for T2 (MNB_1) than T3 (MNB_2) and T5. Treatment 4 was higher than its contemporary positive control (T5). Higher ($P < 0.001$) total DM intake (860.8, 531.6, 736.3 and 664.5 g/d, respectively for T2, T3, T4 and T5) was recorded for the supplemented sheep than control (477.3 g/d). Supplementation did also improve ($P < 0.001$) digestibility of DM, OM, and CP. However, in terms of NDF and ADF digestibility, the former was only significantly higher ($P < 0.001$) for the two treatments (T2 and T4) than non-supplemented groups. Whereas, increased digestibility ($P < 0.001$) of ADF was registered in T2 with no significant difference ($P > 0.05$) in others. Supplementation increased final body weight ($P < 0.01$), feed conversion efficiency (FCE) and mean body weight gain (ADG) ($P < 0.001$). Treatment 4 had the highest final weight (21.7 kg), FCE (0.062) and ADG (46.0 g/d) as compared to the control other treatments which was 16.74 kg, 0.008 and 3.74 g/d in the control; 20.8 kg, 0.044 and 37.6 g/d for T2; 19.5 kg, 0.049 and 26.10 g/d for T3 as well as 20.72 kg, 0.046 and 31.0 g/d for T5 in FBW, FCE and ADG, respectively. In addition, T2 had higher ($P < 0.001$) ADG than T5 and T3. Moreover, dressing percentage (DP) on slaughter weight basis and hot carcass weight (HCW) were higher ($P < 0.001$) for supplemented sheep than the control. DP on empty body weight basis was also significantly higher ($P < 0.01$) for the supplemented sheep. Total edible offals and total usable products also improved as a result of supplementation. Treatment 4, followed by T2 had the highest ($P < 0.001$) rib-eye muscle area and slaughter weight. Therefore, 2WB:1NSC mixed with EM (T4) supplement diet, which was also with the highest return, improved animal performance than the non EM treated feeds and the other treatments and could be used as an alternative feed supplement for a relatively low quality roughage (like Rhodes grass hay) for small-scale finishing of Horro rams which have access to these feed resources. However, since both nutrient blocks also improved animal performance better than those groups fed only on hay they could be opted second alternatives

170. Evaluation of the Performance of Crossbred Dairy Cows and Heifer Calves in Urban and Peri-Urban Dairy Systems in Sebeta Awas Wereda, Oromia, Ethiopia

Dereje Shibru, Yoseph Mekasha and Mohammed Yusuf
Year: 2012

Abstract: The study was aimed at evaluating the performance of dairy cows and heifer calves in urban and peri-urban dairy systems in Sebeta Awas Wereda, Oromia National Regional State, Ethiopia. The study had two parts: survey and monitoring. Stratified random sampling method was used to select target farms and sample respondents for the prepared questionnaire. Selection of farms for monitoring study was based on the data collected during the survey. Hence, 15% of the farms, which had crossbred dairy cows at mid stage of lactation (parity ranged from 2–5) and weaned heifer calves of (3-6 months of age), were purposively selected from both production systems and across the entire herd size category. The total number of farms monitored were 18 (2 production systems *3 farm sizes *3 replicates).The two production systems were urban and peri-urban, while the three farm sizes were, small, medium and large, and each was replicated three times. Both quantitative and qualitative data collected during the survey were analyzed using Statistical Package for Social Sciences (SPSS) and General Linear Model (GLM) of the Statistical Analysis System (SAS) used to analyze monitored data. Part I. The average family size per household in urban and peri-urban areas was 5.9±2.6 and 6.52±2.9, respectively. Most of the activities at the farms were performed by hired labour, (80.2% in large and 73.6% in medium farms). Dairy farming has been gradually expanding in the area through years where above 90 percent of the dairy farm in study area were established within last fifteen years. The overall average crossbred dairy herd size per household was 10.6±2.1 in urban and 11.3±2 in peri-urban area, where, the proportion of cows in overall herd was 46.3% and the proportion of milking cows accounted for 76.7% for urban and 81.2% peri-urban of their respective total cows in the herd. Reproductive performance of dairy cows in urban farms was slightly longer than peri-urban farms, where the overall mean(±SD),lactation length(LL), Days open (DO), Age at firs calving (AFC) and Calving interval(CI) of urban farms were 12.1±3.8 months, 136.5±45.9 days, 36.55±4.35 months and 14.22±2.46 months while it was 10.8±1.2 months, 113.4±21.6 days, 36.99±2.81 months and 12.78±0.77 months, respectively, in peri-urban farms. Stall-feeding system is the common practices of urban and peri-urban farms and mostly feeding hay, straw, high-energy and protein feeds like wheat bran, Nug cake, and brewery waste. Most households (91.7%) raised their heifer calves through bucket feeding, where, 60% of overall farms weaned their calves at three months of age and 26% at four months of age and the remaining after five months of ages. Loose types of barns for dairy housing were common in the area, where comparatively well-constructed barns and better waste management in large sized farms than medium and small sized farms. Manure was used for fire fuel in small and medium farms while in large farms it was mainly used as fertilizer. Among the dairy cow diseases, mastitis took the higher share of common diseases of milking cows across the different herd size in urban and peri-urban farms, whereas Foot rot was mainly observed in urban and peri-urban medium farms. In general, the major constraints of milk production in the study area were shortage of feed, price related milk market problem, land shortage for expansion of farms and developing forage. Part II. The overall least square mean (±SE) milk yield was 9.9±0.1, where it was significantly ($P<0.05$) higher for peri-urban dairy farms than urban farms. Milk yield was also affected by parity where cows in second and third parity had significantly higher ($P<0.05$) milk yield than those in fourth and fifth parity. The overall mean(±SD) for milk compositions of protein, fat, total solids, solids-not-fat and ash contents in urban farms were 2.88±0.27%, 4.58±1.21%, 13.20±1.56%**,** 8.63±1.60% and 0.59±0.09% respectively, while it was 2.67±0.47%, 4.10±0.77%, 12.63±1.53%, 8.21±1.61% and 0.60±0.08%, respectively, in peri-urban farms. Better metabolizable energy and crude protein supply in peri-urban than urban production systems, where, relatively large sized farms were better in satisfying energy and protein requirements of cows than medium and small sized farms, however, in overall there was negative energy balance in dairy farms across the different herd size category. As least square differences of mean indicated large farms were significantly ($P < 0.05$) better in condition than that of the medium and small size farms. Cows in peri-urban farms were significantly ($P < 0.05$) heavier than that of urban farms, where, relatively cows in large size farms were heavier than those in medium and small size farms category. The crude protein (CP) to Metabolizable energy (ME) ratio of offered feeds to heifer calves were slightly below the desired level (66:1). Body weight change, body condition score and girth height of heifer calves were not affected ($P > 0.05$) by production system. However there was significant difference ($P < 0.05$) in body weight changes due to difference in herd size. Though there was no significant ($P > 0.05$) difference in average daily body weight gain (ADG) of heifer calves due to the different production systems, there is significant ($P < 0.05$) differences due to the different herd sizes where heifer calves in large sized farms were superior in ADG. The overall observed productive and reproductive performance of cows and heifer calf growth were good. But relatively inferior performance and prominent management problems were observed in medium sized farms.

171. Effects of Different Levels of Solvent Extracted Rapeseed (*Brassica carinata*) Meal Replacement to Soybean Meal on the Performance of Broiler Chicks

Endeshaw Ashnie, Mengstu Urge and Getachew Animut
Year: 2012

Abstract: A feeding trial was conducted to evaluate the effect of replacing different levels of solvent extracted rapeseed (Brassica carinata) meal (RSM) for soybean meal (SBM) on dry matter (DM) intake, growth performance, dry matter conversion ratio (DMCR), carcass characteristics, and economics of commercial broiler chicks. Three hundred thirty day-old Hubbard classic unsexed commercial chicks with initial body weight of 43.56 ± 0.66 g were used for the experiment. The chicks were randomly distributed to 15 pens of 22 chicks each, which was further randomly distributed to 5 treatment rations. Treatments were replacement of RSM for SBM with 0 (T1), 25 (T2), 50 (T3), 75 (T4), and 100% (T5) (represents 30 kg/100 kg ration). The experiment was arranged in a completely randomized design. Chicken Weight was taken at the start and at weekly interval during the experiment. At the end of the experiment 6 birds (3 male and 3 female) were randomly selected and scarified to evaluate carcass characteristics. Daily DM intake during starter phase (53.5, 52, 48.8, 46.5 and 39.6 g) was reduced beyond 25%, but it was not significantly influenced up to 50% RSM substitution during the finisher phase (110.95, 105.4, 105.9, 91.7 and 73.75 g), and the entire experimental period (82.2, 78.7, 77.4, 69.1 and 56.7 g for T1, T2, T3, T4, and T5, respectively). The DMCR during starter phase were showed non-significant difference among treatments. The DMCR during finisher phase and the entire experimental period were significantly higher at 100% substitution as compared to the other levels of substitution. The final weight (1616, 1601.67, 1453, 1275.5 and 901.1 g) and Total body weight gain (1572.6, 1558, 1409.7, 1232.3 and 857 g for T1, T2, T3, T4, and T5, respectively) for the entire experimental period were significantly reduced ($P < 0.001$) beyond 25% replacement of RSM for SBM. Eviscerated percentage (64.9, 60.8, 59.4, 55.3 and 55.1 for T1, T2, T3, T4, and T5, respectively) significantly ($P< 0.001$) decreased starting from 25% replacement. The weight of breast and drumstick-thigh were also significantly ($P < 0.001$) decreased as the level of RSM increased. The percentage of liver, spleen, gizzard, esophagus, crop, proventriculus, small intestine and ceaca significantly increased with increasing level of RSM. Whereas, the percentage of abdominal fat decreased. There was no significant difference among treatment on mortality percentage during the experimental period. The highest net return was observed for T2. In general, the results indicated that replacement of RSM for SBM beyond 25% hampered growth rate, reduced marketable carcass parts and resulted in enlargement of some edible and non-edible carcass offal, but replacement at 25% did not impact growth, except that carcass yield is a bit lower, which could be compensated by lower cost of production. Therefore, substitution of SBM by RSM at 25% can be used to reduce feed cost with little effect on broiler performance.

172. Effects of Supplementing Dried Branches of *Acacia senegal* and *Cactus cladodes* on Feed Intake, Digestibility, Body Weight Gain and Carcass Characteristics of Local Male Sheep Fed Barley Straw

Gebretnsae Mezgebo, Mengistu Urge and Kefelegn Kebede
Year: 2012

Abstract: Enhancing utilization of available feed resources especially multipurpose trees can solve shortage of livestock feed. The present experiment was carried out using twenty four yearling male local sheep with a mean initial body weight (BW) of 16.94 ± 1.7 kg (mean ± SD) to evaluate the effect of supplementing different proportions of dried Acacia senegal branches (ASB) and cactus cladodes (CC) to sheep fed barley straw (BS) on feed intake, digestibility, average daily gain (ADG) and carcass characteristics. Experimental sheep were blocked into six blocks of four animals based on initial body weight and randomly assigned to one of the four treatments. Treatments were ad libitum feeding of BS + 60 g noug seed cake (T_1, control), and T_2, T3 and T_4 were supplemented with 240 g CC + 80 g ASB, 160 g CC+160 g ASB, and 80 g CC+240 g ASB DM/day, respectively in addition to T_1 ration. Water and common salt blocks were available to the animal all the time. The experiment consisted of 90 days of feeding trial and 7 days of digestibility trials followed by evaluation of carcass at the end. Total dry matter intake (DMI) was 464.7, 735.3, 731.8 and 729.8 ± 24.9 SEM g/day and CP intake was 37, 62.4, 70.5 and 77.8 g/day ± 3.3 SEM for T_1, T_2, T_3, and T_4, respectively. The total DM and CP intake was significantly higher ($P < 0.05$) in supplemented groups than control group, but no significant difference among the supplemented groups. ADG was 0.6, 24.8, 30.1 and 37.6 ± 2.9 SEM g/day and hot carcass weight was 5.8, 7.2, 7.5 and 8 ± 0.22 SEM and significant ($P < 0.05$) in the order of $T_1 < T_2 < T_3 < T_4$. Dressing percentage of sheep supplemented with the highest proportion of ASB (T_4) was higher compared to other groups. From the partial budget analysis treatment four was recorded the highest net return. It can be concluded that supplementation with high proportion of ASB in the mixtures has a tendency to improve growth, carcass yields of sheep and recorded better economic benefit.

173. Comparative Growth and Reproductive Performance of Cross-Bred (Black Head Ogaden × Dorper and Hararghe Highland × Dorper) Sheep under Different Nutritional Management

Genet Berhe, Yoseph Mekasha and Mengistu Urge
Year: 2012

Abstract: An experiment was conducted to compare growth and reproductive performance of cross breed (Black Head Ogaden [BHO]*Dorper and Hararghe Highland [HH]*Dorper) sheep at two levels of nutrition (grazing + concentrate supplementation at 0.9% of body weight [N1] and grazing + concentrate supplementation at 1.5% body weight [N2])). Concentrate mix was prepared from wheat bran and noug seed cake at a ratio of 2:1. The experiment was laid out similarly as 2×2 factorial arrangement using CRD. The number of animals included in the experiment was forty four (20 males and 24 females). The mean initial body weight for male and female BHO*Dorper sheep was 22.08±0.93 and 20.60±2.76 kg (mean±se), respectively, while the mean initial body weight for male and female HH*Dorper was 21.91± 0.73 and 19.14±0.62 kg (Mean ±se), respectively. Male HH*Dorper lambs had significantly higher ($P < 0.01$) pre weaning ADG (106.24±3.32) than females of the same genotype (92.87±3.43). HH*Dorper lambs born from ewes of first parity (104.72 ±3.6) had higher average daily weight gain than lambs born from ewes of second parity (93.03 ±3.14). BHO*Dorper lambs born from ewes of second parity had higher birth weight (BrW) (3 ±1.9) than lambs born from ewes of first parity (2.44 ±1.4). BHO*Dorper lambs born in spring season [short rainy] (99.33 ±3.11) had higher ADG than lambs born in long dry season [winter] (81.66±1.66).Crossbred sheep fed N2 had significantly higher value of average daily body weight gain (male=110±4.66; female=81.6 ±4.27) than N1 (male=94±2.18; female=66.66 ±3.14). Breed had a significant effect on BC, HG and BW of female sheep ($P < 0.05$). BHO*Dorper sheep had higher BC (3.5±0.1) than HH*Dorper sheep (3.1±0.1). Correlation coefficients between body weight and other body measurements for both male and female crossbred Black head ogaden and Hararghe highland sheep were positive and highly significant ($P < 0.001$). The association was also close ($r=0.91$ for females and $r= 0.92$ for males) for HH*Dorper sheep. To predict body weight from other linear body measurements, heart girth was found to be the best predictor. Breed had a significant effect ($P < 0.01$) on semen volume. HH*Dorper rams had significantly higher semen volume (1.048±0.04) than BHO*Dorper (0.89±0.05). Nutrition had also a significant effect on sperm motility ($P < 0.001$).Thus, crossbred rams fed high level of nutrition (N2) had higher motile sperm cells (4.29±0.105) than their contemporaries fed on low level of nutrition (3.33±0.24). The interaction of breed by nutrition had a significant effect on sperm concentration. HH*Dorper sheep fed N2 had higher sperm concentration followed by HH*Dorper fed N1> BHO*Dorper fed on N2 >BHO*Dorper fed on N1. Among crossbred rams, breed significantly affected sexual behavior including lip curl response ($P < 0.05$) and mount duration ($P < 0.05$).Male HH*Dorper rams had higher value of lip curl response (25.83±3.12)and mount duration (3.27±0.12) than male BHO*Dorper rams (2.36±0.18) for mount duration and 12.5±4.11 for lip curl. Crossbred female sheep fed N2 had significantly higher value of % sniffing than animals fed on N1.

174. Comparison of Supplementing Urea Molasses and Urea Atela Blocks on Feed Intake, Digestibility, Body Weight Change and Carcass Characteristics of Male Black Head Ogaden Sheep Fed Natural Pasture Hay

Geaush Fesaha, Mengistu Urge and Kefelegn Kebede
Year: 2012

Abstract: The study was conducted at Haramaya University, using twenty four yearling intact male black head ogaden sheep with a mean body weight of 12.79 ± 1.4 (mean± SD). The objectives of the study were to compare the effect of supplementation with urea molasses and urea atela blocks on feed intake, digestibility, body weight change and carcass characteristics of male black head ogaden sheep fed natural pasture hay. The physical and nutritional quality of the feed blocks and the economic feasibility of supplementing block made from molasses versus block made from atela were also compared. The experiment consisted of ninety days of feeding trial, seven days of digestibility trial followed by evaluation of carcass parameters at the end of the experiment. The sheep were grouped in to six blocks based on their initial live weight and sheep within the same block were randomly assigned to one of the four treatments, giving six animals per treatment using a completely randomized design. For the digestibility trial, and carcass analysis 6 animals were randomly used in each treatment using a completely randomized design. The treatments consisted feeding of Urea Molasses block ad libitum (50% of Molasses: 23% Wheat bran: 9% Urea: 12% Cement: 6% Salt, T1), urea-atela block adlibitum (30% Atela: 43% Wheat bran: 9% Urea: 12% Cement: 6% Salt, T2), urea-atela block ad libitum (40% Atela: 33% Wheat bran: 9% Urea: 12% Cement: 6% Salt, T3) urea-atela block ad libitum (50% Atela:23% Wheat bran:9% Urea:12% Cement :6% Salt, T4). Two kg block per week per head was given to each experimental animal. Supplementation with urea-atela block, consisting higher amount of wheat bran (T2) had significantly ($P < 0.001$) higher daily weight gain (55.5±2.2), DM (600.45 ± 8.7) g and nutrient intakes (CP=104.2 ± 3.2) than Urea-molasses block. Supplementation with T2 diet has also significantly ($P < 0.001$) higher apparent digestibility of DM (69 ± 0.007), OM (63.2 ± 0.007) and CP (82.2 ± 0.01) than urea-molasses block. Sheep supplemented with block consisting higher proportion of Wheat bran (43% T2) and (33% T3) gained more weight ($P < 0.001$) than sheep supplemented with low wheat bran percentage in the block (T1 and T4). The result showed that supplementing both type of block improves sheep performance and combination of higher percentage of wheat bran with atela gave better result.

175. Feeds and Feeding Practices of Traditional Fattening and Evaluation of Supplemental Value of Cotton Seed Cake and Brewers' Dried Grain to Wogera Sheep Fed Grass Hay

Gizat Teshale, Getachew Animut and Solomon Melaku
Year: 2012

Abstract: This study had a survey and an on station animal trial. A survey was done to document the available feed resources, the feeding practices, marketing, constraints and prospective solutions of fattening animals in the area. Four purposively selected kebeles around Gondar town and 15 households per kebele were interviewed using structured questionnaire. The mean total livestock holding ranged 6.8 – 13.33 TLU per household. The major livestock feed resources identified were crop residues of major crops grown in the area. The highly preferred crop residues in the traditional animal fattening are maize stover and pulse straw. Giving priority for fattening animals of better and quality feeds especially concentrates is a common practice. The feeding practice of fattening animals in the study area is mainly tethering. Farmers in the study area used to fatten mainly oxen and bulls followed by sheep. The main constraint of fattening animals in the area is feed shortage followed by market, capital, labor, infrastructure availability. A feeding and digestibility trials with Wogera sheep fed a basal diet of grass hay ad libitum alone (T_1) or supplemented with 300 g DM brewers dried grain (BDG, T_2), cotton seed cake (CSC, T_3) or 1:1 mixture of BDG and CSC (T_4) were determined in a digestibility and feeding trial that lasted for 7 and 90 days, respectively using 24 intact male Wogera sheep with initial weight of 18.43 ± 1.04 kg. Feed intake was measured daily and samples of feed offered and refused, and feces were taken for chemical analysis. At the end, all sheep were slaughtered for carcass evaluation. The CP content of the hay, BDG and CSC were 5.0, 27.6 and 31.5%, and the NDF contents were 79.1, 80.9 and 48.5, respectively. The total intakes as well as digestibility coefficients of DM and nutrient improved ($P < 0.05$) by supplementation. CP and NDF intakes were in the order of $T_3 > T_4 > T_2 > T_1$ and $T_2 > T_4 > T_3 > T_1$ ($P < 0.05$), respectively. Digestibility of DM, CP and NDF were similar ($P < 0.05$) among the supplemented groups. Average daily gain and feed conversion efficiency were in the order of $T_4 = T_3 > T_2 > T_1$ ($P < 0.05$) and animals in T_1 lost 6.28 g/day. Hot carcass weight and dressing percentage on slaughter weight basis were greater ($P< 0.05$) for the supplemented than the non-supplemented sheep, but were similar ($P > 0.05$) among the supplemented treatments. The highest net return and MRR was noted for T_4 followed by T_3 and T_2. The results of the current study indicated that although T_4 performed similar to T_3 in most important biological parameters, T_4 is the most economical feeding regime and thus it is recommended for small scale finishing of Wogera sheep.

176. Effects of Supplementation with Graded Levels of Concentrate Mix of Oats Grain and Lentil Screening On the Performance of Menz Sheep Fed Hay

Gezu Tadesse Mammo, Mengistu Urge and Solomon Gizaw
Year: 2012

Abstract: The study was carried out at Debre Berhan Agriculture Research Center using twenty four Menz sheep with initial body weight of 17.13 ± 1.2 kg (mean± SD). The objectives of the experiment was to determine the response of Menz sheep in fed intake, digestibility, body weight change and carcass characteristics as well as assess economical profitability when supplemented with graded levels of mixture of fodder oats grain (FOG) and lentil screening (LS) and fed a basal diet of natural grass hay. At the end of feeding trial, digestibility trial and carcass parameters evaluation were carried out. The experimental sheep were blocked into six blocks of four animals based on their initial body weight and randomly assigned to one of the four treatment diets within a block. The treatments included ad libitum feeding of natural grass hay (T1, control) and supplementation with mixture of FOG and LS at a ratio of 3:1 with 150, 250 and 350 g DM graded levels. All sheep were offered 50 g noug seed cake. Water and common salt block lick were available to all animals throughout the experimental period. The experimental design used for all parameters was randomized complete block design. The hay intake was significantly ($P < 0.001$) higher in unsupplemented group (450.9 ±4.5 g/d) than supplemented groups (384.5-415.6 ±4.5 g/d). However, the total DM intake was significantly higher ($P<0.001$) in supplemented groups (615.6-797±4.5) than unsupplemented group (500.9±4.5 g/day). Dry matter intake in g/kg $W^{0.75}$was significantly higher ($P < 0.001$) in the order of T4 (75±0.51) > T3 (69±0.51) > T2 (65.9±0.51), and T1 (58.9±0.51). Digestibility coefficient of DM (0.63-0.71%), and CP (0.71-0.77) in supplemented groups were higher ($P < 0.001$) than unsupplemented group (0.6 and 0.61, respectively). T4 had higher ($P < 0.001$) daily body weight gain (68.24 ±0.95) as compared to T3 (47.68±0.95), T2 (29.9±0.95), and T1 (1.92±0.95). The hot carcass weight was significantly higher ($P<0.001$) in order of T4 (9.73 ±0.32) > T3 (9.13± 0.32) > T2 (7.58± 0.32) > T1 (5.84± 0.32). Hind legs made the highest share (23.2-24.8%) of the hot carcass weight and followed by forelegs that made 17.5-21.8% of the carcass. With regard to the economic benefits of the feeding trial, sheep fed with concentrate mix returned higher net income (14.85-48.9 birr) compared to those fed hay. Moreover, sheep on the high level of supplement (T4) returned the highest profit compared to the other supplemented treatments, but the marginal rate of return (MRR) was higher in T3 (1118.7%) compared to T2 (111.7%) and T4 (94.5%). Therefore, from biological point of view, sheep producers can use the supplement feeds in the order of T4, T3 and T2, respectively based on the availability of the supplements. The diet with 350 g/day could be recommended as a profitable level if capital is not a constraint, but when there is shortage of capital the diet with 250 g/day concentrate mix is a choice.

177. Effects of Substituting Basal Diet of Natural Pasture Grass Hay with Urea Treated Maize Stover on Feed Intake, Milk Yield and Milk Composition of Holstein Friesian Cows

Habtom Negussie, Yoseph Mekasha and Mohammed Yusuf
Year: 2012

Abstract: The experiment was conducted with the objective to evaluate the effects of substituting basal diet of natural pasture grass hay (GH) with urea treated maize stover (UTMS) on feed and nutrient intake, apparent digestibility of the diets, milk yield, milk composition and body weight change of lactating dairy cows. Eight multiparous Holstein Friesian cows at mid-lactation with mean milk yield of 14.14 ± 1.5 kg/day were grouped according to pre-trial milk production and randomly assigned to basal forage treatment sequences in double 4 X 4 Latin square design with 4 treatments and 4 periods of 21 days. In each period the first 14 days were used for diet adaptation followed by data collection from day 15 to 21. The four basal forage dietary treatments were increasing level of UTMS substituting GH; T1 (100% GH: 0% UTMS), T2 (67 % GH: 33% UTMS), T3 (33% GH: 67% UTMS), and T4 (0% GH: 100% UTMS). Each basal diet treatments were fed at 2.5% of the cow's body weight on DM basis. Concentrate mix was supplemented at a rate of 0.5 kg per kg of milk produced. Urea treatment of maize stover at 5% w/w increased crude protein (CP) from 4.25 to 9.73% and decreased contents of neutral detergent fiber (NDF) from 77.78 to 68.94, which made it comparable with that of the natural pasture grass hay used. Forage DMI linearly decreased ($P < 0.01$) as UTMS replaced GH at increasing level. The daily forage intake expressed as metabolic weight ($W^{0.75}$) for T1, T2, T3, and T4, it were 92.97, 91.40, 90.85 and 85.20 g DM/kg $W^{0.75}$, respectively. Total DMI followed similar trend as forage intake. With respect to nutrient intake, replacement of GH with UTMS at increasing level linearly increased CPI. However, intake of OM, NDF and ADF were similar among diets. Apparent digestibility coefficients of DM, OM, NDF and ADF linearly increased ($P < 0.01$) as UTMS replaced GH at increasing level. However, the apparent digestibility of CP was not influenced by dietary treatments. Dietary treatments did not affect average daily milk yield of cows, which were 12.56, 12.61, 12.93, and 12.81 kg/day for T1, T2, T3, and T4, respectively. Similarly, milk protein content and yield, solids not fat content and yield were similar among treatments. However, milk fat content and yield, feed conversion efficiency and yield of 4% fat corrected milk (FCM) linearly increased ($P < 0.01$) as UTMS substituted GH at increasing level. The 4% FCM yield of cows were 12.77, 12.84, 13.58, and 13.83 kg/day for T1, T2, T3 and T4, respectively. Average daily weight gain was significantly lower ($P < 0.05$) for T1 (0.30 kg/day) compared to T2 (0.46 kg/day), whereas T3 (0.40 kg/day) and T4 (0.34 kg/day) were intermediate. It is concluded that UTMS can replace 100% of grass hay in the diet of lactating dairy cow with improved feed conversion for milk production, milk fat content and yield, without affecting daily milk yield, milk protein content and yield, and daily body weight gain. Therefore, feeding urea treated maize stover could be considered as one of the strategies that bring about an efficient utilization of crop residues for dairy cow feeding and provides an option for quality forage during the dry season compared to the conventional natural pasture grass hay based diet.

178. Effect of Replacing Maize with Malted Barley Grain on Egg Production, Quality, Fertility and Hatchability of White Leghorn Layers

Haftu Kebede, Mengistu Urge and Kefelegn Kebede
Year: 2012

Abstract: A study was conducted to evaluate the effects of partial substitution of maize by malted barley grain (MBG) as energy source on feed intake, body weight gain, egg production and quality, feed conversion ratio, fertility, hatchability, embryonic mortality and chick quality of white leghorn (WL) layer at Haramaya University Poultry Farm for 90 days. One hundred eighty WL layer at five months of age with average initial body weight of 1036.20± 31.097 g (mean ± S.D) were randomly distributed to four treatments, each replicated three time with fifteen layer and two cockerel per replicate in CRD and kept on a deep litter system. The treatment rations were formulated to contain replacement of MBG for maize with the percentage of 0 (T_1), 10 (T_2), 20 (T_3) and 30 (T_4). Chicken were offered a weighed amount of feed and feed leftover was collected and weighed the next morning. Weight of experimental animals was taken at the beginning and at the end of the experiment. Daily dry matter intake of birds fed diet consisting T_1 (90.60±0.24 g) and T_2 (90.80±0.24 g) was significantly ($P < 0.01$) lower than T_3 (91.90 ± 0.24 g) and T_4 (92.23±0.24). Daily mean body weight gain of hens fed T_4 (0.66 ± 0.03) was significantly ($P < 0.05$) higher than those of T_1 (0.43±0.03) and T_2 (0.48±0.03). The results of the experiment showed that there were no significant differences ($P > 0.05$) among treatments in hen-day egg production (46.5,48.3, 51.6 and 53.8 (SEM= 1.18), for T1, T2, T3, and T4, respectively), egg mass (22.2, 23.7, 24.7 and 26.1 (SEM= 0.58), for T1, T2, T3, and T4, respectively), yolk diameter, shell weight (5.7, 5.7, 5.9 and 5.9 (SEM=0.05), for T1, T2, T3, and T4, respectively), Haugh unit, feed conversion ratio, fertility, hatchability, embryonic mortality, chick length and chick visual score. Results of Roche color reading revealed that eggs from hens fed T_1 diet has significantly ($P<0.01$) lower yolk color (1.58 ±0.09) than those of T_2 (2.02± 0.09), T_3 (2.26±0.09) and T_4 (2.24±0.09). Eggs laid by hens fed T_1 has thinner egg shell thickness (0.31 ±0.004) than T_3 (0.34±0.004) and T_4 (0.35±0.004). Day old chick weight of birds fed T_1 (29.9±0.39) was lower ($p<0.05$) than T_3 (32.8±0.39) and T_4 (31.9). Even though, feed cost slightly increased with increasing level of MBG in the ration, but egg was produced economically in groups in which MBG replaced maize. Therefore, it can be concluded that MBG can be replaced for maize grain as a source of energy up to 30%, since the inclusion level used in the present experiment is profitable and did not negatively affected laying performance and product quality.

179. Effects of Supplementation with Air Dried Leaves of African Wild Olive (*Olea africana*), Red Thorn (*Acacia lahai*) And Their Mixtures on Performance of Tigray Highland Sheep Fed Grass Hay

Hagos Abraha, Mengistu Urge and Getachew Animut
Year: 2012

Abstract: The experiment was carried out at Wukro Saint Marry ATVET College, using twenty five yearling intact male Tigray Highland sheep with an initial body weight of 16.7 ± 2.1 kg (mean ± SD) with the objectives of determining the effects of supplementation with air dried leaves of African wild olive (OTL), Acacia lahai (AL) and their mixtures on feed intake, digestibility, body weight change, carcass characteristics, and economics of the supplementations. The experimental design was randomized complete block design. The experimental sheep were blocked into five blocks of five animals based on their initial body weight and randomly assigned to one of the five treatment diets within a block. The treatment diets included ad libitum feeding of grass hay plus 60 g noug seed cake alone (control, T1),or supplemented with 300 g (100% OTL: 0% AL; T2), 300 g (65% OTL: 35% AL; T3), 300 g (35% OTL: 65% AL; T4) and 300 g (0% OTL: 100% AL; T5) on DM basis. Water and salt were available ad libitum. The feeding trial was conducted for 90 days after 15 days of adaptation period followed by 7 days of digestibility trial, and at the end evaluation of carcass parameters was made. The grass hay, OTL and AL consisted of 9.8, 10.1, and 12.7% CP, respectively. There was a significantly ($P < 0.001$) higher basal diet intake in the non-supplemented treatment (599.6±14.68 g/head/day). But statistically higher ($P < 0.001$) total DM intake was recorded in the supplemented ones (722.9±14.68-748.4±14.68 g/head/day) with no significant ($P > 0.05$) difference among supplemented animals. There were no significant ($P > 0.05$) differences in DM, OM, NDF and ADF digestibility between supplemented and control groups, whereas digestibility of CP was significantly ($P < 0.001$) higher for supplemented sheep (0.62±0.05-0.65±0.05) than the control (0.47±0.05) with non-significant ($P > 0.05$) among supplemented ones. The control group gained 7.4 g/head/day, while the daily body weight gain of the supplemented ones was in the range of 36.7-41.8 g/head/day. The slaughter and hot carcass (8.5±0.2-9.1±0.2 g/day) weights of the supplemented treatments were significantly ($P < 0.01$) higher than the control sheep (6.8±0.2 g/day). Similarly, empty body weight, dressing percentage (slaughter weight basis) and rib eye muscle area were ($P < 0.001$) higher for the supplemented treatments than the control. No statistically significant difference ($P > 0.05$) was noted within the supplemented treatments for the carcass parameters. In general, results of the present study suggested that supplementation with air dried leaves of the multipurpose trees and their mixtures significantly improved feed intake, body weight change and carcass characteristics of sheep, and resulted in better economic benefits. Therefore, small-holder farmers in arid and semi-arid areas, where these trees are found, should be advised to conserve and use them as dry period feed supplement.

180. Physicochemical Properties and Microbiological Quality of Dhanaan: Traditional Fermented Camel Milk Produced in Eastern Ethiopia

Kasa Biratu and Eyassu Seifu
Year: 2012

Abstract: This study was conducted with the objectives of assessing the production, handling and utilization practices of the traditional fermented camel milk Dhanaan produced in Jijiga woreda and determining the physicochemical properties and microbiological quality of traditional and laboratory made Dhanaan. The study had two parts: one was a survey on production, handling and utilization practices of Dhanaan and conducted among sixty camel milk producing households in three selected Kebeles of Jijiga woreda. Selection of the Kebeles were done based on their possession of camel and accessibility whereas selection of households were done using purposive sampling technique based on possession of milking camels, accessibility and willingness to take part in the study. All camel milk producers were interviewed individually using a semi-structured questionnaire. For collecting Dhanaan samples for the experiment part, nine households, three from each Kebele, were purposively selected based on milking camel possession, accessibility and willingness to participate in the study. Fresh raw milk used to prepare Dhanaan in the laboratory was also sampled from the bulk milk container among selected households one from each Kebele. A total of 36 Dhanaan samples (27 traditionally made plus 9 laboratory made Dhanaan) were analyzed for their physicochemical properties and microbiological quality. The survey result indicated that Dhanaan is the only camel milk product popular in the study area produced by spontaneous fermentation process to be used as a food, means of conserving milk and increasing its shelf life and treating some diseases. The overall mean (SD) values for pH, titratable acidity, total protein, fat, total solids, solids-not-fat and ash were 4.18 ± 0.29, 1.75 ± 0.34% lactic acid, 4.11± 0.67%, 2.50 ± 0.60%, 11.08 ± 2.47%, 8.64 ± 2.08% and 0.96 ± 0.03 %, respectively for traditionally made Dhanaan. Whereas the corresponding values for laboratory made Dhanaan samples were 4.04 ± 0.25, 1.54 ± 0.26% lactic acid, 4.04 ± 0.42%, 2.39 ± 0.56%, 11.83 ± 1.24%, 7.79 ± 1.22% and 0.99 ± 0.09%, respectively. No significant difference ($P > 0.05$) was observed between traditional and laboratory made Dhanaan samples for all the physicochemical parameters considered. The average (SD) total bacteria count (TBC), coliform count (CC), lactic acid bacteria count (LABC) grown on MRS agar, lactic acid bacteria count (LABC) grown on M17 agar, non-lactic acid bacteria count (NLABC) and yeast and mould count (YMC) were 6.26 ± 1.01l, 5.88 ± 0.84, 5.88 ± 0.97l, 5.98 ± 0.73, 6.25 ± 0.92, 7.05 ± 0.90 log10 cfu/ml, respectively for traditional Dhanaan. Whereas, the corresponding values for the laboratory made Dhanaan were 5.50 ± 0.62, 3.76 ± 0.29, 5.52 ± 0.55, 5.80 ± 0.81, 5.50 ± 0.62 and 5.65 ± 0.62 $\log_{10}$ cfu/ml, respectively. Significant ($p<0.05$) differences were observed between traditional and laboratory made Dhanaan for total bacteria, coliform, non-lactic acid bacteria and yeast and mould counts. In all cases higher counts were observed in the traditionally made Dhanaan. The results indicated that the quality of traditional Dhanaan was poor. The results of the microbiological analysis showed that by improving hygiene during handling and processing, it is possible to improve the microbial quality of Dhanaan made from camel milk.

181. The Effect of Different Levels of Soybean (*Glycine max*) Meal Supplementation on Feed Intake, Digestibility, Live Weight Changes and Carcass Characteristics of Black Head Ogaden Sheep Fed Natural Pasture Hay

Kiflay Welday, Getachew Animut and Mengistu Urge
Year: 2012

Abstract: The experiment was carried out using twenty four yearling male Black head Ogaden sheep with initial body weight (BW) of 12.95 ± 1.79 kg (mean ± SD) to evaluate the effect of different levels of soybean meal (SBM) supplementation to natural pasture hay on feed intake, digestibility, average daily BW gain (ADG) and carcass characteristics. The experimental sheep were blocked into six blocks of four animals based on initial BW and randomly assigned to one of the four treatments. Treatments were ad libitum feeding of natural pasture hay + 50 g/day wheat bran (T_1) supplemented with 125 g/day SBM (T_2), 250 g/day SBM (T_3), 375 g/day (T_4) SBM. Water and mineral salt were available to the animals all the time throughout the experiment. The experiment consisted of 90 days feeding and 7 days digestibility trials followed by evaluation of carcass at the end. Hay dry matter (DM) intake was 562, 471, 421 and 367 (SEM = 15.70) and was in the order of $T_1 > T_2 > T_3 > T4$ ($P < 0.05$). Total DM (612, 644, 718 and 769 (SEM = 13.8)) and CP intake (33.8, 78.5, 125.4 and 164.8 (SEM = 10.31)) increased ($p < 0.05$) with increasing level of SBM supplementation. Supplementation of SBM increased DM and CP digestibility but NDF and ADF digestibility decreased with increasing levels of SBM supplementation. ADG was 30.3, 80.9, 104.0 and 116.2 g/day (SEM = 6.89) and hot carcass weight was 5.9, 8.9, 10.4 and 11.6 kg (SEM = 0.48) in the order of $T_1 < T_2 < T_3 < T_4$ ($P < 0.05$). Dressing percentage both on slaughter (37.3, 44.6, 46.4 and 48.6% (SEM = 0.94)) and empty BW (48.4, 51.9, 54.2 and 59.7% (SEM = 0.94)) basis for T_1, T_2, T_3 and T_4, respectively was highest for T_4, intermediate for T_3 and T_2 and lowest for T_1. Partial budget analysis showed that T_4 was the most economical feeding regime. Therefore, based on result of biological performance and partial budget analysis, T_4 was found to be recommendable for this study.

182. Identification and Nutritional Value Assessment of the Major Browse Species Utilized By Livestock in Chilega Woreda, North Gondar

Kassahun Desalegn, Yoseph Mekasha and Getnet Asefa
Year: 2012

Abstract: The study was conducted in Chilga Woreda of North Gondar Zone of the Amhara National Regional State for 5 month for field work. The objectives of this study were to generate base line information on the available livestock feed resources and feeding system, to identify the major browse species and their potential estimated biomass yield, their chemical composition, in vitro digestibility and in sacco degradability of the major browse species. The major livestock feed resources available in the study area were crop residues, natural pasture, hay, crop aftermath and indigenous browse species. The purpose of keeping livestock in the study area varied based on the species of livestock kept. The primary purpose of keeping cattle was to use oxen for draught power, while it was for generation of income in case of small ruminants and transports in case of equines. Shortage of feed was the first production constraint followed by disease and parasite across all the livestock species. During the study period 20 browse species were identified; - out of which twelve were selected based on their abundance in the Woreda, preference by livestock, ease of browsing and additional uses other than livestock feed. The selected browse species are Acacia spp, Blecarcites aegyptica,Bridelia cathartiica, Combretum collinum, Combretum molle, Ficus sycomorus, Ficus thonningii, Helinus mystacium, Lecaniodicus fraxinifolius, Pilliostigma thonningii and Stereospermum kanthianum. According to the respondents, nearly all the domesticated ruminants in the survey area consumed browse species. Browses were utilized in both wet and dry seasons. Some browse species shed leaves early, while others retained leaves late into the dry season. Leaves, pods, twigs and flowers were the plant parts utilized by livestock. However, leaves were the most preferred part. The browse species were found on grazing land, crop land, in home compounds or grown as boundary plant species between farm lands. The farmers did not give great attention to the fodder value of the browse species and so do not manage them well. Significant difference ($P < 0.05$) in potential biomass yield was observed among browse species. There is a wide variation in CP, NDF, ADF, ADL, and ash contents. The IVDMD value varied ranging from 21.16 to 71.07. There was a significant difference ($P < 0.05$) in DM and CP in sacco degradability among browse species. The result showed that there was relatively better digestibility and CP composition in browse species such as Helinus mystacium, Blecarcites aegyptica and Ficus thonningii, implying that, these browse species could be used to improve animal performance through improving the nutritive value of low quality feed resources. Further study is suggested to asses the nutritive value of other parts of the browses such as pods, which are consumed by livestock but not considered in this study. It is also recommended to conduct agronomic studies, anti-nutritional factors of browse species and animal feeding trial on the most promising browse species.

183. Effect of Supplementation with Synthetic Lysine Amino Acid on the Performance of Broiler Chicks

Mebratu Melaku, Mengistu Urge and Getachew Animut
Year: 2012

Abstract: A study was conducted to evaluate the effect of supplementing different levels of synthetic lysine (sLys) on dry matter intake (DMI), average daily weight gain (ADG), dry matter conversion ratio (DMCR), carcass characteristics and economics of production. Two hundred forty day-old Hubbard Classic broiler chicks with an average initial body weight (IBW) of 46.6 ± 0.31 g were randomly distributed to 12 pens of 20 chicks each, and assigned to four treatment rations in a completely randomized design. Six broilers (3 males and 3 females) from each replication were randomly selected, starved for 16 hours and slaughtered to evaluate carcass characteristics. The control diet had a calculated lysine content of 0.9 and 0.8 % of the ration, which was 0.3 and 0.2 % of the ration below the recommended level for the starter and finisher phases, respectively. The four rations were formulated by including synthetic lysine (sLys) at levels of 0, 50, 100 and 150% of the deficient amount of lysine. Treatments thus, were no sLys inclusion in the ration (T_1); and rations to which 50% (T_2), 100% (T_3) and 150% (T_4) of the deficient amount of lysine being added as sLys. No significance difference ($P > 0.05$) were observed among treatments in total and daily DMI, ME and CP intakes and DMCR at all phases of the experiment. Final body weight (FBW) and ADG during the starter phase was similar ($P > 0.05$) among treatments. Final BW during the finisher (1665, 1672, 1707, and 1786 g (SEM = 18.04)), and ADG during the entire period (33.0, 33.1, 33.9, and 35.5 g/day (SEM = 0.36) for T_1, T_2, T_3 and T_4, respectively) was significantly higher ($P < 0.05$) for birds kept on T_4 diets. No significant difference ($P > 0.05$) existed in mortality percentage among treatments during all phases. Dressed carcass weight (1407, 1426, 1461, and 1510 g (SEM = 15.07)), breast weight (329, 334, 338, and 365 g (SEM = 5.09)) and drumstick weight (134, 137, 135, and 150 g (SEM = 2.3) for T_1, T_2, T_3 and T_4, respectively) were greater for T_4 than other treatments. Abdominal fat (2.1, 2.1, 1.7 and 1.59 g (SEM = 0.07)) was greater for T_1 and T_2 than T_3 and T_4. Treatment four has the highest net income and marginal rate of return. In conclusion, 12.5% extra addition of sLys above the level recommended by NRC as in T4 to the commercial diets improved broiler performance and profitability and thus can be recommended.

184. Assessment of Livestock Feed Resources, Utilization Practice, Conservation and Copping Strategies in Southern Ethiopia: A Case Study of Abello District

Mizan Seifu, Abule Ebro and Mengestu Urge
Year: 2012

Abstract: This study was undertaken in Yabello district of the Borana zone with the objectives of assessing the feed utilization practices, method of feed conservation, and feed shortage coping strategies of pastoralists. Furthermore, the study investigated the chemical composition of major livestock feeds during the short rainy and long dry seasons, as well determined the biomass of natural pasture and woody species during the short rainy season. Field vegetation and household surveys and chemical analyses of feed samples were conducted to achieve the above objectives. The study was undertaken in seven rural kebeles (RKs) of the study district. The total households included in the survey were 90 of which 60 and 30 were male and female headed households, respectively. The female headed households were included purposely whereas the male headed households were taken randomly from each rural kebele (RK). For the vegetation study, the district was stratified by grazing types (communal, enclosure and benchmark/ranch). The leaf biomass of each woody plant was calculated using the Biomass Estimates from Canopy Volume (BECVOL) model. Feed sample collection was undertaken in the long dry season and short rainy season for the purpose of chemical composition analyses whereas the sample for biomass determination were collected during the short rainy season. In the study district, natural pasture is the main source of feed during the wet season whereas, browse trees are the major source of feed for dry season followed by natural pasture, crop residues and crop aftermath. All respondents indicated that woody vegetation provide feed for livestock throughout the year while grazing lands provide pastre starting from March to late November. The communities feed crop residues (maize, haricot bean and teff straws) as sole diets and sometimes by mixing with pods and foliage leaves from browse plant starting from May to early December. The survey result also showed that 78.3% of the male and 86.7% of the female respondents practiced feed conservation for dry period. The feed preserved is standing hay from the enclosure (Kallo) for sick animals, lactating cows and calves during the dry season and is one of the feed shortages copping strategy in the study area. As a result, the majority of the males (98.3%) and females (93.3%) are involved in enclosures management practice; such as bush clearing, fencing, management concerning proper utilization of enclosures while guarding is mainly undertaken by males. A total of 19 grass species were identified in the study district during the short rainy season. From the total grass species, the highly desirable, desirable and less desirable species accounted for 46.21%, 31.26% and 22.54%, respectively. Moreover, a total of 25 browse species were identified in the study area, out of which 23.61%, 44.96% and 31.43% were highly palatable, less palatable and unpalatable, respectively during the short rainy season. The total browse leaf DM yield obtained (1,566 kg/ha) in the benchmark / ranch grazing areas is the highest biomass followed by enclosure (855 kg/ha) and the least was recorded in communal grazing areas (466 kg/ha). Grass species in the communal grazing type had significantly ($P < 0.05$) higher DM and ash contents than in the ranch grazing type. However, the enclosure grazing areas had a significantly lower ($p > 0.05$) ADF and higher CP contents than the two grazing types. Furthermore, the results of the chemical analyses of the browse species revealed that there is no significant differences ($P > 0.05$) difference among the three grazing areas in DM, ADF and NDF contents. However, the browses in the communal grazing areas had a significantly lower ($P< 0.05$) ash content than the browse species in the enclosure grazing type, but no significant difference ($P<0.05$) was observed with that of the ranch/benchmark areas. With regard to CP values, the ranch grazing system was significantly higher ($P < 0.05$) than both the communal and enclosure grazing systems. Moreover, the contents of DM, ADF and NDF were significantly ($P< 0.05$) higher during the long dry season than during the short rainy season. However, ash and CP contents were found to be higher in the short rainy season than in the long dry season. 88.3% of male and 90% of female headed households indicated that livestock feed in the area was deteriorated; moreover, January and February are the most critical months of feed shortage. Thus, in order to increase livestock production and productivity of the district, problems related to livestock feeds and feeding systems should be solved through proper management of the rangelands, introduction of improved forage technologies and strengthening the capacity of pastoralists and agro pastoralists in feed conservation techniques.

185. Growth Performance and Carcass Characteristics of Dorper Sheep and Boer Goat Crosses Compared With Local Sheep and Goat Breeds

Mekonnen Tilahun, Kefelegn Kebede and Girma Abebe
Year: 2012

Abstract: The experiment was conducted to evaluate the growth potential, nutrient utilization and carcass yield of crossbred sheep and goats having different levels of (50 and 25% Dorper and Boer) exotic blood compared with CHS and indigenous goats under similar feeding and management conditions on station at Sirinka agricultural Research center located in Amhara Regions. All animals used for this study were intact males and at the start of the experiment their age was about 3 to 5 months for sheep and 6 to 9 months for goat and all were at milk teeth. All the experiment animals were kept indoors, in individual pens, have free access to water, allowed ad libitum intake of the native grass hay but with restricted amount of concentrate mixture considering 2% of their body weight in dry matter basis which were adjusted every ten days following regular weight measurement of the different sheep and goat genotypes. Concentrate mixture was prepared with an ingredient composition of 46% Noug seed cake, 28% wheat bran, 24% (crushed) sorghum grain and 2% common salt for all sheep and goat genotypes. The animals were separated by genotype type and assigned to a single pen in a completely randomized design for 90 day. The experiment lasted for 90 days from December to March 2011 for goat trial and from July to October 2011 for sheep trial. Among the sheep genotypes the mean daily intake of DM, OM, NDF, ADF, He-Cell, and Lignin were higher at ($P< 0.05$) for 25% Dorper x 75% CH sheep genotype than that of CHS while an intermediate value being for 50% Dorper x 50% CH sheep genotypes. However, in goat genotypes, no significant genotype differences were noted for all mean dry matter intake and nutrient intake parameters. There was no significant genotype difference occurred for sheep on parameters recorded for DMD, CPD, OMD, NDFD, ADFD, and He-CellD. However significant differences among goat genotypes were seen in NDF and He-Cell digestibility. The NDF and He-Cell digestibility was significantly higher for 50% Boer x 50% CH goats than 25% Boer x 75% local goats with an intermediate value of Central Highland goat breeds. Both Dorper crossbred sheep genotypes were significantly ($P<0.01$) higher in final body weight, average daily gain and gain efficiency than CHS. The Average daily gain for 25% Dorper x 75% CH sheep and 50% Dorper x 50% CH sheep was 130.79 and 125.84 gd^{-1}, respectively and both crossbreds gained more rapidly ($P< 0.01$) than CHS (91.39 g d^{-1}). The feed efficiency g DMI/g LW gain was significantly ($P<0.01$) better in 50% Dorper x 50% CH sheep (7.23 g DMI/g gain) followed by 25% Dorper x 75% CH sheep (7.35 g DMI/g gain) and CHS (9.17 g DMI/g gain) This implies 50% Dorper x 50% CH sheep and 25% Dorper x 75% CH sheep were more efficient in converting feed to meat than CHS breeds. While for goat trial no significance difference for final body weight ($P> 0.05$), ADG ($P> 0.05$), FE ($P> 0.05$) and GE ($P> 0.05$) among the three goat genotypes were noted. Both Dorper crossbred sheep genotypes were higher ($P< 0.001$) in SW, EBW, HCW, CCW, HotDP SWbase, ColdDP SWbase, left carcass weight, right carcass weight, REA, lean, bone, fat and ratio of lean + fat to bone than that of CHS genotypes but no significance difference were observed in the above parameters between 25% Dorper x 75% CH sheep and 50% Dorper x 50% CH sheep genotypes. Moreover 25% Dorper x 75% CH sheep carcasses were 60% heavier than CHS carcasses and 50% Dorper x 50% CH sheep carcasses were 52% heavier than that of CHS when we compare on hot carcass base. While lean to fat ratio was higher ($P< 0.01$) for CHS than that of the Dorper crossbred genotypes. Dorper crossbred genotypes were heavier ($P<0.01$) weights of heart, head with tongue and feet than CHS. However, there were no significance difference ($P>0.05$) observed among sheep genotypes for gut full, gut empty, gut content, respiratory tract, liver, and testicles. Boer goat crossbreds had higher ($P<0.01$) than CHG in the parameters of hot carcass weights, cold carcass weights, right carcass weights, lean weight, fat weight, and lean + fat to bone ratios. Slaughter weight and empty body weight, were significantly higher at ($P<0.001$) and ($P<0.01$) for 50% Boer x 50% CH goat genotypes than that of 25% Boer x 75% local crosses and CHG genotypes while no significance ($P>0.05$) difference exist for these parameters between 25% Boer x 75% local goats and central Highland goat genotypes. Moreover, Differences due to genotypes of goat were studied significant for almost all non-carcass parameters except feet weight of the goat genotypes. In general, from the results obtained in this study, it can be concluded that genotypes influenced the growth rate, dry matter intake and carcass characteristics of sheep and goat. Among sheep genotypes, 25% Dorper x 75% CH sheep and 50% Dorper x 50% CH sheep had the fastest growth rates, more efficient in converting feed to meat and heaviest body and carcass weights. However among the goat genotypes the Boer crossbred did not show superior performance than that of CHG in growth rate and biological efficiency parameters but in terms of carcass parameter the improved Boer crossbreds show better performance at similar age in main characteristics and further study required to suggest for future use in Ethiopian condition

186. Study on Production Practices and Production Performance of Indigenous and Exotic Chicken Breeds Under Rural Household Condition in Nole Kabba Woreda, Western Wollega, Ethiopia

Matiwos Habte, Negassi Ameha and Solomon Demeke
Year: 2012

Abstract: Survey of production practices and production performance of rural chickens and on-farm evaluation of the performance of Fayoumi chicks distributed in hay box brooder were studied in three kebele's of Nole Kabba woreda of west Wellega Zone. About 30, 33 and 29 households were randomly selected from poor, medium and rich wealth groups, respectively and 32, 29 and 31 from mid-highland, highland and lowland agro-ecological zones, respectively and a total of 92 households and 18 key informants were used for the survey work. A total 18 households were offered Fayoumi chicks along with hay box brooder of 10 chick's capacity to evaluate the performance of fayoumi breed of chicken under rural household conditions. Finally all the data collected were analyzed using statistical package for social science and Statistical Analysis System. The results obtained revealed that, the overall mean flock size per household was 7.37 chickens which is dominated by local ecotypes. There is no purposeful formulated feeding in the study sites and the birds depend on scavenging with provision of supplementary feed and water. There is no separate poultry houses for night enclosure and the chickens spent more of their times on scavenging in the vicinity of human dwellings. Poultry diseases are widely spread in the study areas and about 85% of the respondents reported seasonal outbreak of Newcastle diseases. About 85.9% of respondents practice culling unproductive chicken based on egg production, body weight, and plumage color. Women were mostly responsible for poultry management and make decision on the income from sale of poultry and poultry products. About 50% and 27.2% of eggs produced are used for sale and consumption, respectively. Farmers sell their chicken and eggs directly to consumers and middle men. About 71.7% of all the respondents indicated that local chickens performed well than exotic chickens and their crosses in terms of survivability, disease résistance and alertness against predators. On the other side all the respondents agree that the egg production performance of exotic chickens and their crosses is superior to the egg production performance of indigenous chicken under improved management system, indicating that risk of disease and predation and lack of supplementary feeding are the major limitations to the productivity of exotic chickens and their crosses under rural household conditions. The results of the on-farm study showed that about 79% of the Fayoumi chicks distributed survived to an age of 8 weeks. There was significantly higher of the chicks distributed in lowland (34.56) and medium households (34.32) wealth status in rate of growth ($P < 0.05$). Significantly shorter ($P < 0.05$) age in sexual maturity of chicks in Mid-highland (5.54 months) and rich households (5.58 months). Egg production performance were significantly ($P < 0.05$) lower in poor household than rich and medium household. In summary the results of this study tends to indicate that production performance of indigenous chicken is low under traditional production practice and egg hatchability from RIR need to be improved. Fayoumi chicken production performance as measured Hatchability, fertility and disease resistance ability under scavenging condition seems to be the future direction of research in the Nole Kabba woreda.

187. Effect of Supplementation with Dried Leaves of *Acacia albida*, *Acacia Seyal a*nd Their Mixture on Feed Intake, Digestibility, Live Weight Gain and Carcass Characteristics of Local Sheep Fed Barley Straw as a Basal Diet

Neamn Gebreselassie, Getachew Animut Mengistu Urge
Year: 2012

Abstract: This study was conducted to evaluate the effect of supplementation of Acacia albida (AA), Acacia seyal (AS) and their mixture on feed intake, digestibility, daily body weight (BW) gain (ADG), feed conversion efficiency (FCE), carcass characteristics and economic feasibility of local sheep fed a basal diet of barley straw (BS). Twenty four yearling intact male sheep with initial BW of 16.6±2.4 (Mean ± SD) were blocked in to six based on initial BW and animals within a block were randomly assigned to treatments. Treatments were ad libitum barley straw(BS) and 100 g wheat bran (WB) alone (T1) or supplemented with 200 g of dried leaves of Acacia albida(AA) (T2), Acacia seyal(AS) (T3) and a 1:1 mixture of AA:AS (T4). The feeding and digestibility trial were conducted for 90 and 7 days, respectively followed by carcass evaluation at the end. Dry matter (DM) intake of BS was in the order of T1 > T2 = T4 > T3 ($P < 0.05$). Total DM intake (500, 650, 597 and 636 g/day (SEM = 12.96) for T1, T2, T3 and T4, respectively) was lowest for T1, highest for T2 and T4 and intermediate for T3 ($P < 0.05$). Total CP intake was 38, 77, 65 and 71 g/day for T1, T2, T3 and T4, respectively, and was increased by supplementation ($P < 0.05$). Among the supplemented treatments, T2 had higher ($P < 0.05$) CP intake than T3, while the CP intake of T4 was similar with T2 and T3. Apparent digestibility of DM and CP increased ($P < 0.05$) and that of NDF and ADF was unaffected ($P > 0.05$) by the supplementation. ADG was lower for T1 than the supplemented animals, and was in the order of T2 = T4 > T3 > T1 (2, 36, 15 and 28 g/day (SEM = 3.39) for T1, T2, T3 and T4, respectively). FCE followed somewhat similar trend like that of ADG. Hot carcass weight (HCW) (5.3, 7.2, 6.1 and 6.7 kg (SEM = 0.25) for T1, T2, T3 and T4, respectively) was greater ($P < 0.05$) for the supplemented than T1. Among the supplemented group, HCW was greater for T2 than T3, and values for T4 were similar with T2 and T3. Dressing percentage on slaughter weight basis was lower ($P < 0.05$) for T1 than the supplemented treatments, but was similar ($P > 0.05$) among the supplemented treatments. However, supplementation did not impact ($P > 0.05$) dressing percentage on empty BW basis. Partial budget analysis in the current study showed T1 to have the negative net return (-16.4 ETB), and the highest net return and marginal rate of return was obtained for T2 (14.2 ETB). Therefore, result of the current study suggested that 200 g AA leaf meal supplementation to barley straw basal diet to be better both biologically as well as economically.

188. Evaluation of Urban and Peri-Urban Dairy Production Systems in Adama Milk Shed, East Shoa Zone, Oromia National Regional State, Ethiopia

Nigusu Fekade, Yoseph Mekasha and Azage Tegegne
Year: 2012

Abstract: Herd management practices, productive and reproductive performances of crossbred dairy cows in urban and peri urban dairy production system were assessed in Adama milk shed. A total of 145 farms having crossbreed cows, 62 from urban farms and 83 from peri urban farms were studied. Depending on their herd size farms were stratified into small (less than 3), medium (3 to 10) and large farms (more than 10 cattle). Farm owners were interviewed using structured questionnaire and a total of 24 farms, 6 farms from urban and 18 farms from peri urban areas were monitored for feed intake, milk yield, body weight and body condition score. Survey data were analyzed using Statistical Package for Social Science (SPSS). Monitoring results were analyzed using General Linear Model (GLM) procedures of SAS. In urban areas milking cows account for 71.4%, 44.4% and 38.0% of small, medium and large farms, respectively, while in peri urban these values were 45.8%, 47% and 33.7% for small, medium and large farms, respectively. In urban areas, pregnant cows account for 42.8%, 36.2% and 40.6% in small, medium and large farms, respectively, while these values were 29.3%, 32.5% and 31.2%, respectively, in peri urban farms. Mean daily milk yield was significantly affected ($P < 0.01$) by production systems, genotypes, herd size and parity. The overall mean daily milk yield per cow was 14.1±4.3 kg. The higher daily milk yield was found in urban production system (15.5 ±5.2) and for high-grade Holstein cows (15.3± 4.1); and the lower milk yield was recorded in peri urban production system (13.7 ± 3.9) and for crossbred cows (11.2± 3.6). The average daily milk yield was higher (15.6 ±3.7) in large farms compared to medium sized farms (12.9± 4.3). The average daily milk yield of cows with parity 3 was (15.36±4.44), significantly higher ($P < 0.01$) than cows with parity 4 (9.9±2.5). Small, medium and large urban farms contributed 6.1%, 13.7% and 33.1% to the total milk production per day, respectively, while these values were 5.2%, 15.3% and 26.5% in peri urban farms. Cows at early stage of lactation in urban farms were significantly heavier ($P < 0.01$) and with better body condition score (447.2 ± 24.2 kg) and (3.1 ±0.50) than peri urban farms (425.9 ± 24.7 kg) and (2.9±0.5). Higher ($P < 0.01$) body weight (374.5±23.0) and better body condition scores (3.08±0.3) were recorded in medium farms. The overall body condition score of dairy cows at early lactation (3.0± 0.4) is close to the recommended level (2.5 to 3.0). Body weight and body condition score of cow in parity 3 was 437.2±26.2 and 2.97±0.5, which was significantly ($P < 0.01$) higher than for cows in parity 4. Body weight (447.2±26.2 kg) and body condition score (3.1±0.5) of cows in Adama town was significantly higher than body weight and condition score of cows in Welenchiti. The survey study conducted on reproductive performance of the dairy herds also indicated that genotype exerted a highly significant ($P< 0.001$) effect on average age at first mating, age at first calving, Days open and calving interval. The mean age at first mating was 20.44 months. High-grade Holstein heifers (29.7) appeared to calve significantly earlier ($P < 0.001$) than crossbred (36.7 months) heifers. The mean calving interval was 13.6 months. The mean for days open for high grade cows (91.5 days) was lower than crossbreds (134.1 days). Anoestrus (14.6%), repeated oestrus (12.6%) and uterine infections (4.2%) followed by retention of placenta (2.8%) and stillbirth (5.5%) were the most important reproductive loss. Roughage and total dry matter intake were significantly ($P < 0.05$) varied between the productions systems. Peri urban dairy farms had higher total (11.2 kg/day) and roughage (5.9 kg/day) dry matter intake while these values were 9.2 kg/ day and 3.1 kg/day in urban farms. The overall mean total crude protein intake was 1.4±0.4 kg. Crude protein intake was not affected by production systems. Dry matter intake varied ($P < 0.05$) among herd size groups for both roughage and concentrate intake. Total dry matter intake, however, was similar ($P > 0.05$) among the herd size groups. Concentrate intake was higher ($p<0.05$) in large sized farms. Yet, small sized farms had higher roughage intake. Crude protein intake from roughage was significantly ($P < 0.05$) higher in small herd size groups. Energy intake from concentrate (50.0MJ/kg/day) for small farms is lower than energy intake from concentrate (85.4MJ/kg/day) in large farms. However, small, medium and large farms were significantly ($P > 0.05$) similar in the total energy intake. Feed shortage was 1st most important problem for major proportions of dairy farm owners to reduce milk productivity. Development of suitable forage crops and enhancement of crop residues need to be addressed with integration of training and extension works.

189. Effects of Supplementing Cassava Leaf Meal, Brewers' Dried Grain and Their Mixture on Growth and Carcass Traits of Local Goats Fed Urea Treated *Teff* Straw

Samuel Tilahun, Getachew Animut and Mengistu Urge
Year: 2012

Abstract: An experiment was conducted using twenty-four yearling intact local goats with a mean live weight of 14.57 ± 2.2 kg (mean ± SD). The objective of the experiment was to evaluate the effect of supplementing cassava leaf meal (CLM), brewers' dried grain (BDG) and their mixture on digestibility, dry matter intake, body weight change and carcass characteristics of goats fed urea treated teff straw (UTTS). The experiment consisted of 90 days of feeding trial, 7 days of digestibility trial and evaluation of carcass parameters at the end. The four treatments included ad libitum feeding of urea treated teff straw and supplementation with 0 g (T_1), 300 g cassava leaf meal (T_2), 150 g CLM +150 g brewers' dried grain (T_3) and 300 g BDG (T_4). The experimental goats were grouped into six blocks of four animals based on initial live weight and randomly assigned to the four treatments. The crude protein (CP) content of UTTS, CLM and BDG were 8.3, 21.9 and 24.4 %, respectively. Urea treated tef straw dry matter intake differed significantly ($P < 0.05$) among treatments, which was higher for the control treatment than T_3 (803.2 ± 199.7) and T_4 (733.4 ± 250). Total CP intake was greatest for T_2 (133.3 ± 21.5) and T_3 (128.5 ± 20.5), intermediate for T_4 (92.9 ± 33) and lowest for T_1 (80.4± 20.1) ($P < 0.05$). Digestibility of CP was in the order of $T_2 > T_3 > T_4 > T_1$ ($P < 0.05$). Feed conversion efficiency differed significantly ($P < 0.05$) among treatments, which was higher for T_3 than T_1. Supplementation had no effect ($P > 0.05$) on final body weight and average daily gain. Positive average daily gain (1.1 g/d) was observed in the control treatment, whereas 14.5, 21.15, 29.8 g/d was recorded for T_4, T_2 and T_3, respectively. Hot carcass weight and dressing percentage on slaughter weight basis was greater ($P < 0.05$) for T_2 (5.9 ± 1.2 and 35.8 ± 2.8, respectively) than T_1 (4.3 ± 0.66 and 30.6 ± 1.5, respectively), while values for T_1 and T_4 (5.2 ± 0.76 and 34.2 ± 1.1, respectively) were similar with other treatments. Net return was highest for T_3 followed by T_2 and Marginal rate of return (MRR) was greatest for T3. Therefore, based on most performance parameters, T_2 and T_3 can be recommended and based on MRR; T_3 can be recommended as a better treatment in this study. This study also highlights the positive potential of CLM as a supplement to ruminants on a basal diet of fibrous feed.

190. Effects of Substituting Sweet Potato (*Ipomoea batatas*. L) Vines for Concentrate Mix on Feed Intake, Digestibility, Body Weight Gain and Carcass Characteristics of Sidama Goat Fed Grass Hay as Basal Diet

Tadesse Megersa, Mengistu Urge and Ajebu Nurfeta
Year: 2012

Abstract: The study was conducted using thirty yearling male intact Sidama goats with a live weight of 15.3 kg ± 1.64 (mean ± SD) to investigate the Effect of Substituting Sweet Potato (*Ipomoea batatas*. L) Vines for Concentrate mix on feed intake, Digestibility Body, Weight Gain and Carcass Characteristics of Sidama Goat. The experimental treatments where control (T1) which consumed only natural grass hay ad libitum, T2 which consumed grass hay ad libitum supplemented with 350 g sweet potato vines (SPV), T_3 and T_4 consumed grass hay ad libitum and supplemented with concentrate mix on which sweet potato vine (SPV) replaced the concentrate mix at a proportion of 65% and 35%, respectively. While T_5 consumed a basal diet supplemented with 350 g concentrate mix of cotton seed cake and wheat bran at a ratio of 33:67. The animals were blocked based on initial BW into six blocks and were randomly assigned to one of the five dietary treatments. The experiment was conducted in a randomized complete block design with five treatments. The experiment lasted for 70 days feeding and 7 days digestibility trials and carcass evaluation at the end. The CP contents were 3.84, 6.53, 26.74 and 15.02 % DM for hay, sweet potato vine, cotton seed cake and wheat bran, respectively. The chemical analysis of feed showed that basal diet (grass hay) and sweet potato vine had low CP, which is below the maintenance requirement of animals. The result of the feeding trial showed that supplemented goat consumed higher ($P < 0.001$) quantity of total DM (602.3, 615.3, 547.3 and 556.3 g/d (SEM= 19.67)) for T_2, T_3, T_4 and T_5, respectively than unsupplemented goat (371.3 g/day). The CP intake among the supplemented goats increased with increasing level of the concentrate mixture (34.9, 48.2, 59.5, and 75.1 g/day (SEM= 1.2)) for T2, T3, T4 and T5, respectively. The decreased CP intake with increasing proportions of SPV supplementation is due to the lower CP content of SPV compared to the concentrate mixture. Apparent digestibility of CP (0.6, 0.67, 0.78, 0.83 and 0.88 (SEM= 0.043)) for T1, T2, T3, T4 and T5, respectively was significantly lower ($P < 0.001$) for goats supplemented with sole SPV diet compared to T_4 and T_5, which could be attributed to low CP content in SPV and hay compared to concentrate mix. Moreover, DM digestibility (0.56, 0.69, 0.72, 0.73 and 0.74 (SEM=0.034) for T1, T2, T3, T4 and T5, respectively increased significantly ($P < 0.01$) in supplemented than in non-supplemented goats. However, there was no significant difference ($P > 0.05$) among supplemented groups. Significantly higher ($P < 0.001$) average daily weight gain (31.2, 46.4, 48.6 and 47.6 g/d (SEM= 6.6)) were recorded for T2, T3, T4 and T5, respectively than non-supplemented. However, no significant differences ($P > 0.05$) were noted among the supplemented animals. Hot carcass weight (7.9, 8.1 and 8.2 kg (SEM= 0.34) and dressing percentage on SW basis (41.7, 41.72 and 42.4 g (SEM= 0.94) were significantly greater ($P < 0.001$) for T3, T4 and T5, respectively as compared with T2 and T1. However, no significance difference ($P > 0.05$) noted among T3, T4 and T5. In conclusion this study highlighted that sweet potato vine could replace portion of the conventional concentrate and could be fed with poor quality hay to at least prevent body weight loss of animal in the absence of other supplements.

191. Effect of Different Protein Sources Mixed with Brewer's Dried Yeast on Performance of Broiler Chicks

Tolera Chala, Mengistu Urge and Getachew Animut
Year: 2012

Abstract: The experiment was conducted to evaluate the effect of brewer's dried yeast (BDY) mixed with soybean meal (SBM), noug seed cake (NSC) and their mixture on dry matter (DM) intake, daily body weight gain (ADG) DM conversion ratio (DMCR) and carcass characteristics of Hubbard Classic broilers and profitability of the rations. Four nearly isocaloric and isonitrogenous starter and finisher rations were prepared according to the recommendation of NRC. Unsexed 240 Hubbard Classic chicks with an average initial body weight (BW) of 49.49 ± 2.01 g were randomly divided into 12 groups of 20 chicks each and assigned randomly to 4 treatments with 3 replications. The chicks were offered starter and finisher rations for 28 and 21 days, respectively. Treatments were ration containing 0% BDY, 20% SBM, and 19.6% NSC (T1; control), 15% BDY and 25% SBM (T2), 15% BDY and 25% NSC (T3), 15% BDY, 12.5% SBM and 12.5% NSC (T4). At the end of the trial, 3 male and 3 female chickens were slaughtered for carcass parameters evaluation. The crude protein (CP) and metabolizable energy (ME) contents of BDY were 42.6% and 3399.2 kcal/kg DM, respectively. The CP content of the rations during the starter and finisher phases were about 23 and 20, respectively. The ME content of the rations was slightly higher than the 3200 kcal/kg recommended for broiler. Intake of DM during the starter phase (69, 52, 67 and 68 g/bird/day (SEM = 2.4)) and the entire trial period (107, 85, 103 and 98 g/bird/day (SEM = 3.0)) was lower ($P < 0.05$) for T2, but was similar among other treatments, whereas DM intake during the finisher phase (156, 126, 151 and 138 for T1, T2, T3 and T4, respectively (SEM = 4.6)) was unaffected by treatment ($P > 0.05$). Superior ($P < 0.05$) ADG was recorded in broilers fed T1 and T4 rations during starter phase (20, 17, 18 and 20 g/day (SEM = 0.5)), finisher phase (45, 43, 42 and 47 g/day (SEM = 0.7) and the entire experimental period (31, 28, 28 and 32 g/day for T1, T2, T3 and T4, respectively (SEM = 0.5)). Dry matter conversion ratio of T2 (3.05±0.30) and T4 (3.1±0.30) was better ($P < 0.001$) than that of T1 (3. 5±0.30) and T3 (3.6±0.30). Group fed with T4 has higher ($P < 0.001$) percentages of eviscerated (68.5±0.4) and drumstick-thigh (19.6±0.1) than other treatment groups. There was no significant difference ($P > 0.05$) in mortality among the treatment. The highest net income, marginal rate of return, chick sale to feed cost ratio was noted for T4. The results showed that ration formulation using mixture of BDY, SBM and NSC, like as in T4 of the present study resulted in better biological and economic performance than the common practice of using SBM and NSC alone or in combination in broiler rations.

192. Effects of Graded Levels of Quality Protein Maize and Normal Maize on Egg Production, Egg Quality and Hatchability of White Leghorn Hens

Wubu Taye, Mengistu Urge and Solomon Melaku
Year: 2012

Abstract: Two hundred and twenty five white leghorn layers at the age of 24 weeks were used in completely randomized design in a 12-weeks feeding trial to evaluate the effects of graded levels of quality protein maize and normal maize on egg production, egg quality and hatchability of white leghorn hens. There were five treatments each with three replicates and 15 layers and two cocks per replicate. The hens and cocks were randomly allocated to each pen. Five treatment rations were formulated by replacing NM QPM at 0, 25, 50, 75 and 100%, representing T1, T2, T3, T4 and T5, respectively. During the experimental period data on dry matter intake (DMI), hen-day egg production (HDEP), hen-housed egg production (HHEP), egg mass (EM), hatchability, fertility, egg quality, embryo mortality and chick quality were collected. Crude protein and metabolisable energy of QPM were 10.03% and 4066, respectively. The treatment groups fed ration containing higher levels of QPM (T3, T4 and T5) had better feed intake (103.50, 104.03 and 104.54 g/day, respectively; SEM: ±0.4) compared to those consumed NM-based ration (T1, 102.6 g/day) and the group in T2 (102.09 g/day; SEM: ± 0.4). Dietary inclusion of QPM above 50% (T3, T4 and T5) as a substitute of NM improved HDEP ($P < 0.05$; mean values = 61.89, 64.85 and 62.47%; respectively; SEM: ± 2.5), compared to T1 and T2 (56.21 and 51.03%), respectively. EM increased with increasing levels of QPM in the ration ($P < 0.05$). HHEP and FCR were not significant among the treatments ($P > 0.05$). Higher fertility percentage was recorded in all groups, and treatment ration did not hamper fertility ($P>0.05$). Higher levels of QPM (T3, T4 and T5) significantly improved ($P < 0.01$) hatchability both on total eggs set and fertile eggs basis and had mean value of 74.6, 73.8 and 79.4% (SEM ± 4.2; total eggs set base) and 77.0, 77.9 and 81.3 (SEM ± 4.67) fertile egg base, respectively compared to T1 (55.6 ± 4.6 and 56.9± 4.67%) and T2 (56.3 ± 4.2 and 57.3 ± 4.67%). The intensity of yolk color increased ($P < 0.001$) as the percentage of QPM increases in the ration. No remarkable difference was noted on egg weight, yolk index, yolk height, Haugh unit, albumen weight and albumen height. Early embryo mortality, late embryo mortality and dead pipped seemed to decrease with increasing levels of QPM ($P < 0.01$), but mid embryo mortality and live pipped were not different among treatments ($P > 0.05$). Chick quality was not affected by treatments ($P > 0.05$). Therefore, the result revealed that QPM could be incorporated in layers ration up to 100% as a substitute for NM with better result in some economically important traits like egg production, hatchability and some egg quality parameters.

193. Supplementation with Different Forms of Processed Lupin (*Lupinus albus*) Grain in Hay Based Feeding of Washera Sheep: Effect on Feed Intake, Digestibility, Body Weight Gain and Carcass Parameters

Yilkal Tadele,Yoseph Mekasha and Firew Tegegne
Year: 2012

Abstract: The digestibility and feeding trial study was conducted using twenty four intact yearling Washera sheep with mean initial body weight of 17± 0.81 (mean ± STD).The objective of the study was to assess the effect of supplementation with different forms of processed lupin grain on feed intake, body weight (BW) change, apparent nutrient digestibility, feed conversion efficiency (FCE), carcass characteristics as well as economic return of the feeding regime in Washera sheep fed a basal diet of natural pasture hay. A completely randomized block design consisting of four treatments and six blocks was used. The sheep were blocked based on their initial BW and they were randomly assigned to one of the four treatment feeds within a block. The sheep were adapted to the treatment feeds for two weeks followed by seven days of digestibility trial. The feeding trial was conducted for ninety days and carcass parameters were determined at the end of the study. The treatments consisted of adlibitum feeding of natural pasture hay (non-supplement) and supplementation with 300 g/head/d roasted coarsely ground lupin grain, roasted soaked lupin grain and roasted soaked coarsely ground lupin grain in DM basis. The CP and OM contents of hay used in the study were 8.75% and 91.9% on DM basis respectively. The CP contents of different forms of lupin grain, namely, roasted coarsely ground(T_2); roasted soaked(T_3) , and roasted soaked and coarsely ground(T_4)were 30.5% ,36% and 36.8 % on DM basis. Non-supplemented sheep consumed higher ($P < 0.05$) pasture hay DM (608.8 g/head/day) as compared to the supplemented treatments (464.4-519.5 g/h/d).Supplementation of T_2, T_3 and T_4 increased ($P < 0.05$) total DM (728.9-764.4) g/head/day) and crude protein (CP) (109.3-150.9 g/head/day) intake. Similarly supplementation improved ($P < 0.05$) the apparent digestibility coefficient of DM (0.69), OM (0.7-0.71) and CP (0.81-0.89.) Sheep Supplemented with T2, T3 and T4 gained weight of 34.1, 54.3 and 63.7 g/day while those non supplemented gains only slightly (5.7 g/day). Moreover, dressing percentage on slaughter weight basis, hot carcass weight, rib eye muscle area were higher ($P < 0.05$) for supplemented sheep than the control. In general, supplementation improved feed intake, body weight gain, nutrient digestibility and carcass characteristics and its effect was more pronounced in sheep supplemented T4 than in the other treatments**.** Results from this study suggested that supplementation with roasted soaked and coarsely ground lupin grain showed better nutrient utilization, response in live weight gains and carcass parameters in washera sheep and returned the highest net profit compared to the other forms of the grain.

194. Feeding Value of *Prosopis juliflora* Pod's Flour as a Substitute for Wheat Bran in Fattening Ration of Cattle

Yohannes Dagnew and Mengistu Urge
Year: 2012

Abstracts: Twenty four indigenous Hararghe highland intact male bulls with age of 4-5 years and initial average body weight (Mean±SE) of 240±1.77 kg were used to evaluate the effect of replacing wheat bran by ground Prospis juliflora pod (GPJP) flour on body weight change and carcass characteristics. Bulls within the block (six blocks) were assigned randomly to one of the four dietary treatments, and within each treatment there were 6 animals. Grass hay was offered ad libitum to all animals, and a supplement of 3 kg concentrate according to the established ratio between wheat bran (WB) and noug seed cake (NSC), i.e. 70:30, respectively were used as a supplement. The difference between the treatments is therefore, the amount of GPJP that substituted the wheat bran portion of the concentrate. Thus, treatment one (T_1) bulls received 3 kg of mixtures of WB and NSC. In treatments two (T_2), three (T_3), and four (T_4), the WB portion of the concentrate mix were substituted by 15, 30, and 45% of GPJP. Common salt block (Amole) was available to the bulls all time and water was given twice a day, in the morning and afternoon throughout the experiment. Total DM intake of fattening bulls in T_3 (7.82±0.07 kg) was higher ($P < 0.05$) as compared to the other treatments. The total OM intake did not significantly differ ($P > 0.05$) between all treatment groups, but it tended to increase in the order of $T_3 > T_4 > T_2 = T_1$. Higher CP intake was recorded in the group supplemented with 30% GPJP as compared to the control and 15% GPJP ration. There were no significant differences ($P > 0.05$) between treatment groups in NDF and ADF intakes. The apparent digestibility coefficient of DM in T_3 and T_4 was significantly higher ($P < 0.01$) than the control group ($P < 0.01$), but T_2 did not differ from the control as well as the other GPJP groups. The OM digestibility of T_3 and T_4 is higher than T_1 and T_2 ($P < 0.01$). Digestibility of CP was significantly higher ($P < 0.01$) for T_3 and T_4 compared to T_1 and T_2. The result in the present experiment showed a positive effect of substituting of WB by GPJP up to 30% on average daily gain (ADG), final body weight and FCE. ADG was highest for bulls in T_3 (935.18±27.72 g), while differences were not observed between bulls in T_4 (766.6 ± 46.1), T_2 (696.3±67.9) and T_1 (683.3±50.20). Bulls receiving the control diet (0.09±0.06) had lower ($P < 0.05$) feed conversion efficiency than T_3 (0.11 ±0.03) groups, with no difference between the control, T_2 and T_4 diets. Logistic regression of body condition scoring (BCS) did not show significant difference among the treatments ($Pr > ChiSq > 0.05$ at $\alpha = 0.05$). Feeding bulls with T_3 and T_4 diet improved empty body ($P < 0.01$) and hot carcass weights (T_3= (185.7±4.23); T_4 = (172.1±1.46); $P < 0.001$, T_1) compared to T_2 (158 ± 5.52) and T_1 (157.3±4.95). Dressing percentage was higher ($P<0.01$) for bulls in T_3 (57.17±0.85) and T_4 (55.7±0.50%) compared to bulls in T2 (52.13±1.46) and the control group (52.18±1.44%). Fillea, backbone, lumbar and ribs were heavier ($P < 0.01$) for T_3 and T_4 than the control group with no differences between the control and T_2 diets. Fore-quarter, brisket and total usable carcass were heavier ($P < 0.001$) for T_3 than the control. Based on these results, it can be concluded that inclusion of GPJP up to 30% of the wheat bran in the concentrate mixture could be recommended as optimal level for better feed intake, digestibility, live weigh gain and carcass parameter in feeding of Hararghe highland bulls.

195. Effect of Supplementation with Noug Seed Cake and Wheat Bran Mix on Body Weight Gain, Testicular Growth and Seminal Traits of Horro Rams Under Grazing Management

Abera Seyoum, Yoseph Mekasha and Azage Tegegne
Year: 2013

Abstract: The effect of supplementation of Noug seed cake (NSC) and Wheat bran (WB) mixture [1:1 ratio] on body weight (BW) gain, testicular size and seminal traits of Horro rams was evaluated under grazing management condition at Bako Agricultural, Technical and Vocational Education and Training(ATVE) college, west shewa. The experiment involved 18 intact yearling Horro rams with average initial body weight of 18.55 ± 1.99 kg (mean ± SD). Treatments consisted grazing natural pasture alone (T1; Control), or grazing + supplementation with NSC and WB mix[1:1 ratio], at 0.9% of body weight (T2) or grazing + supplementation with Noug seed cake and wheat bran(1:1 ratio) at 1.5% of Body weight (T3). The experiment was laid out completely at random where rams were randomly allocated to three dietary treatments (six per treatment) for equal body weight. Water was given twice a day in the morning and afternoon and mineral salt was made available in their individual pen at night. The animals grazed natural pasture for 8 hr /day. The result indicated that natural pasture was poor in Crude Protein(CP) (6.07%) content and relatively lower in Invitro digestible organic matter(IV DOM) (54.61% of DM) with higher Acid detergent fiber(ADF) (67.78%), whereas the respective values for NSC and WB mixture were 23.89%, 72.95%, 38.66%, respectively. Average daily body weight gain (ADg) was found to be 12.02 ± 5.9, 40.77 ± 5.9 and 41.55 ± 5.9 g/day for T1, T2 & T3, respectively. Supplementation significantly ($P < 0.05$ to $P < 0.001$) increased ADg, final body weight gain (FBW), body condition score (BCS), heart girth (HG), testicular traits, libido (LB) and most of seminal variables considered, except sperm tail abnormality and semen pH. There was no significant ($P > 0.05$) difference between T2 and T3, with respect to parameters considered, except semen volume (SV), sperm concentration per ml (SCO), sperm mass motility (SMM), and sperm progressive individual motility (SIM). There was a significant ($P < 0.001$) increase in the production of morphologically normal spermatozoa in supplemented rams compared to non- supplemented group. In general, since supplementation with T2 improved ADg, Heart girth (HG), testicular size, and seminal traits in Horro rams grazing natural pasture, consistent with T3, T2 should be considered as an appropriate feeding strategy to improve productive and reproductive performance of Horro rams under small holder farming system. Further, since supplementation with T3 resulted in higher semen production compared to T2, T3 could be recommended to exploit the genetic potential of the animal, especially for Artificial Insemination program.

196. Evaluation of Slaughter Parameters, Proximate Composition, Microbial Load and Eating Qualities of Beef from Arsi Cattle in Adama and Bishoftu Towns of East Shoa, Oromia, Ethiopia

Arse Gebeyehu, Mohammed Yusuf and Ameha Sebsibe
Year: 2013

Abstract: The study was conducted in Adama and Bishoftu towns, on live Arsi breed cattle and carcass samples with major objective of evaluating beef eating quality with trained sensory panellists, proximate and microbiological qualities with standard procedures. Beef sample was aseptically collected from longissimus dorsi chuck for sensory evaluation and proximate composition analysis. For microbiological quality assessment, however beef was aseptically excised and collected from all part of exposed body of carcasses. Brief survey on cattle producers, beef butchers and beef consumers were also undertaken. Breed type was determined by phenotypic traits and age was determined with dentition. The production system being practiced by the animals selling and buying farmers were subsistence production systems. Mostly (61%) farmers sell their animals to replace with younger animal and 29.3% sell to get cash needed for different expenses. Majority of cattle in the market are between 5 – 8 years old. Above half (55%) animals brought into Adama terminal market comes from lowland areas and the rest comes from highland according to respondents. At the time of this study the prices of beef was varying from 70 - 120 birr/kg in both towns. According to butchers' sensory quality ratings; Rib eye, Loin eye, Tenderloin, Top round, Bottom round, Short loin, Sirloin, and Chuck were rated 97.5%. The meat cuts from Brisket (32.5%), Plate and Flank (6%) were rated as lower quality. There was significant variation in heart girth, slaughter weight and carcass weight due to effect of age ($P < 0.05$). There was significant difference in all slaughter parameters between Adama and Bishoftu towns ($P < 0.05$). But production systems have no significant effect on all considered slaughter parameters ($P > 0.05$). The mean heart girth, slaughter weight, carcass weight and dressing percentage were 162.96 ± 8.7cm, 300.08 ±39.69 kg, 154.68 ±27.80 kg and 51.71± 5.66%, respectively. The carcass weight and heart-girth has strong correlation ($r = 0.66$). The carcass weight and slaughter weight has strong positive correlation ($r = 0.78$). Age and production system has significant effect on tenderness of beef ($P < 0.0001$). Production systems have significant effect on beef juiciness ($P < 0.05$). The trained sensory panellists rated 5.23, 5.20 and 5.47 for beef tenderness, juiciness and flavour of beef respectively. There was no variation in proximate qualities due to age and production system effect and their interactions ($P > 0.05$). The protein and fat content of longissimus dorsi chuck of Arsi cattle were 22.10 and 6.86, respectively. Aerobic plate count, total coliform count and fecal coliform counts were significantly different among different sampling days and batches of samples ($P < 0.05$). The microbial load on beef, APC 1.62×10^5, total coliform count 5.29×10^1 and fecal coliform count 9.05×10^1. Since the general hygienic condition of the abattoir and carcasses production processes was poor beefs consumers in Adama and Bishoftu are advised to eat properly cooked beef to avoid intoxication due microbes.

197. Assessment of Major Browse Species Quality and Utilization in Jijiga Zone of Somali Region, Ethiopia

Daniel Seyoum, Getachew Animut and Lisanework Negatu
Year: 2013

Abstract: The present study was conducted in 9 representative kebeles of Jigjiga Zone, Somali Regional State, with the objectives of identifying the major browse species and their utilization by livestock, to evaluate the potential foliage yield, chemical composition, in vitro organic matter digestibility (IVOMD) and in sacco degradability characteristics of the major browse species. The average livestock holding per household were larger number of goats (15.3 ± 10.33) and sheep (13.54 ± 11.28) followed by cattle (8.7 ± 4.88), camels (4.17 ± 2.72) and donkey (0.83 ± 0.74) in that order. The purpose of livestock keeping in the area is mainly as source of income. The major identified constraints to livestock production were shortage of feed, scarcity of water and animal disease. A list of twenty browse species were identified, out of which seven were selected based on their abundance or availability and preference by livestock. According to the respondents, livestock in the study area consume natural pasture, browse species and crop residues during wet and dry seasons. However, natural pasture and fodder trees were found to be the major feed resources. Only in Lankarta kebele, Harshin woreda, where preservation of tree fodders in organized scale used to be practiced as the dry-season fodder reserve. Potential foliage yield of the browse species were found higher in Balanites glabra and lower in Grewia bicolor. Species and season interactions were observed for the OM, NDF, ADF, hemicelluloses, CP and lignin concentrations of the browse species ($P < 0.05$). The CP, NDF, ADF, and lignin contents of the browse species in the wet season were relatively higher than in the dry season. The mean values for IVOMD of the browse species during the wet season were relatively lower than in the dry season. The in sacco degradation parameters (a, b, c, ED and PD) for DM and N varied significantly ($P < 0.05$) among browse species within a season. Based on their potential DM and N degradability for the wet and dry seasons, B. glabra and Acacia lahai ranked top; Acacia etbaica ranked at the bottom. This result also suggested that season has an influence on the ranking of browse species based on determinants of forage quality such as DM and N degradation. Generally, browse species can be used as good protein supplements to low quality basal diets, especially during the dry season when the quality and quantity of green herbages is limited.

198. Effects of Feeding Detoxfied Ethiopian Mustard (*Brassica carinata*) Seed Meal as a Substitution for Soybean Meal on Egg Production, Qaulity, Fertility, And Hatchability of Dominant CZ Chicken

Elfinesh Bekele, Mengistu Urge and Getnet Asefa
Year: 2013

Abstract: The experiment was conducted at poultry farm of Debre Zeit Agricultural Research Center for 90 days. The objective of the study was to assess the effect of replacement of Soybean Meal (SBM) with Detoxified Mustard Seed Meal (DMSM) on egg production, quality, fertility, and hatchability of Dominant CZ layers and to determine economic benefits and 84 pullets with initial body weight of 115 ± 2.50 g at 24 weeks were randomly distributed to 12 pens each with 1 male and 7 pullets on 20 cm depth litter housing. The experiment was arranged in a Complete Randomize Design with 4 treatments each replicated 3 times. The treatments were T1 (0% DMSM +100% SBM), T2 (20% DMSM +80% SBM), T3 (40% DMSM +60% SBM), T4 (60% DMSM+40% SMB). DMSM contained 91.5% DM, 38.8% CP and SBM contained 91.4% DM, 40% CP, Metabolisable energy content of DMSM and SBM was 3,493.8 and 3,453.52 kcal ME/kg DM, respectively, indicating their potential to be used as sources of both protein and energy. There were significant differences ($P < 0.05$) among treatment in yolk, and albumin heights (mm) and highly significant differences ($P < 0.001$) in egg, yolk, albumin and shell weights (g). The egg and Shell weights (g) of birds fed T2 and T4 diets were similar and higher than T1 and T3. Yolk height (mm), Albumin height (mm) and albumen weight (g) obtained in T2 and, T4 were similar with T1 but T3 was lower than T1. T2 was obtained with higher yolk weight which was similar with T1 and higher than T4 and T3 all shown in (Table 7 page 37). Ration containing higher level of DMSM as a replacement of SBM slightly reduced cost of ration. Thus, the result showed that inclusion of DMSM up to 60% as substitution for SBM or its inclusion in total ration at a level of 24% did not affect layers production performance and egg quality, but slightly reduced cost of feed based on present experiment.

199. Evaluation of Consumer Perception, Physical Characteristics, Chemical Composition and Bacteriological Loads of Chicken Eggs from Retail Markets in Urban Settings, Eastern Ethiopia

Ewonetu Kebede, Negasi Ameha and Yitbarek Getachew
Year: 2013

Abstract: So far in Eastern Ethiopia, research and extension works have focused on boosting egg production but no attention was given to type of egg preferred and consumed by the community. Moreover, little is known about microbial, physical and chemical qualities of eggs sold in the local markets. Therefore, the present study was conducted to determine the consumers' attitudes and preferences regarding the quality and consumption of eggs, and to evaluate physical, chemical and microbial quality of consumed eggs at retail levels of open markets in major urban settings and Haramaya University (HU) poultry farm. Survey was carried out on 90 peoples and questionnaires were purposively collected from ten retailers of each markets and people who came to purchase eggs at each open market aiming at appraising egg storage duration and conditions, and preferences for egg quality parameters. Data obtained through the survey and laboratory results were analyzed using SPSS and SAS software program, respectively. A total of 880 eggs were randomly bought for determination of egg content bacterial contamination (120 eggs), physical quality (480 eggs), chemical quality (120 eggs), pH (120 eggs) and cholesterol (40 eggs) of eggs. Based on the survey result, among 87 of respondents who consume eggs 71.1% considered egg as very important, 25.6% feel as important nutrition while all the three none egg consumers believed egg is not very important part in their diet. The large egg size, brown-shelled eggs and yellow yolk color are the preferred characters by 78.9%, 51.1% and 67.8% of respondents, respectively. The majority of the respondents store eggs any place, while 20% and 23.3% were used refrigerators and cold room, respectively. The physical data revealed a good uniformity for most of the studied external and internal traits, as the highly statistical significant ($P < 0.001$) differences found among the retailers of the study areas and farm; however, lack of significance occurred just for the eggs shape index and specific gravity. No significant differences in chemical composition of eggs except moisture ($P < 0.05$), and cholesterol ($P < 0.001$) which were significantly higher in farm eggs. Significantly ($P < 0.001$) lower pH was detected in HU farm eggs. In addition**,** significantly ($P < 0.05$) lower bacterial load was detected in HU farm egg compared to retail eggs. Overall, an egg from retail market has lower internal and external qualities compared to HU poultry farm. Longer egg storage duration, poor storage condition; exposure of eggs to sunlight in the market and during transportation might have contributed for lower internal and external qualities of eggs retailed in open market. Therefore, introduction of refrigeration systems and construction of shades in open market are suggested to maintain and improve quality of eggs sold in open market. Eggs from retailers had lower egg quality compared with egg for HU farm, but within the standard specification for eggs and where fit for consumption as shell eggs. For better quality maintenance eggs must be stored in refrigeration and protected from direct sun light where facilities was not available.

200. Effect of Substitution of Different Levels of Sweet Potato (*Ipomoea batatas.* L) Vine for Concentrate on Performance and Carcass Characteristics of Growing Arsi-Bale Sheep

Feyisa Hundessa, Getachew Animut and Abule Ebro
Year: 2013

Abstract: The experiment was conducted at Adami Tullu Agricultural Research Center using thirty yearling intact male Arsi-Bale sheep with mean initial body weight (IBW) of 23.7±0.46 kg (mean± SE). The objective of the experiment was to study effect of different levels of sweet potato vine (SPV) replacement to concentrate mixture (CM) on feed intake, digestibility, body weight and carcass characteristics of sheep fed a basal diet of Rhodes grass hay ad libtum. The experiment consisted of seven days of digestibility trial and ninety days of feeding trial followed by evaluation of carcass parameters at the end. Treatments were supplementation of 300 g at a proportion of 0% SPV+100% CM (T1), 25% SPV+75% CM (T2), 50% SPV+50% CM (T3), 75% SPV+25% CM (T4) and 100% SPV (T5). The experimental design was RCBD, and animals were blocked in to six blocks based on their IBW. The crude protein (CP) content of the hay, SPV and CM was 4.9, 19.1 and 22.9% respectively. No significant ($P > 0.05$) variation was observed among treatments on the intake of total and hay DM. The intake of CP varied ($P < 0.05$) among treatments. The intake of CP for T1, T2, T3, T4 and T5 was 85, 86, 80, 82 and 79 (SE=1.2), respectively and it was higher in T1 and T2 than other treatments. Intake of estimated metabolizable energy was similar among treatments. Treatment effect was not significant ($P > 0.05$) on digestibility of DM and other nutrients, except the wider numerical range, 73.58% and 59.67%, between the digestibility value for CP obtained from T1 and T5, respectively. Final body weight were similar ($P > 0.05$) among treatments. Average daily body weight gain (ADG; 49, 40, 28, 31, and 19 (SEM = 6.4)) and feed conversion efficiency (FCE; 0.071, 0.054, 0.041, 0.044, and 0.023 (SEM = 0.009) for T1, T2, T3, T4 and T5, respectively) were greater for T1 than T3 and T5 and values for T2 were greater than for T5, while other mean comparisons were similar. Hot carcass weight ranged from 8-9 kg and was similar among treatments. Similarly, average dressing percentage on slaughter body weight and empty body weight basis were about 34 and 41%, respectively, and were unaffected by treatment. Rib eye muscle area was also similar ($P > 0.05$) among treatments and ranged between 6.83-8.67 cm^2. Yield of primal cuts, i.e., leg, loin, rack, shank and breast, and shoulder and neck were not significantly affected by treatment ($P > 0.05$).The result of this study suggests that SPV can replace up to 75% of concentrate mixture in the ration of Arsi-Bale lamb without significant reduction in product output.

201. Effect of Different Proportion of Malted Oat Grain and Noug Seed Cake Supplementation on Digestibility and Performance of Arsi-Bale Sheep Fed Grass Hay Basal Diet

Girma Hailu, Getachew Animut and Mengistu Urge
Year: 2013

Abstract: An experiment was carried out using twenty-five yearling male Arsi Bale sheep with initial body weight of 14.4 ± 1.8 kg (mean ± SD) with the objective of determining effect of supplementing malted oat (MO), noug seed cake (NSC) and their mixtures at different proportions to grass hay (GH) basal diet on feed intake, digestibility, live weight change and carcass parameters of Arsi Bale sheep. The experiment consisted of 90 days feeding and 7 days digestibility trials followed by evaluation of carcass components at the end. The experimental design used was RCBD with five treatments and five blocks. Treatments were ad libitum feeding of grass hay alone (T_1) or with supplementation of sole MO (T_2), 2MO:1NSC (T_3), 1MO:2NSC (T_4), and sole NSC (T_5), which was offered at 300 g/head/day. The crude protein (CP) content of GH, MO and NSC used in the study were 7.5, 12.7 and 29.8%, respectively. Sheep in T_1 consumed greater ($P < 0.001$) basal diet and lower total dry mater (DM) intake (539, 649, 679, 669 and 670 g/day total DM intake for T_1, T_2, T_3, T_4 and T_5, respectively) compared to the supplemented groups. The CP intake ranged 40 to 117 g/day and was lowest for T_1 and increased with increasing level of NSC in the supplement. Digestibility of DM and CP was increased due to supplementation. Daily body weight gain (ADG) was lowest for T_1, highest for T_3 and intermediate for other treatments (1, 62, 87, 66 and 68 g/day with 6.2 SEM for T_1, T_2, T_3, T_4 and T_5, respectively). Hot carcass weight followed a similar trend like that of ADG (5.7, 9.2, 10.7, 9.5 and 9.5 (SEM = 0.40) for T_1, T_2, T_3, T_4 and T_5, respectively). Dressing percentage on slaughter weight and empty body weight basis, TEOC, TNEOC and rib-eye muscle area were significantly higher ($P < 0.001$) in the supplemented group and lower in the un-supplemented animals. Partial budget analysis showed a net return in the order of $T_3 > T_2 > T_4 > T_5 > T_1$ and marginal rate of return was in the order of $T_2 > T_3 > T_4 > T_5$. Based on the result of animal performance and net return, T_3 is a better supplementary regime of this study.

202. Comparative Performance Evaluation of Yearling Arsi-Bale Sheep Fed Urea Treated Maize Stover or Grass Hay Basal Diet Alone or With Concentrate Mix

Gizachew Delilo, Getachew Animut and Mengistu Urge
Year: 2013

Abstract: A study was conducted on twenty yearling Arsi-Bale sheep of 15.1 ± 2.1 kg initial body weight to evaluate the comparative dietary effect as well as partial budget analyses of urea treated maize stover (UTMS) and grass hay (GH) basal diets alone or with concentrate mix (CM = 67% wheat bran: 33% noug seed cake) on Performance and carcass characteristics. Treatments were GH + 300 g of CM, GH alone, UTMS + 300 g of CM and UTMS alone as T_1, T_2, T_3, and T_4, respectively. Digestibility trial and carcass evaluation were carried out at the end of feeding trial, consecutively. Urea treatment improved crude protein (CP) by 47% from 4.8 to 9.11%. Supplementation improved intakes of total dry matter (DM) (908, 607, 883, and 571 g/ day (SEM = 11.0)) and CP (132, 60, 124, and 51 g/day (SEM = 2.4)) for T_1, T_2, T_3, and T_4, respectively. Greater ($P < 0.001$) total DM intake was recorded for the lambs supplemented than the lambs non-supplemented, though there was no ($P > 0.05$) significant different between the two supplemented (T_1 & T_3) as well as the two non-supplemented (T2 & T4) groups. This indicated that the total DM intake of GH and UTMS among treatments was similar. Apparent digestibility of CP was in the order of $T_3 > T_1 > T_4 > T_2$ (74, 73, 48 and 45%). The daily body weight gain (ADG) was 98, 8, 103, and 8 g/day (SEM = 6.1) and hot carcass weight (HCW) was 12.3, 7.0, 12.7, and 7.6 kg (SEM = 0.68) for T_1, T_2, T_3, and T_4, respectively. Both ADG and HCW followed similar trend like DM intake and were greater ($P < 0.001$) for the supplemented treatments. The net return was greater for the supplemented group than non-supplemented ones, there was no significantly different ($P > 0.05$) between the two supplemented as well as two non-supplemented treatments. Marginal rate of return for the two supplemented treatments were comparable. In general, almost in all results of parameters for performance and partial budget analyses were similar between the two supplemented groups as well as the two non-supplemented treatments. This suggested that UTMS can be used in place of grass hay basal diet alone or with a supplement in areas where long dry season is prominent.

203. Effect of Supplementation with Graded Levels of Mixtures of Sesame Seed (*Sesame indicum*) Cake and Wheat Bran on Feed Intake, Digestibility, Live Weight Changes and Carcass Characteristics of Tigray Highland Rams Fed Grass Hay Basal Diet

Meaza Abebe, Mengistu Urge and Getachew Animut
Year: 2013

Abstract: The study was conducted at Wukro Agricultural Technical Vocational Education and Training College (ATVETC) to evaluate the effect of graded levels of wheat bran and sesame seed cake mixture supplementation in grass hay based feeding on feed intake, digestibility, live weight changes and carcass characteristics of Tigray highland sheep as well as to evaluate the appropriate economical levels to achieve optimum production in feedlot fattening. Twenty Tigray highland rams with average initial weight of (18.58± 1.9 kg (mean SD) were divided into five blocks based on initial live weight. The treatment diets, namely, 0, 125, 250 and 375 g DM/day wheat bran and sesame seed cake mixture at a proportion of 3:2(WB:SSC) for T1, T2 (low), T3 (medium) and T4 (high), respectively. Animals are assigned to each treatment randomly. The basal feed (hay) was given ad libitum. The digestibility trial and carcass parameters evaluation were carried out at the end of the 90 days of feeding trial. Total DMI ($P < 0.001$) was significantly ($P < 0.01$) higher in the order of high > medium > low level of supplementation, all of which were also higher ($P < 0.001$) than the control treatment. Organic matter (OM) and CP intakes followed the same trend with TDMI. Significantly higher ($P < 0.01$) ADF intake was observed for the high level of supplementation than the medium and lower level of supplementation. The non-supplemented group has significantly lower ($P < 0.001$) ADF and NDF intake. Average daily gain (23.33, 81.10, 97.33, and 108 g (SEM=9.31) for T1, T2, T3, and T4, respectively) and Final body weight were significantly higher ($P < 0.01$) for the supplemented groups than the non-supplemented once. However, there was no significant difference among the levels of supplementation in these parameters, but numerically increased with increasing levels of supplementation. The feed conversion efficiency (0.032, 0.095, 0.102, and 0.102 (SEM=1.031) for T1, T2, T3, and T4, respectively) was higher ($P < 0.001$) for the supplemented compared to the control sheep. Apparent digestibility of CP (61.77, 74.91, 75.97, and 81.47 (SEM=3.14) for T1, T2, T3, and T4, respectively), DM, and OM, were significantly higher for the supplemented groups than the control. Hot carcass weight (8.14, 10.66, 11.38, and 12.26 (SEM=0.590) for T1, T2, T3, and T4, respectively), Slaughter weight, rib-eye muscle area, and dressing percentage based on slaughter weight were higher for the supplemented groups than the non-supplemented sheep. The Marginal Rate of Return (MRR) of T2 (1.86%) is higher than T3 (1.12) and T4 (0.54), respectively even though rams in T4 showed good performance in live weight gain and feed conversion efficiency. In general, supplementation improved performance of sheep, but increasing level of supplementation did not bring significant change as compared to the lower level. The value of marginal rate of return also revealed that supplementation of the lower level T2 is the optimum economic level for feedlot fattening of sheep under the conditions of the present experiment

204. Effects of Supplementation of Different Levels of Garlic (*Allium sativum*) on Egg Production, Egg Quality, Hatchability, Selected Blood Profile and Immunity of White Leghorn Chicken

Meseret Asrat, Negassi Ameh, Mengistu Urge and Tesfaheywet Zeryehun
Year: 2013

Abstract: A 90 days study was conducted to evaluate the effect of feeding different levels of garlic powder inclusion on dry matter (DM) intake, egg production, egg quality, yolk cholesterol, fertility, hatchability, embryonic mortality, chicken mortality and chick quality of white leghorn layers. Some haematological values, total Protein and total immunoglobulin was also evaluated. A total of 180 chickens (156 layers and 24 cocks) with uniform body weight (BW) and eight month age were randomly distributed in to 12 pens and assigned to 4 treatments. Treatments were rations containing 0, 1, 2, and 3% garlic powder for T1, T2, T3 and T4, respectively. The CP and ME content of treatment rations were 16-16.6% and 3021.31 -3244.4 kcal/kg DM, respectively. The DM intake of layers was 70.10, 80.96, 73.47 and 82.62 g/bird/day (SEM =1.888) for T1, T2, T3 and T4, respectively. The highest DM intake was recorded for T4 followed by T2 at ($P < 0.05$).Hen-day and hen-housed egg production did not significantly differ among treatments. However, hen-housed egg production tended to increase ($P=0.083$) with increasing levels of garlic powder. Feed efficiency ratio (FER) and egg mass (EM) were not affected ($P > 0.05$) by the treatment. Albumen weight, albumen height, haugh unit, yolk index, yolk height, egg weight, fertility, hatchability, embryonic mortality, chick weight and chick visual score were not affected ($P > 0.05$) by the treatments. A significant ($P < 0.05$) improvement was observed for yolk diameter, yolk weight, chick length and yolk color at 2% inclusion of garlic compared with other treatments. Shell thickness ($P =.058$) and shell weight ($P=0.087$) tended to increase with 2% garlic powder inclusion as compared to other treatments. Total yolk cholesterol was not affected by treatments. A value of hemoglobin (Hb) increased insignificantly due to supplementation of different levels of garlic powder. These effects are may be due to the presence of some bioactive constituents and/or their metabolites in garlic. Total white blood cell count (TWBC), basophile, lymphocytes, heterophils and monocytes were not affected ($P > 0.05$) by treatments. But, slight rise in lymphocyte and heterophil counts were observed in garlic supplemented groups which may be due to immuno-stimulatory effects of garlic. Packed cell volume (PCV) and eosinophils were affected ($P < 0.05$) by treatments, PCV (38.1, 45,2,41.5 and 39. 2 (SEM=.0938)), eosinophils (4.9, 3.2, 3 and 2.8 (SEM=.269)), for T1, T2, T3, and T4, respectively. Mean values of total protein (g/dl) (9.37, 9.33, 7.35 and 6.16 (SEM= 0.683)) was not affected ($P > 0.05$) by treatment. The mean values of total immunoglobulin (gm/dl) (3.53, 4.09, 5.58, 3.04, (SEM= .343) was significantly ($P < 0.05$) higher in T_3 compared to other treatments. The mortality percentage of the control treatment were significantly ($P < 0.05$) higher over other treatments. Generally, inclusion of 2% garlic powder has significantly improved yolk weight, yolk diameter, yolk color, chick length and total immunoglobulin. Shell thickness ($P=.058$) and shell weight ($P=0.087$) were also tended to increase at this level. Additionally, 2% garlic inclusion has significantly lower hen mortality and eosinophils compared to control group. The present study indicated that mixing layer diets with 1-3% garlic powder could be used in practical layer diets to improve some haematological value without adverse effects on performance and egg traits of laying hens.

205. Effects of Replacing Soybean Meal with Processed Kidney Bean Meal (*Phaseolus vulgaris*) On Production, Quality, Fertility and Hatchability of Egg of White Leghorn Hens

Sisay Fikru, Mengstu Urge and Getachew Animut
Year: 2013

Abstract: A study was conducted to evaluate the effects of replacing processed kidney bean meal (PKBM) for soybean meal (SBM) on profitability, feed intake, body weight gain, egg production and quality, feed conversion ratio, fertility, hatchability, chick quality of white leghorn (WL) chicken. A total of 225 (165 layers and 30 cocks) with uniform body weight (BW) and age were randomly distributed in to 15 pens and assigned to five treatments. Treatments were SBM substitution by PKBM at 0, 25, 50, 75 and 100% levels for T1, T2, T3, T4 and T5, respectively. Chicken were offered a weighed amount of feed and feed leftover was collected and weighed the next morning. Weight of experimental animals was taken at the beginning and end of the experiment. The CP and ME content of treatment rations ranged 16.05 - 17.23% and 2867.49-2868.53 kcal/ kg DM, respectively. PKBM contain 25.8% CP and 3513.23 kcal ME/kg DM. Replacing SBM with PKBM did not affect dry matter intake, average weight gain, average egg weight, hen-day egg production, egg mass and feed conversion efficiency. The shell weight (6, 6.02, 5.61, 5.39 and 5.41 (SEM=0.14)) for T1, T2, T3, T4 and T5, respectively was significantly ($P < 0.05$) lower for T5 than Tl. Moreover, yolk color (3.28, 3.33, 3.88, 3.81 and 4.23 (SEM=±0.23)) for T1, T2, T3, T4 and T5, respectively was significantly ($P < 0.05$) higher for T5 than Tl. Replacement of SBM with PKBM in the diet did not affect chick length, chick weight, albumen height and weight, Haugh unit, yolk index, diameter, weight and height, shell thickness, fertility, hatchability, embryonic mortality and chick quality by visual score. Feed cost decreased with increasing level of PKBM in the ration because of the lower purchasing price of raw kidney bean. Thus, it can be concluded that 100% (at a rate of 100 g/kg concentrate diet) of PKBM as a substitution for SBM in the diet of layers did not affect production parameters, but egg was produced economically in groups in which PKBM replaced SBM.

206. Honeybee Production System and Quality Status at Gemechis District of West Hararghe, Ethiopia

Timketa Dagne, Amssalu Bezabeh and Mengistu Urge
Year: 2013

Abstract: Assessment of honeybee production system and the quality status of honey were undertaken to identify honeybee production systems and production constraints and to determine the quality attribute of honey produced in Gemechis District of West Hararghe, Ethiopia. Among the 36 rural kebeles found in the study district, 6 rural kebeles were randomly and proportionally selected from highland, midland and lowland of the district. From each of the selected rural kebeles fifteen (15) farmers were randomly selected. A total of 90 beekeeping households were interviewed by semi-structured questionnaire. For honey quality analysis, 16, 4, 4 and 4 honey samples were proportionally collected from midland, highland, lowland and Kuni market, respectively. Thus, total of 28 honey samples each 500 gram was collected for their physicochemical and pollen analysis. The data collected through survey was analyzed using SPSS while that of honey quality parameters were analyzed using the GLM ANOVA of SAS and the pollen frequencies was analyzed using descriptive statistics. The average productivity of identified production practices namely: traditional, transitional and movable frame beehives were 3-8.75, 10 -16 and 15-27 kg honey per harvesting season, respectively. The most important factors affecting honey yields were shortage of forage, water scarcity and drought. The mean physico-chemical properties for moisture, reducing sugars, sucrose, acidity, ash, water-insoluble solids and ph contents of the honey samples collected from the study area were 17.2 %, 64.4%, 4.38%,41.3 meq/kg, 0.18%, 0.15% and 4.03, respectively. The result showed that moisture and ash content fits national standard, sucrose content fits both national and international standards, acidity, ph and total reducing sugar fits international standards. On the basis of pollen frequency classes, 33.9, 40.32 and 25.86% of the pollen grains were secondary, important minor and minor, respectively. Therefore, we suggest strategies that improve use of modern hive and practical demonstration on postharvest management of honey in the study area.

207. Effect of Fructose Addition in Skim Milk Based Extender on Semen Quality and Fertility in White Leg-Horn Chicken

Tarekegn Getachew, Negassi Ameha and Melaku Tefera
Year: 2013

Abstract: This experiment is designed to study the effect of fructose addition as energy source in skim milk extender on the quality (motility, in vitro longevity, and abnormalities), fertility, embryo mortality (EM) and hatchability of white leghorn's spermatozoa stored at 4 ºC. Fifteen Adult, White Leg-Horn (WL) cockerels with similar age and body weight were used for the purpose of semen collection. One hundred twenty WL female chickens with similar age and body weight were randomly distributed to 12 pens each with 10 layers for AI and kept in a deep litter system representing four treatments each with three replications in 3 X 4 Factorial Completely Randomized Design (CRD). The treatments in semen quality experiment were T1 (0% Fructose + MRS), T2 (5 mM fructose + 1% (w/v) skim milk +MRS), T3 (10 mM fructose + 1% (w/v) skim milk +MRS), T4 (15 mM fructose + 1% (w/v) skim milk +MRS). In this experiment motility, morphology and in vitro sperm viability were examined at the 4^{th}, 8^{th}, and 12^{th} hour of storage. For the purpose of AI the semen is treated with T1 (0% Fructose + MRS) for immediate insemination within 30 minutes, T2 (5 mM fructose + 1% (w/v) skim milk +MRS), T3 (10 mM fructose + 1% (w/v) skim milk +MRS), T4 (15 mM fructose + 1% (w/v) skim milk +MRS) inseminated after 4 hours of storage and 360 eggs (30 from each pen) were incubated and examined for fertility, EM and hatchability. The experimental design for AI was CRD. The collected data were subjected to analysis of variance (ANOVA) for all parameters considered. The result of this study indicates general semen characteristics of milky white semen color, an average volume of 0.36 ml per ejaculation/rooster, average pH of 7.2 and 5500 X 10^6/ml average concentration. There was high significant difference ($P < 0.05$) in sperm motility between all fructose levels or control. The best motility was recorded in T3 (10 mM fructose + 1% (w/v) skim milk +MRS) at the fourth hour of storage (90.00±0.00%). Significant difference ($P < 0.05$) was recorded in sperm abnormalities in all durations of storage in extender with fructose supplementations or control. The least morphological abnormality is recorded at T1 (0% Fructose + MRS) at the 4^{th} hour of storage (88.33%±0.33). There was significant difference ($P < 0.05$) in sperm in vitro viability in all fructose concentrations or control in extenders stored for 4, 8 and 12 hours. Extender containing 10 mM fructose concentration and 4 hours of storage is the best combination (77.67±0.88%) for better in vitro sperm viability. There was significant difference ($P < 0.05$) in fertility between semen of different levels of fructose or control inseminated after 4 hours of storage at 4 ^oC. Higher fertility is recorded at the control extender (85.6±11.28). There was significant difference in hatchability between semen of different levels of fructose inseminated after 4 hours of storage. Higher hatchability is recorded on extender containing 10 mM fructose concentration (86.6±4.69). There was no significant difference in EEM, MEM and LEM between semen of different levels of fructose or control inseminated after 4 hours of storage at 4 ^oC.

208. Impact of Walking Distance and Breed on Milk Production, Body Weight Change and Some Physiological Parameters of Dairy Cows

Tesfaye Tadesse, Yoseph Mekasha and Mengistu Urge
Year: 2013

Abstract: The study was conducted in Bako Agricultural Research Centre with major objectives of assessing the impact of breed and walking distance on milk yield and milk components. Two breeds of dairy cows (50% Horro, 50% Friesian and 50% Horro, 50% Jersey) were used to conduct this experiment. The response of cows (milk yield and physiological parameters) to weather variables (Temperature and humidity) was also studied. The cows were assigned to three walking distance groups: WD0 = grazing around the barn, WD1.5 = grazing 1.5 km away from the barn and WD3.0 = grazing 3 km away from the barn. The experiment was arranged as a 2 x 3 factorial and laid down in a randomised complete block design. A total of 36 cows (eighteen cows of each breed) uniform in previous lactation milk yield and at mid stage of lactation were involved in the study, and they were grouped into 2 based on the period of joining the experiment (blocks). Each period lasted 14 weeks (1 week of adaptation and 13 weeks of measurement). The result showed that the mean daily milk yield of cows was higher ($P < 0.05$) for WD0 cows than WD3.0, while milk yield of WD1.5 cows was not different from WD0 or WD3.0. However, the interaction of breed and walking distance was not significant ($P > 0.05$). The mean protein content of milk of HF cows (27.03 g/kg) was significantly higher ($P < 0.05$) than HJ cows (25.2 g/kg). The mean milk protein content of cows in WD1.5 (27.8 g/kg) was significantly ($P < 0.05$) higher than the mean milk protein content of cows that were in WD0 and WD3.0. The mean milk fat composition of HJ cows (57.7 g/kg) was significantly ($P < 0.05$) higher than HF cows (51.0 g/kg). HF cows lost weight while HJ gained during the experimental period. Dairy cows in WD0 had higher mean body weight and better gain compared to those walked 1.5 and 3.0 km. This study further demonstrated that the loss of BW at longer distance of 3.0 km was higher for HF (-4.1 kg) compared to HJ (-1.0 kg) cows. The mean respiration rate of cows during the mid-day was different ($P < 0.05$) among walking groups. Accordingly, the mean respiration rate of cows in WD3.0 (20.7 breaths/min) was significantly higher than that of WD0 (20.1 breaths/min). In this study, HF cows had slightly higher mean breathing rates across all the morning, mid-day and afternoon records than HJ cows, though the difference was not significant ($P > 0.05$). Mid-day mean body temperatures of cows in the three walking distances were significantly ($P < 0.0001$) different. Morning mean body temperature was also affected ($P < 0.05$) by walking distance. HF cows had average milk yield which declined by 0.1437 units for a unit change in THI ($Y = 37.756 – 0.1437THI$). The mean change in milk yield of HJ cows, however, was little ($b_1 = 0.0446$) for a unit change in THI.

209. Inclusion of Dried Ground Sholla (*Ficus sycomorus*) Fruits in Layers Diet on Egg Production, Quality, Fertility and Hatchability of White Leghorn Layers

Yonas Belete, Mengstu Urge and Negassi Ameha
Year: 2013

Abstract: The study was conducted to evaluate the effects of feeding different proportions of dried ground Ficus sycomorus fruit (DGFSF) in a concentrate mixture on egg production, quality, embryonic mortality, chick quality, economics of feeding, fertility and hatchability of White leghorn (WLH) chicken at Poultry Farm of Haramaya University. One hundred fifty six WLH chicken with average initial body weight of 1021.71 ± 11.35 g (mean ± SD) and aged seven month were used for the experiment. The chickens were randomly distributed to 12 pens each with 13 hens and 2 cocks. The chickens were kept on a deep litter housing system. The 12 pens were randomly distributed to the four treatments diets in CRD. The treatment rations were formulated to contain different levels of DGFSF with the percentage of 0 (T1), 7 (T2), 14 (T3) and 21 (T4). Chicken were offered a weighed amount of feed and feed leftover was collected and weighed the next morning. Weight of experimental animals was taken at the beginning and at the end of the experiment. The experiment lasted for 90 days during which dry matter intake (DMI), laying performance and egg quality parameters, embryonic mortality and chick quality were measured. Partial budget analysis was undertaken to evaluate the economic benefits of the different proportions of DGFSF. Daily dry matter intake of birds fed T1 (90.24 ± 0.40 g) and T2 (90.27 ±0.40 g) diets was significantly ($P<0.01$) lower than birds fed T3 (92.00 ± 0.40 g) and T4 (93.05±0.40 g) diets. Daily mean body weight gain of hens fed T4 (0.59 ± 0.33 g) and T3 (0.52± 0.33 g) diets was significantly ($P < 0.05$) higher than that fed T1 (0.36 ± 0.33 g) and T2 (0.38 ± 0.33 g) diets. Hen-day egg production (45.74, 47.51, 50.68 and 51.80 %; (SEM= 0.95) for T1, T2, T3 and T4, respectively) was not hampered by inclusion of DGFSF in layer ration. There were no significant differences ($P > 0.05$) among treatments in yolk diameter (3.67, 3.64, 3.64 and 3.60 cm; (SEM=0.013 cm) for T1, T2, T3 and T4, respectively), egg mass (21.61, 22.64, 24.43 and 25.23 g; (SEM= 0.633 g) for T1, T2, T3 and T4, respectively), shell weight (5.3, 5.32, 5.49 and 5.57 g; (SEM=0.051 g) for T1, T2, T3 and T4, respectively). Similarly, Haugh unit, feed conversion efficiency, fertility, hatchability, embryonic mortality, chick length and chick visual score were not statistically different among the treatments. Results of Roche color reading revealed that eggs from hens fed T1 (1.78±0.077) and T2 (2.38±0.077) diet has significantly ($P < 0.01$) lower yellowish yolk color than T3 (2.53±0.077) and T4 (2.81±0.077). Eggs laid by hens fed T1 diets has thinner egg shell thickness (0.31±0.002 μm) than T2 (0.32±0.002 μm), T3 (0.32±0.002 μm) and T4 (0.32±0.002 μm). Day old chick weight of birds fed T1 diet (30.53±0.15 g) was lower ($P < 0.05$) than T3 (31.67±0.15 g) and T4 (31.2±0.15 g). The result showed that feed cost slightly decreased with increasing levels of DGFSF and eggs were produced economically. Therefore, we concluded that DGFSF can be included up to 21 %, since this level of inclusion was more profitable and did not negatively affected laying performance and product quality.

II. Animal Genetics and Breeding

1. Growth Performance of Crossbred Dairy Cattle at Asella Livestock Farm, Arsi, Ethiopia

Abdinasir Ibrahim, E. Brannang and Keno Banjaw
Year: 1992

Abstract: Genetic and non- genetic factors affecting growth traits and growth performance at different upgrading levels were studied for the years 1969-1982, in the Arsi highland, Ethiopia. The traits studied were: weight at birth, 6, 12, 18,24,36,42 and 48 months, the last two being only included for AI bulls comprising a small group. Analyses were carried out by dividing the material into 6 groups. In group 1 F1FA and F1JA were compared. The former group was heaviest at all ages, although not significant at 6 months. In group 2 F1FA and F1FZ were compared. The latter group was heaviest at all ages and the differences were significant at birth, 18, 30 and 36 months. In group 3 F1FA, F1FZ, F (JXA), 75% FA and 75% FZ were compared. The 75% FA were heavier than F1FA at all ages and the differences were significant at birth, 6 and 30 months. No significant differences were found between F1FZ and 75% FZ. Although the former were heaviest at 24 and 30 months, and the latter were heaviest at birth 6, 12, 18, and 36 months. The difference between F (JXA) and F1FA were not significant except at 6 months. However, the former were heaviest at birth, 6, 12, 18 and 24 months, while the latter were heaviest at 36 months. In group 47.5% FL, 75%FL inter se and F2 were compared. At almost all ages 75% FL, were heaviest although the differences were only significant at 18 months. Nevertheless, F2 were the lightest of the three breed groups at almost all ages. In group 5 F (JXA),Y(FXA),75% FA,75% FZ and F2 were compared. The F (JXA) were significantly the lightest except from F2 at birth. The differences between three- breed crosses and F2 were not significant at 6 months, but 75% Friesian grades were heavier significantly than F2 at this age. All groups except Y (FXA) were heavier significantly than F2 at 24 months. However, F2 were the lightest of all groups, though not significantly, at almost all ages. The differences were not significant at 12, 18, 30 and 36 months. However, the 75% Friesian grades were heavier at almost all ages than the two three breed crosses. In group 6, F (JXA), F (F(JXA)), 75% FA, 75% FZ and 87.5% FA were compared. The F(JXA) were significantly the lightest at birth .The 75 and 87.5% FA were not significantly different at all ages, however, the latter were heavier only up to 18 months. These two breed groups were heavier significantly ($P<0.01$) than the F(JXA) and F(F(JXA) at birth ,respectively .The 75% FA were heavier at almost all ages, though not significantly except at birth and 6 months than F(JXA) and F(F(J x A)), respectively. Nevertheless, the three- breed crosses were not different significantly except at birth. Pure Friesian bulls were the heaviest at all ages, followed by the 75% and F1 Friesian crosses, in that order. Heritability estimates for weights at birth, 6, 12, 18 and 24 months were: 0.20±0.15, 0.14±0.23, 0.04±.21, 0.68±.34 and 0.33±0.29, respectively in group 3 and 0.20±0.12 at birth, 0.43±0.29 at 18 months and 0.33±0.38 at 24 months in group 6. Males were significantly heavier than the females at birth, 12, 18 and 24 months, however, non – significant effects of sex at birth and at 6 months were also observed, though males were heavier. Animals born to first and second parities were the lightest and those born to third and fourth and above were the heaviest at birth .Year of birth exerted significant influence at almost all ages. The effect of season of birth in most cases was significant at birth but to less degree at higher ages. From the results obtained, it may be concluded that management and feeding conditions at the Asella Livestock Farm would warrant the limitation of the levels of upgrading between 50 and 75% of exotic inheritance. This conclusion is supported by studies on milk production, reproduction and mortality. The smaller weights for three- breed crosses, i.e. F (JXA) and Y (FXA), may be advantageous to the smallholder farmers. Such animals have lower nutrient requirements for production and maintenance.

2. Evaluation of the Reproductive and Pre-Weaning Growth Performance of Fogera Cattle and Their F_1 Friesian Crosses at Andassa Cattle Breeding Station, Ethiopia

Asheber Sewalem, Keno Banjaw and E. Brannang
Year: 1992

Abstract: The study was conducted on the fogera cattle and their F1 Friesian crosses maintained at the Andassa Cattle Breeding Station, Ethiopia. Performances regarding age at first Calving (AFC), Gestation length (GL), calving interval (CI) and days open (DO) of cows as well as birth and weaning weights of calves were evaluated using fixed and mixed models (Harvey, 1990). The overall AFC was 48.90± 0.66 months. The respective ages for F1 and pure fogera heifers were 44.05± 69 and 53.75 ± 0.66 months. Year of calving had a significant effect ($P < 0.01$), while season of calving failed to show any significant influence ($P > 0.05$). The least square mean for the GL was 279.41±0.46 days. All factors tested (breed of sire year and season of calving, sex of calf and parity of cow) had no significant effect ($P > 0.05$) except the birth weight of calves ($P < 0.01$). The overall least squares means for CI and DO were 549.44 ± 6.77 and 284.60±7.58 days, respectively. Year of calving and parity of cow influenced both traits significantly ($P < 0.01$), whereas season of calving had only significant effect on CI ($P < 0.05$). The overall least squares means for birth and weaning weight were 24.06±0.19 and 108.18 ±1.41 kg, respectively. The estimated least squares mean for birth weight was 23.09±0.27 and 25.02 ± 0.19 kg for pure fogera and F1 crossbred calves, respectively. The corresponding figures for the weaning weights were 99.96 ± and 116.39 ±1.46 Kg. Year and season of birth, breed group and parity of cow had a significant effect ($P < 0.01$) on both birth and weaning weights of calves. Sex of calf influenced only the birth weight of calf ($P < 0.01$). On the basis of the overall performances of the traits studies, the F1 crossbred calves were 8.4% 16.4% heavier both at birth and weaning, respectively. They also calved for the first time 9.7 months earlier than the pure fogera heifers. Heritability values for the birth and weaning weights were 0.38± 0.32 and 0.22± 0.25, respectively. The overall mortality rate up to AFC was 11.8% based on this observation a cow in the pure fogera herd require 2.27 calving to produce a calf. Thus, it was estimated that 45% of the female valves born were required as replacements and that the average generation interval was 7.94 years. Considering the mean intensity of selection as 1.40, the expected genetic gain on body weight that could have been achieved through selection is 0.15 and 0.77 kg per year for the birth and weaning weights, respectively. Therefore, it is recommended that selection within breed coupled with crossbreeding could be an effective genetic improvement in the fogera cattle.

3. Reproductive Performance of Local and Crossbred Dairy Cattle at the Asella Livestock Farm Arsi, Ethiopia

Eneyew Negussie, Eskil Brannang and Keno Bangjaw
Year : 1992

Abstract: The genetic (breed group) and non-genetic aspects or reproductive performance and herd life for indigenous Zebu and contemporary crossbred dairy cows with 50,75, and 87.5% exotic inheritance were evaluated. The evaluation was based on the data compiled for over 20 m years (1968-1988) from the cattle crossbreeding program of the Assella Livestock Farm, in the Arsi Administrative region, Ethiopia. The whole data set was divided in to two materials (Material I and material II) and two separate sets of statistical analysis were made for each of the traits considered in the study. The first set of analysis were made on the first material, consisting the records of local cows and their contemporary F_1 crosses , while the second set of analyses were made on the second material consisting the records of only crossbreds with different levels (50, 75, and 87.5%) of exotic inheritance. Reproductive performance traits such as, age at first calving (AFC), number of services per conception (NSC), days open (DO), gestation length (GL) and calving interval (CI) were considered for both materials and in both analyses. For crossbred in the second material, however, in addition to reproductive traits, herd life traits such as, length of herd life and number of lactations per cow life time were assessed. Genetic variation (breed group), interactions among some factors and the effects of all possible sources of environmental factors (year, season, parity of the cow and sex of calf) were assessed for the traits considered. All statistical analyses were made at the Alemaya University of Agriculture using PC-2 version Mixed Model Least - Square and Maximum Likelihood computer program (Harvey, 1990).According to the results obtained, the comparison of the indigenous cows with their contemporary F_1 crosses in the first material showed a significant effect of breed group for almost all of the traits considered. Thus, F_1 crosses in general, and Jersey crosses in particular had the best reproductive performance, with lower AFC, fewer NSC, and shorter DO and CI than the local cows. Although non-significant, the performance of Arsi cattle was found to be slightly better than that of the other group of zebu cattle. Similarly, in the second analyses, the comparison among the crossbreds with different levels of exotic inheritance showed a highly significant ($P < 0.001$) effect of breed group. F_1 crosses in general, and Jersey crosses in particular as well as three- breed crosses (with ½ Friesian ¼ jersey ¼ Arisi inheritance) displayed the best reproductive efficiency. They had the lowest AFC, NSC and the shortest DO and CI. It was followed by crossbreds with 75 and 87.5% exotic inheritance. The overall best performances of crosses, such as F_1Jersey x Arsi and three – breed crosses (with 50 and 25% levels of jersey breeding, respectively) indicated the suitability of Jersey inheritance for tropical environment. Moreover, the performance of Arsi crosses at both 50 and 75% exotic inheritance (F_1 Friesian x Arsi and ¾ Friesian x Arsi) excelled the performance of the other zebu group crosses with similar levels of exotic inheritance. With respect to herd life traits, F_1 crosses stayed in the herd longer and completed more number of lactations than the other breed groups. It was followed by crosses with 75% exotic inheritance and those with 87.5% left the herd early and completed fewer numbers of lactations. In general, the performance of F_1 crosses excelled local cows and overall decline of performance was observed in upgrading the indigenous cattle from 50 to 75 and 87.5 exotic inheritance. Among the crossbreds F_1 crosses, were shown to be the best, followed by 75% crosses, and cows with 87.5% exotic inheritance were found to be poorest in all aspects. Therefore, under the prevailing feeding, management and environment conditions upgrading the indigenous cattle to 50% exotic inheritance (preferably with Jersey breed) appears to be promising. Furthermore, there are also indications that upgrading Arsi cattle to 75% would be recommended provided the level of management is good enough to meet the relatively higher demand of these animals. Parity number (age of the cow) exerted a highly significant ($P < 0.01$) effect on the NSC, DO and CI in both analyses. The trend observed was one of decreasing the NSC, DO and CI as the age of the cows increased up to the fourth parity. Beyond the fourth parity, however, a gradual decline of

performance was observed. The effect of year was highly significant ($P < 0.001$) for almost all reproductive traits studied. Improved performance was observed at the early and overall deterioration during the late period of the project. Apart from the effects of climatic and nutritional fluctuations over the years, a highly significant year effect clearly indicated an obvious decline in the level of farm management. Therefore, to attain a reasonable level of performance, a considerable improvement in the present dairy cattle management practices of the Asella Livestock Farm is urgently required. With few exceptions, the effect of season was non – significant for most of the traits studied. However, there are obvious indications that under Asella conditions if animals are to be bred seasonally on consideration of reproductive performance alone, improved performance would be realized if mating is designed to take place during the wet months, preferably commencing just before the beginning of the big rainy season.

4. Preliminary Survey of Indigenous Goat Types and Goat Husbandry Practices in Southern Ethiopia

Workneh Ayalew, Christie Peacock, Bernard Rev and Keno Banjaw
Year: 1992

Abstract: The study was undertaken as the second part of the National Indigenous goat breed survey. In its exploratory approach to the identification of livestock breed types and management systems; this survey is the first of its kind in Ethiopia. The field survey was conducted between February and August 1991, and covered four administrative regions in southern Ethiopia, namely Sidamo, Borena, North Omo and south Omo. Each region was stratified in to a latitudinal transect with sample frames every 500 meters, and sampling sites (villages) were selected at random. Whole flocks belonging to the sampled owners were surveyed until about 500 goats were observed in each site. Nineteen morphological measurements were taken from over 13,000 goats belonging to 1306 owners from the 29 study sites. Three to five sample goat owners with different flock sizes were formally interviewed on their goat husbandry practices. Cluster analysis on selected morphological variables was employed to identify homogenous goat populations that may represent breed types. The clustering technique was single- linkage, agglomerative, hierarchical and non- overlapping (SAHN). Four distinct goat types associated with specific agro ecological zones as well as ethnic groups were identified and described: these are the Sidama, the Guji, the Somali and the Woyto. The Somali and the Sidamo were briefly mentioned in the literature, whereas the other two are new. The Somali (arid zone) and the Sidama (highland) goats appear to be better milk producers than the others. The Sidama are more prolific with multiple birth frequency of 32.7% followed by the Guji (20 .9%) and the woyto (12.1%). The Somali goats showed relatively faster kid growth rate, but there appeared to be some delay in first kidding. A higher percentage of the Sidama and the Guji appear to produce their first kids by the time of the eruption of their first incisor teeth. The traditional goat husbandry practices were described with respect to seven production systems that correspond to different agro ecological zones. Different management systems including tethered feeding and housing and nomadic ways of goat keeping are practiced. Goats were observed to have adapted to a wide range of altitude from under 200 to over 3000 meters in different pastoral and agricultural production systems. Their role and contribution invariably includes production of food, generation of cash and fulfillment of social and cultural obligations. They are extensively milked in all the production systems. Apart from goat breed characterization and improvement programmes, it is recommended that a goat genetic resource data bank be established. It is also recommended to organize a continual goat population census using the existing extensive network of extension and veterinary services. The urgent need for the production of the vaccine against CCPP is stressed. The severity of mange mite infestations in certain parts of the study area is pointed out as deserving close investigation. The rapid survey methodology developed and tested in this study is also proposed for general reference for exploratory livestock breed identification studies. The raw data set used for the cluster analysis is also declared available for further investigation.

5. Comparative Study on Growth, Carcass and Woll Traits in Menz Sheep and Their Crosses with the Awassi and Corriedale Breeds under Supplemented Grazing

Sendros Demeke, Beyene Kebede and Keno Banjaw
Year: 1993

Abstract: This experiment was conducted to study the aspects of growth, meat and wool and their intr- relationships in purebred (Menz) and crossbred (corriedale x Menz , and Awassi x Menz F1) sheep. Growth and wool traits were examined in 237 lambs reared under concentrate supplemented and non- supplemented grazing. Carcass traits were evaluated in 6 ram lambs from each genotype x supplement feeding group. Overall mean body weights (±SE) at birth, 90, 180, 270 and 365 days of age were 2.8± 0.03, 9.9 ± 0.12, 13.8 ±0.15, and 20.2 ± 0.22, and 25.0± 0.24 k, respectively. Crossbred lambs exceeded ($P < 0.05$) purebred Menz in all weights recorded from birth to yearling. Similarly, male lambs were significantly heavier than females at all ages except 90 days. Concentrate supplemented lambs were 7.1 and 10.7 kg heavier ($P < 0.001$) than unsupplemented ones at 270 and 365 days of age respectively. However, the response of the three genotypes to concentrate supplement was different at these ages; relative to un-supplemented controls , the supplemented Menz, Corriedale X Menz and Awassi X Menz lambs showed responses of 26 and 39%, 48 and 56%, and 52 and 67% in live weight at 270 and 365 days of age , respectively . Similarly, male lambs showed significantly greater responses than females at these ages. Corriedale x Menz and Awassi x Menz lambs were significantly higher ($P < 0.05$) than purebred mez sheep in all carcass traits except dressing percent, abdominal fat weight, and fat thickness over the loin muscle. The weight of tail fat in the Awassi x Menz cross exceeded that of Corriedale x menz and purebred Menz lambs by 349 and 237 g respectively ($P < 0.01$). When carcass parts were expressed as a percentage of carcass weight, Awassi X menz still remained superior in tail fat and corriedale X Menz superior in kidney fat, hind – saddle and loin weight when compared to the other genotypes. Pre-slaughter live weight was significantly correlated with kidney fat (0.67; $P< 0. 01$), hot and cold carcass weight (both 0.98; $P < 0.01$), dressing percent (0.50; $P< 0. 01$) and tail fat weight (0.54; $P < 0.01$). Rib – eye muscle area was significantly associated with back fat thickness (0.80; $P < 0. 01$) and abdominal fat weight (0.74; $P< 0. 01$). Awassi x Menz showed the greatest response (19%) in wool staple legth to cocentrate supplementation, followed by purebred Menz (7%) while corriedale X Menz had no response. Corriedale X Menz lambs produced significantly more ($P < 0 .001$) greasy and clean wool than the purebred Menz and more greasy wool than Awassi x Menz lambs (1.21± 0.03 kg vs 1.04± 0.03 kg). Supplemented Awassi x Menz corriedale x Menz and purebred Menz lambs produced 45%, 27%, 14% more greasy wool and 55%, 27%, and 14% more clean wool than their un-supplemented counterparts. corriedale x Menz ,Awasssi x menz and Menz lambs had mean fibre diameters and medullation indices of 30.4 μm and 14.6, 34.9 μm and 16.4, and 39.5 μm and 19.3 respectively .Female lambs had significantly ($P < 0.05$) coarser fibres (36.1± 0.6 μm) and higher medullation indices (17.1±0.3) than male lambs (33.8 ±0.3 μm and 16.8 ±0.3). Supplemented lambs had also greater ($P< 0.001$) fibre diameters than unsupplemented ones (36.6 ±0.60 vs 33.2 ±0.61 μm; $P< 0.01$). Most body weight traits showed positive and significant phenotypic correlations with wool measurements in the three genotype groups considered. The correlations with wool measurements in the three genotype groups considered .The correlation coefficients in Menz , corriedale X Menz and Awassi x Menz for greasy wool weight were 0.34, 0.29 and 0.44 with weaning weight , 0.50, 0.53, and 0.70 with yearling weight , 0.28, 0.21 and 0.25 with pre-weaning average daily gain , and 0.28, 0.30 and 0.29 with post- weaning average daily gain, respectively. The above results indicate that corriedale X menz and Awassi x Menz crosses had a better response in meat and wool production to improved feeding than did purebred Menz sheep in the highlands of Ethiopia. Therefore, to fully exploit the genetic potential of crossbred animals, supplementary feeding in addition to grazing is required.

6. Comparative Study of Milk Yield and Lactation Persistency of Crossbred Cattle at Asella Livestock Farm, Arsi, Ethiopia

Gashaw Mellesse and E. Brannang
Year: 1994

Abstract: A total of 530 and 830 lactation records were analyzed in two materials using Harvey's mixed model Maximum Likelihood computer program Harvey (1990). Material I compare 3 F1 breed groups namely: Jersey X Arsi, Friesian x Arsi and Friesiann x zebu (Borana, Barka and fogera) with birth years 1969- 1973. Material II compare F1 (except Jersey X Arsi), F2, 75 and 87.5% Friesian Arsi and Feiesian zebu and 75 and 87.5% Friesian Jersey Arsi with birth years 1972-1984. In material I the F1 friesian zebu crosses performed the best for all traits under study. In material II the higher grades were not better than the F1 in terms of lactation and 300 days yield and the F2 were the least performing animals among all breed groups. In terms of persistency, higher-grade animals performed the best among the breed groups and F2 the least. This shows that under the existing level of management upgrading above the 50% level seems not be appropriate in Ethiopia. Nevertheless, it should also be noted that maintaining F1 animals appears difficult and the performance of F2 was not encouraging to keep them. Therefore, in this regard further study is required. Differences between parities were highly significant ($P < 0.001$) for all traits except for lactation yield. Moreover, the effect of calving year was highly significant ($P < 0.001$ or < 0.01) for all traits showing that the influence of environmental factors was important. The effect of season was highly significant ($P < 0.01$) for all traits except lactation length in material I. In material II, however, it was not significant for lactation length and yield and 300 days yield but highly significant ($P < 0.001$) for maximum yield and persistency. This indicates the fact that arrangement of the breeding period needs to be synchronized with that of season.

7. Reproduction Performance of a Holstein- Friesian Dairy Cattle Herd at Holetta, Shoa, Ethiopia

Melaku Negash and Brannang
Year: 1994

Abstract: A review of literature on reproduction and mortality with main emphasis on temperate dairy cattle in the tropics in given. The study deals with a purebred Holstein – Friesian herd at Holetta State Farm in Ethiopia. The period under study is from 1967 to 1991. For the age at first calving 422 records were available, for days open and calving interval 851 records and finally for gestation length 1071 records. The traits analyzed are age at first caving, days open, calving interval, gestation length, herd life, perinatal wastage and early calf death and calf mortality rate. Age at first calving showed significant variation in relation to birth year. The overall age at first halving was 41.1 months, with variation from 31.6 to 49.0 months. Heritability for age at first calving was estimated to 0.46 with large standard errors. Calving interval and days open showed highly significant variation due to the effects of calving year and parity. The calving interval was on average 477.6 and the days open 199.2 days. The calving interval varied from 397.6 to 553.1 over the years and the days open from 104 .7 to 256.7 days. Both calving interval and days open were longest for the first parity and then decreased. The average gestation length was 276.1 days. The effect of calving year and sex was significant with variation for the years from 270.0 to 280.2 days. Male calves were carried in 277.1 and female calves in 274.3 days. Birth year had a significant effect on herd life, which on average was 53.8 months with big variation between the years. Infertility was the most common disposal reason (25.8 % of all culling and 43.1 % of all deaths). Abortion rate was 7.9 % and stillbirth and early calf death (within 48 hours) 5.6% .Big variation between the years occurred, from 1.7 to 12.1 %. The highest death rate occurred in the first parity, 35.8 % and then decreased down to 6.5 in the higher lactation. The female calf mortality for the period 1984 to 1992 was 63.4%. The highest mortality, 33.6 %, occurred from birth to 3 months of age. Further the highest death rate occurred in the rainy months June to August and in January and February. Big variation in relation to years was also found.

8. Milk Production and Persistency Characteristics of Holstein / Friesian Cattle on the Holeta Government Dairy Farm, Ethiopia

Mureja Shiberu and E. Brannang
Year: 1994

Abstract: Milk production data were collected from the Holeta Government Dairy farm for the years 1967-1991, including totally 1384 lactations. The production and persistency traits were analyzed to know environmental and genetic components of variances, which in turn helped to estimate heritability of the traits, and to correct management situations existing within the farm. The traits analyzed included total lactation milk yield, lactation length, first, second and third 100 days lactation yield, 300 days lactation yield, maximum daily milk yield, annual milk yield and lactation persistency, p 2:1 and p 3:1. The independent variables examined were sire, year and season of calving, lactation number and interaction between these factors. The effect of year of calving was significant for all the traits studied. The same was true for the effect of season of calving, except for lactation length and lactation yield. Lactation number also significantly affected all traits. Interactions between year and season of calving were significant for all traits, except for lactation yield and lactation length. The average lactation yield was 3157.4±82.0 kg, with variations over the years from 4228.9±193.6 to 2168.5±178.7 kg. First lactation yield was 3160.3±71.7 kg, second 3314±76.5 kg and third 3395.0 ± 85.2 kg. Thereafter no increase was found, but a marked decrease was observed from the fifth lactation onwards. These results are not less than those obtained in most other tropical zones, indicating promising milk from the Holstein/ Friesian cattle at the Holeta farm. Persistency estimates were 79.9+19.9 for p 2: 1 and 50.5+1.0 for p 3: 1. The heritability estimates were generally unreliable although showed a possibility for selection with regard to some of the traits.

9. Reproductive and Milk Yield Performance of Crossbred Dairy Cattle at the Cooperative Farms in the Arsi Region, Ethiopia

Teferi Dina and E. Brannang
Year: 1994

Abstract: Genetic and non-genetic aspects of reproductive and milk yield performance of 50% Friesian (Friesian X Arsi), (Friesian X Arsi) with (friesian x Boran) and back cross of 50% Friesisn Arsi cows to pure bred Friesian bulls i.e. F1, F2 and F(FXA) were evaluated . The estimation was based on data compiled for over 9 years (1979-1988) on 10 cooperative dairy farms, in Arsi Administrative region, Ethiopia. The data was entered in a database using IDEAS and extracted utilizing dBaseIV for further statistical analysis. All considered performance traits (age at first calving, days open till conception, calving interval, total and 300 days lactation yield, and lactation) and possible sources of variations (genetic and non-genetic factors) were statically analyzed using mixed model Least squares and Maximum Likelihood computer program (Harvey, 1990). The ages at first calving of the three breed groups were combined and estimated under one analysis of variance, though F1 crossbreeds were brought from the Gobe ranch as in -calf heifers to the farm. For the estimation of days open till conception, farms and records with no service date as well as F2 cows having inadequate records were excluded. Results obtained show that least squares means for age at first calving of F1, F2 and F(FXA) were 47.7, 57.6 and 48.3 months respectively . Breed and birth year had significant effect ($P < 0.001$), whereas birth season and its interaction with birth year was not significant. The estimated least square means for days open of F1 and F (FXA) were 238.9 and 149.8 days, respectively. Except for calving year and season, farm breed and parity exerted significant influence on this trait. The mean values for calving interval were 524, 450 and 461 days for F1, F2 and F (FXA), respectively. In addition to calving year, farm, breed and parity had significant effect on calving interval. The mean values of total lactation yield were 1341, 1151 and 1539 kg, whereas the 300 days lactation yield were 1080, 958, and 1215 kg for F1, F2 and F (FXA), respectively. Breed, farm and calving year had significant effect on both traits whereas that of the lactation number (except on 300 days yield) was not significant. The least squares means for lactation length were 392, 349 and 408 days for F1, F2 and F (FXA) respectively. With the exception of farm and calving year, all sources of variations considered had no significant effect ($P > 0.05$) on lactation length. In general, comparisons between least square means of economic traits (calving interval and lactation yield) of crossbred animals on cooperative dairy farms show that farms with no or a low number of F(FXA) crossbreeds performed better than farms having high number of this breed group in the herd . This indicated that FXA perform better than F (FXA) on cooperative dairy farms where management and feeding is inadequate for the sustenance and productivity of the high grades.

10. Evaluation of the Performance of Danish Jersey Cattle at Ada Berga State Farm, Ethiopia

Yimam Hassen and E. Brannang
Year: 1994

Abstract: Reproductive, lactation and weight performances, including calving performance, and mortality rate were evaluated from records for 1988 to 1991 for a jersey herd imported from Denmark in 1988 to Ada Berga state dairy farm, Ethiopia. Initially the herd was stall-fed and received supplementary feeding. After about the end of 1990 the herd grazed natural pastures and was provided hay ad libitum with limited other supplementary feeding. Totally there were 1, 447, 18,968, 1,118 and 1,791 original data records for pedigree, milk reproduction and weigh, respectively .All statistical analyses were undertaken by employing the PC-2 version for mixed model least squares and maximum likelihood computer program procedures of Harvey, 1990. For some parameters separate analyses were done for the imported and Ethiopian born animals. Performances included 167. 3±4.6 and 411.3±9.9 Days for days open and calving intervals respectively, when partly and season were considered. The corresponding estimates when using calving year instead of parity in the model were 164.8±4.4 and 413.9±10.5 days respectively. The overall gestation length was 277.2 (SD 7.6) days for 808 observations .All effects considered were significant to highly significant. The estimates for lactation performance for imported cows were 277.2±5.7 days, 1820. 8±40.1 and 1699.3 ±29.0 kg for lactation length, lactation and 300 days yield respectively. The corresponding figures for the Ethiopian born heifers were 182.3±11.5 days, 944.9±68 .6 and 937.4 ± 67.9 kg, respectively. Season, Parity, interaction season X parity and year were significant to highly significant .The estimates of persistency (2nd 100 days yield in per cent of first 100 days yield) for the imported animals were in the order of 76.1±1.0, 64.2±0.8 and 29.7 ±1.6 for the first three lactation , respectively. The corresponding values for the Ethiopian born heifers in years 1990 and 1991 were 51.6±5.4 and 30.9±7.5. For the imported animals lactation yield was 1977.9± 91.4 kg in the first lactation, 2332.3 ± 37.4 kg in the second and then declined to 1152.3±69.1 kg in the third lactation. For the Ethiopian born cows the decline was from 1193.0±86.02 in 1990 to 696.9 ±120.2 kg in 1991. The mean birth weights of the calves were 22.2 ±0.2 kg for calves after imported dams and 19.5±0.6 kg for calves after Ethiopian born dams. The weight increased from 21.4 kg in first parity to 24.3 in second parity but then dropped to 21.0 kg in third parity (imported dams). Bull calves were 0.7 kg heavier than female calves. The effect of parity, sex, season and interaction season X parity were highly significant. The estimated heritability were high, probably due to a limited material in one herd and a short concentrated calving period. For most of the traits season 2 (June to September, the big rains) had the poorest performance probably resulted from decreased feed availability and less efficient disease control. The total loss of calves through abortion, still birth and early mortality was 18.3 % (194 out of 1058 parturitions). Out of calves born alive the death rate was 53.5 % (462 out of 864) during the study period. The most common reasons for death were pneumonia (25.4%) and enteritis / scours (51.6%). High death rate due to internal parasites and liver fluke occurred after that the animals had been put at pasture. During the study period 117 of the imported cows dies or 29.4 %. The herd size was too big to be maneuvered in one place and at once. In general the results achieved in this study were discouraging. Therefore, cattle evaluation and importation policy has to be devised in order to screen the kind of genetic material to be imported and or used in the country.

11. Characterization of Some Indigenous Cattle Breed of Ethiopia Using Blood Protein Polymorphism

Sissay Gezahegne, E.J. Rege and Mekonnen H/Mariam
Year: 1996

Abstract: The cattle population of Ethiopia plays a significant role in almost all the farming systems In the highlands, besides providing meat, milk, income and manure, farmers are highly dependent on cattle for ploughing . In the lowlands, where livestock raising is the primary occupation, cattle are highly valued. Despite these, Ethiopian cattle have not been studied adequately. The existing types, their number and genetic potentials are not well documented This study was conducted to characterize and measure the genetic relationships among seven (Abigar, Arsi, Borana, Fogera, Horro, Ogaden and Sheko) Ethiopian cattle breeds using biochemical markers. Seven polymorphic blood protein systems (Albumin, amylase, carbonic anhydrase, hemoglobin, Post- albumin, transferrin and post- transferrin) were analyzed by gelelectrophoresis . All the loci showed high levels of polymorphism. Twenty-one different alleles and 42 genotypes were observed. Even though most of these alleles were found in all populations, breed- specific variation as reflected in allele and genotypes frequency differences were found . The genetic structure of most breeds was at Hardy- Weinberg equilibria, except some deviation at Albumin locus in Ogaden ($P < 0.001$) and Abigar cattle ($P < 0.05$). The average inbreeding coefficients varied from 8% (Ogaden) to – 6% (Horro) and were not significantly different from zero. The high average heterozygosity values (0.46 in Abigar to 0.40 in Horro) indicated the existence of high level of genetic variation within each breed. High heterozygosity levels were found in cattle living in more stressful environments than those were which exist in relatively better environments. Gene diversity estimates showed transferrin and carbonic anhydrase to be the most and the least variable loci in the total population with values of 0.768 and 0.189 respectively. Post – transferrin locus was found to be the most variable between populations followed by hemoglobin. These loci seem to be the most important to measure genetic variation between breeds. The test of independent gene and genotypic frequency distributions between breed pairs were generally significant in most cases. This reflected the existence of genetic variations between breeds. The lack of significant variation in some breeds was attributed to close relationship between the breeds. The lack of significant variation in some breeds was attributed to close relationship between the breeds and the inability of the method to detect small differences. Genetic distances were estimated between every breed pair using three distance measures (Taxonomic, standard and DA). The values ranged from 0.066 to 0.212, - 0.0017 to 0.0503 and 0.003 to 0.0226, respectively. Even though the magnitude varied with the method, the three measures were highly correlated ($r= 0.97$ to 0.98) . In all the three methods used, the minimum distance was between fogera and Borana and the maximum was between Arsi and Sheko. Pair-wise distances were estimated among Arsi, Borana, Fogera and Horro breeds and a maximum value of 0.0046 was found between Arsi and Horro. The distance between Ogaden and Horro, Abigar and Ogaden and between Sheko and Arsi was 0.012, 0.031 and 0.0503, respectively. These estimates clearly showed existence of substantial genetic variation among Zebu, intermediates, sanga and humpless breeds. Genetic relationships were assessed from the phylogenetic trees. The trees constructed showed the presence of two major clusters. In the first cluster, Borana and Fogera breeds showed the highest relationship with very short branch length. The Arsi breed was also close to the two breeds. The very short branch length between Borana and Fogera may be indicative of the fact that these breeds were recently differentiated. The branch length of Horro and Ogaden was relatively longer, possibly due to earlier separation of these tow breeds from Borana, Arsi and Fogera. The second cluster contained Sheko and Abigar breeds with the longest branch length, indicating that these tow breeds might have separated from each other much earlier than the separation of breeds in the first cluster. The genetic relationships estimated from biochemical data accorded well with the present classification of the breeds. Assuming the present classification primarily based on historical and archaeological evidence is correct, this result indicate that analysis of protein polymorphism through the technique of gel electrophoresis could be utilized to differentiate indigenous livestock breeds. However, for breeds, which are more closely related, this method seems to be less efficient to reveal the existing genetic variability. In such cases, inclusion of more number of loci or utilization of improved analytical techniques would be preferable.

12. On-Farm Feeding Management and Production Performance of Crossbred Dairy Cows in the Selale Area Central Ethiopian Highlands

Solomon Mamo, E. Zerbeni and Alemu Yami
Year: 1996

Abstract: The study was conduction in North Shoa Zone of Oromiya Region. Selected farms were located 80 to 140 km north of Addis Ababa at altitudes ranging from 2580 to 3050 m, with mean annual rainfall of 1079 mm and average daily temperature of 12.9 ^{0}C. Red, black and brown soils cover 53%, 33% and 14% of the area, respectively. The objectives of the study were 1) to identify feed allocation priorities on- farm in "high" and 'Low" producing farms, and 2) to estimate the effects of feed allocation practices on the production performances of crossbred dairy cows. The study was a sample survey of 30 farms with crossbred cows chosen with two strata: 1) 15 High producing farms (> 1500 Kg milk /cow/year); and 2) 15 Low producing farms (<1000 kg milk /cow/year). Cows in each farm were of similar body size, parity, crossbred type (Friesian X Boran) and calving dates . Crossbred cows per farm over a period of two years were 1.7 and 1.8 in high and low producing farms, respectively. Average size of own land for the study farms was 5.2 ha of which more than 40% was allocated for livestock production in both high and low producers. Own grazing land allocated was similar between farm types (high and low) but significantly (P<0.01) greater in Debre Libanos compared to Degem (0.8 V 2.2 ha, respectively). Average herd size was 11.0 TLU. Cattle represented more than 80% of total TLU and crossbred cattle more than 45% of the total TLU distributed similarly among farm types and locations. Local cattle contribute on average to 36% of the total herd size. Average hectares Per TLU were 0.35 ha. Three types of feedings were practiced. 1: Individual feeding of crossbred cows; 2: Group feeding of crossbred cows and 3: Group feeding of all cattle. Crossbred cows were fed individually by 53% of high but only by 8% of low producers and by 43% of Selale compared to 21 % of Debre Libanos farm. Feeding practices seem to be directly linked to performance differences between farm types and location. Allocation of different feeds vary between animal types and location. Supply of straw, green feeds, concentrates and noug cake were significantly (P < 0.05) different between animal types. Straws were fed more to local cattle, but the rest are fed more to crossbred cows. The feeding proportion and amount also vary between locations. High producers and Degem farm fed significantly (P < 0.05) higher amounts of noug cake and concentrates compared to low and Debre Libanos farms, respectively. More than 90% noug cake and 75% of concentrates were allocated to crossbred cows, irrespective of location or farm type. Average grazing hours was 7.4/day. Stall feeding of dry matter, metabolize energy (ME) and crude protein in high producing and Degem farms over a period of one and two years were significantly (P < 0.05) greater than in low and Debre Libanous farms, respectively. Over a period of one year, ME supplied was 22 and 34% lower than the calculated requirements for high and low and 22% and 34% lower than calculated requirements for Degem and Debre Libanos farms, respectively. Over a period of one and two years, total milk yields of high producing farms were significantly (P < 0.05) greater than those of low producing farms (1904 v. 1356 and 2358 v 1701 kg, respectively). Average lactation milk yield of crossbred cows was 1826 kg in 405 days. Lactation milk yield for high producing farms was significantly (P < 0.05) greater than that of low producing farms, and lactation yields in Degem were greater than those in Debre Libanos. Average dry period and calving interval were 131 and 547 days, respectively with no significant difference either between farm types or locations. Over a period of two years greater losses of live weight in crossbred cows were shown from April to August, while pains were observed from October to February in both high and low producing farms. However, cows in low producing farms tended to lose more weight than in high producing farms. Mean condition score of crossbred cows over a period of two years was 4.3. Cows had cow body condition from April to June best from November to December. It general, higher milk yields and overall performance of crossbred cows in Degem and Debre Libanos was associated with greater dry matter intake specially green feeds, concentrates and noug cake. These feeds are translated in to relatively greater ME and CP available to the animal during the lactation period. Another important parameter identified for yield differences was method of allocation (individual verses group feeding).

13. Comparative Study Reproductive Efficiency of Boran and Its Crosses at Holetta Research Farm

Gifawosen Tessema, Jayaparakash and Alemu G/Wold
Year: 2001

Abstract: The reproductive efficiency of local Zebu cattle (Boran) and its cross with exotic breeds (Friesian and Jersey) were studied on 1025 records from 1989 to 1999. Data were collected from the former Ethiopian Institute of Agricultural Research (IAR) and the present Ethiopian Agricultural Research Organization (EARO) the Dairy Research program at Holetta Research Center, which embodies local Boran cows, and Friesian and Jersey as sires. Least square means for number of services per conception (NSC) for all genetic groups was 1.72±0.14. Year of conception affected ($p<0.001$) NSC. The overall conception rate (CR) found to be 76%. The NSC tended to decrease with increasing exotic blood inheritance among cow genetic group. Hence, the highest NSC (2.06) were required for Boran cows and the lowest for 5/8 jersey-Boran/ 15/18th JBO/ (1.34). F_1 Friesian – Boran /F_1FBO/ and F_1 Jersey-Boran/ F_1 JBO/ were required 1.74 and 1.65 NSC respectively. The estimated least square means shows seasonality that cows bred during the dry, short and main rainy seasons required 1.55, 1.47 and 1.87 services per conception, respectively. Least square means for days open till conception (DOC) was 181 ±20 and was affected by genetic group and year of calving ($P < 0.05$). Boran cows had 34 days longer days open than the F_1 crosses. The shortest mean value for DOC was found for the 3/4 Jersey-Boran (3/4 JBO) (121 days) and followed by 5/8 Jersey-Boran 5/8JOB (123days), F_1 Jersey-Boran (F_1 JBO) (143 days) and F_1 Friesian – Boran F_1FBO(144 days) while 5/8 Friesian – Boran (5/8 FBO) cow, had the longest (121 days). Least square mean postpartum anoestrus interval (PPAI) was 149±21 days. Longest anoestrus interval in 5/8FBO cows (188 days) while the shortest (144 days) was for 3/4JBO. F_1FBO and F_1JBO required 115 and 121 days respectively. Therefore, in this study, we concluded that if the reproductive efficiency of Boran cows is to be improved, cows must be genetically up graded to the level of 50%. There is an indication that upgrading Boran cattle up to 75% exotic inheritance preferably with Jersey sires could be take up at least for better reproductive efficiency provided the level of management is good enough to meet the relatively higher managerial demand of these animals. However, the causes of poor oestrus manifestation in Zebu cows need further investigation.

14. Survey of the Village Breeding Program and Evaluation of Semen Characteristic of Camels in the Central Rift Valley of Ethiopia

Alemayehu Gashaw, Jayaprakash and Bekele Tafesse
Year: 2002

Abstract: The study was carried out in Oromia and Afar National Regional States on camels owned by the Afar and the Kereyu pastoralists, with the objective to study the village breeding programs and to evaluate the semen characteristic of camels in the Central Rift Valley of Ethiopia. Camels in the study area are kept traditionally in very extensive systems. The basic features of the production systems in the area consists of transhumance, nomadic and sedentary. The survey- based study on village breeding program of camels was conducted at two districts using a total of fifty randomly selected pastoralist households. The overall village breeding program aims primarily at increment of milk, fulfillment of the cultural interest, risk avoidance, getting replacement stock, getting extra animals for sale and bartering and meat production. The breeding bull was found to be the important part of the herd. Though, the study areas share almost identical traditional management practices and environmental conditions differing only in ethnicity, the statistical analysis showed the presence of statistically significant difference ($P < 0.01$) with age at puberty and sexual maturity. Age at puberty and sexual maturity was found to be 4.0 ± 0.112 and 4.5 ± 0.116 years for Afars, while it was 3.5 ± 0.123 and 4.97 ± 0.095 years for camels of Kereyus, respectively. The average service per conception for both districts was 1.75, while the average number of copulation per bull per day was 7.5. Among the criteria for bull selection, the most important was found to be the bearing of more female offspring. Given the limitations of getting more number of bulls, the assessment of semen characteristic of camels was conducted using three bulls. The three bulls with age of 5, 6.5 and 8 years, were obtained from the FARM Africa's, Ethiopia Pastoral Project. Totally fifteen ejaculates, five from each bull were collected for evaluation. Semen was collected using bovine artificial vagina of 40-cm length. The semen was translucent in appearance, odorless, milky-white in color with least square mean and standard error value of 8.37 ± 0.20 for pH and an ejaculate volume of 3.6 ± 0.23 ml. The spermatozoa had a mean length of 48.53 ± 0.27 μm. The least square mean values and standard error for mass activity and motility were observed to be 1.93 ± 0.18 and 51.67 ± 1.26 percent, respectively. The morphological abnormality observed included head defects (double and detached) and tail defects (double tails, colied and bent tail) and its least square mean value obtained was 13.07 ± 0.28 percent. The mean sperm concentration and the total sperm count were found to be 8.47 x 10^6 /ml and 30.89 x 10^6 /ejaculate, respectively. Total count and concentration showed statistically significant difference ($P < 0.01$) among individual bull whereas only concentration was found to differ significantly ($P < 0.01$) among the frequency of collection while all the other characteristic did not. Among the identified existing management problems inbreeding was expected to be the important, which could be minimized by exchange of breeding bulls between ethnic groups, clans, and sub- clans accompanied with controlled breeding.

15. Evaluation of Performance of Baran Cows in the Production of Crossbreed Dairy Heifers at Abarnosa Ranch, Ethiopia

Ababu Dekeba, Workineh Ayalewu and B.P.Hegde
Year: 2002

Abstract: The present study was conducted to evaluate the reproductive performance of Ethiopian Boran cows and viability of their F1 crosses with Holstein_ Fresian bulls, the influence of non-genetic factors and the breeding program of the ranch and its links with the farmer's herds. It was designed to test three hypothesis: (1) Management of reproduction in the ranch is inadequate; (2) Non-genetic factors affect overall performance of the breeding herds, and (3) Breeding program of the ranch ensure genetic improvement in farmer's herds. Data from Abernosa ranch (1993-2001) and recalled indicators from sample smallholder herds in Degem district , where cattle crossbreeding have been promoted for dairy improvement, were used for this study. The implication of the reproductive, viability and growth performance results were discussed in relation to the effects of season, year, parity and sex. Overall reproductive performance were inadequate. Late AFC (53.9 months), and long DO (305.5 days) and long CI (529.8 days) were observed. Mean NSC and GL were 1.5 and 278.8 days, respectively. The long DO and CI values were attributed to low BE (44.6%) and low calving rate (72.9%). From average dairy performance value lactation length of 210-281 days lactation, milk yield of 1632-2280 l. and average estimated current market price of crossbred animal 1050-2440 Birr, were calculated. Crossbreeding program and performance of crossbred animal of smallholder appear to be economically attractive. However, the goal of stabilizing exotic blood level in the crossbreds has not been achieved. It was observed that the smallholder farmers use much more feed and veterinary impute to raise crossbred cows than for indigenous cows because they find it economically worthwhile. However, there lack of reliable supply of breeding stock to sustain production of crossbreds on-farm. The huge increase in milk yield from crossbreds were not matched by secured access to reliable milk markets, which are discourage farmers from investing on crossbred animal. Overall the crossbreeding technology still needs external support and subsidies. Comparison of the cost of production with the value from sale of crossbred heifers and culled animal showed crossbred heifer production was at lower cost recovery. The study results indicated that there is a wide gap between the actual (25%) and projected (42.8%) crossbred heifer production efficiency. Both the smallholder and the ranch have no control over genotype of AI bulls and performance recording is not practiced in the smallholder herds. It was observed that the bull station and AI service are declining, unintended and unknown genotype calves are produced; there is poor control of mating and lack of supervision of the intended genetic progress. A substantial delay in the attainment of sexual maturity (age at first conception) and low rate of heifers production (65.1%) and low rate of confirmed pregnancy (39.9%) on the ranch resulted in weak supply and distribution (37.9%) of crossbred heifer to the smallholders. There lead to the acceptance of the two hypotheses that management of reproduction in the ranch is inadequate and non-genetic factors affect overall performance of the breeding herds; and the rejection of the hypothesis that the breeding program of the ranch ensures genetic improvement in farmer's herds.

16. Accuracy of 30-Days Interval Method to Estimate Lactation Yield of Crossbred Cows (Fresian X Arsi) at Agarfa, Bale

Oumer Wabe, B.P.Hegde and Girma Abebe
Year: 2003

Abstracts: To test the accuracy of 30-days' time interval method in comparison with 15 45-day time interval method of milk recording to estimate the lactation yield and to measure the effect of genetic group. Parity and season of calving on the accuracy, 1120 lactation records of Fresian X Arsi cows were utilized. The lactation yield was estimated for lactation length of 210-305 days. The accuracy was measured in terms of absolute difference and percentage difference between actual and estimated yield. The study revealed that 15, 30 and 45 days' time interval can estimate lactation yield. Accurately to extent of less than five percentages bias irrespective of genetic group (50 percent, 75 percent and 87.5 percent Fresian X Arsi) and parity. The season of calving significantly ($P \leq 0.05$) affected the percentage difference in 15 day interval method and not in 30- day and 45-day time interval method. The lactation yield estimated by 15-day TIM was marginally more accurate with high R^2 value (99.62%) and lower root error mean square compared to 30 and 45 day TIM. The regression analysis indicated that the actual yield of 9^{th} period (121-135) in 15-day 5^{th} period in 121-150 days) in 30 day and 3^{rd} period (91-135) in 45-day time interval method predicted reliable estimate of 305-day yield. The step wise regression analysis of various combination of test period actual yield elucidated that combination of more than three periods of recording can be used in estimation of lactation yield in crossbred cows irrespective of season of calving and parity. However, further research is required based on larger data generated by different native dam and exotic sire breeds.

17. Indigenous Cattle Genetic Resources, Their Husbandry Practices and Breeding Objectives in North-Western Ethiopia

Zewdu Wuletaw, Workneh Ayalew, B. P. Hegde and Soelkner, J.
Year: 2004

Abstract: Phenotypic as well as genetic characterization of indigenous livestock genetic resources provides the basis for any livestock development intervention. However, in Ethiopia, little attention has been given to identify, characterize and conserve the diversity of the various livestock breed types. It is with this understanding that the present study was initiated and conducted in North and South Gondar zones with the view to characterize indigenous cattle breeds/population, identify the main problems, and outline intervention for genetic improvement of the identified breed populations based on farmer trait preferences. Six sample sites were selected based on initial rapid survey conducted at the start of the study. Three different survey techniques; namely focus group discussion, administration of semi-structures questionnaires on husbandry practices and indicative production and reproduction performance, and phenotypic distance measurements were employed. Findings of the focus group revealed that each of the cattle breed types of the respective study sites were markedly different in phenotypic characteristics. Findings from the semi-structured interviews revealed that the indigenous cattle breed types are multipurpose production and input functions, adapted to wide range of environments, and managed under traditional and largely subsistent mode of production. Furthermore, farmers were interested to improve their local genotypes and suggested different target traits for improvement. Based on these farmers traits preferences village breeding scheme is proposed through the provision of genetically selected breeding bulls. Overall lactation length, and average daily milk yield of this study are higher than national average figures of 1.17 liter per day and 6.33 months, respectively. Reported figures for age at first calving from the different study sites have been found longer than the overall estimated value for Bos indicus. The overall mean value of 14.5 years for longevity exceeds the figure for most African cattle of 10 to 13 years. The reported critical constraints of traditional cattle production were seasonal feed shortage, high disease challenges, weak infrastructure, lack or shortage of working capital, weak cattle markets and cattle raiding. For a phenotypic distance study a total of 1623 sample animals were recorded and identified by sex, dentition, and some discrete variables. Linear measurements on 12 traits were taken from 708 female and 146 male mature animals. Categorical body forms and types were recorded from these as well as the rest of the sample animals too. The general linear model was used to analyse variance on the 12 quantitative traits between sites for males and females separately. Tukey´s multiple comparison test showed that each of the 12 quantitative traits were highly significant ($P < 0.0001$). The model fitted for the male populations explained variation ranging from 35.2 to 67.2%, whereas the model explained 34.7 to 56.1% of the variation in the female population. For the categorical variables chi-square test was employed, and found, for most of the variables, highly significant ($P < 0.0001$). Following this other statistics derived from the Pearson chi square were used to measure the level of association. Furthermore, multiple mean comparisons were also made for these categorical variables using Bonferroni's correction. Multivariate analyses were applied separately to females and males. The resultant discriminant function resulted in a hit ratio of 73.8 and 80.5% for female and male populations, respectively. Canonical discriminant analysis for females and males showed highly significant ($P < 0.0001$) Mahalanobis distances between sites. The multivariate test for differences between the sites is also highly significant ($P < 0.0001$) in all of the four types of multivariate tests. The step-wise discriminant analysis for both male and female sample populations showed that all variables had highly significant ($P < 0.0001$) contribution for explaining the variation in the model. Trees/phenogram constructed separately for male and female populations revealed the existence of four distinct clusters in both sexes. The tree topologies as well as the branch length somehow differ between the sexes. The reliability of the phenogram/dendrogram was tested by the bootstrap method and the result showed that both trees were supported by the high to moderate bootstrap values. In general both the categorical and quantitative variables have differentiated the sample populations in to four to six different classes. Thus, indigenous cattle populations under traditional management in North Gondar as well as parts of South Gondar zones are heterogonous populations divisible into distinct breed types based on phenotypic distance of some quantitative traits and analysis of qualitative variables.

18. On Station Ex-Situ Phenotypic and Morphological Characterization of Ogaden Cattle at Alemaya University

Getinet Mekuriaw, B. P. Hegde and Workneh Ayalew
Year: 2005

Abstract: The Ogaden Zebu is known in the literature as a lowland Zebu. Although definitive research information is still lacking, this lowland-type, range-adapted indigenous breed is believed to have good potential for beef production. The study evaluated the growth and reproductive performance, morphometric features and common health problems of the indigenous Ogaden cattle breed herd at Alemaya University based on the data collected between 1990 and August 2004. The animals were on pasture and no supplementary feed was offered. Natural block mating was practiced. Cows were not milked and calves were allowed to run with dams till weaning age of 180 days. The GLM procedure of SAS was used to analyze the data. A total of 4016 body weight records were used. The mean birth weight of Ogaden cattle was 21.50±0.29 kg. The average adjusted weight at three months and average daily weight gain from birth to three months of age were estimated as 62.85±0.46 kg and 462 g, respectively. The adjusted weight at six months (weaning age) and average daily weight gain from three to six months of age were 91.65±1.67 kg and 389 g, respectively with high coefficient of variation indicating a large scope of intensive selection at this age. The estimated values of adjusted weight at nine months of age and average daily weight gain from six to nine months were 111.07±2.16 kg and 336 g, respectively. The overall mean adjusted weight at yearling and the average daily weight gain from ninth months to yearling age were 136.30|2.36 kg and 322 g, respectively. The adjusted weight at eighteen months age and average daily weight gain from twelve to eighteen months of age were 163.32|2.51 kg and 226.0 g, respectively. At two years of age, adjusted body weight was 200.68|3.43 kg with rate of gain of 227 g per day from 18 to 24 months. The adjusted mean weight at thirty months and average daily weight gain from 24 to 30 months of age were 234.79|3.67 kg and 222 g. The Ogaden cattle had 267.63 kg and 212 g as overall mean adjusted weight at thirty-six months and average daily weight gain from 30 to 36 month. The overall mean adjusted weight at forty-two months age and average daily weight gain from 36 to 42 months of age were 298.70|5.48 kg and 212 g, respectively. The overall adjusted mean weight at forty-eight months of age and average daily weight gain from 42 to 48 months were 289.57 kg and 184.10±0.01 g, respectively, which were less compared to previous body weight and rate of gain. This is because disposal of heavier males. The calves born from purchased dams were found to be significantly superior in weight from one year to 42 months of age. Inspite of significantly higher birth weight of the calves born to fifth and above parity of dams were lighter in weight at later stages of their life. Naturally male calves were superior in body weight than the female calves. The mean weight at first service was 245.70 kg and the mean weight at first calving was 269.15 kg. The overall mean age at first calving was 49.18±4.43 months for Ogaden cattle subjected to seasonal mating. The overall mean gestation length was 284.89 day. The annual calving rate was 74.21±16.03 percent and the overall calf crop was 2.45± 0.16. The average breeding efficiency was 69.65 percent. The average chest girth measured for 107 females over three years age was 150.11±8.20 cm and for 20 males, it was 148.20±14.31 cm. The average chest depth obtained for Ogaden breed was 57.79 and 57.20 cm for female and males. The average distance from the ground to the abdomen of Ogaden cattle in this study was 57.49 cm and 58.40 cm for females and males, respectively. The average body length of Ogaden breed was 121.09 cm for females and 120.45 cm for males. Irrespective of sex, the average height at wither was 115.54 cm and 115.47 cm for females and males, respectively. Majority of adult females (66%) had hair glossiness, which was not very shiny and all the males had unattractive dull color. All males considered and 81 percent of females had white grey and the rest possessed white coat color. Most of the females (97%) had coat colored top line and the majority of males (80%) had white beige top line. All the cattle had very straight top line. All the males and 69 percent of the females skin color was white beige and the rest had grey. The muzzle color was grey for all males and 80 percent of females and white grey for the remaining females. The flat foreheads, straight facial profile with level head were the common features of all the Ogaden cattle. The majority of them possessed vertical, straight and short horns, which were firm and normal sized at the base and tips pointing upward and lateral. The ears were medium sized, horizontally oriented but the tip of the ears were rounded or pointed in equal proportion in the animals studied. Females had small sized hump with pyramidal orientation, but males had large hump size with pyramidal shape. The dewlap was usually small but small proportion had medium dewlap. Over 80 percent of the females had no naval flap and 95.24 percent had small udder. The teat shape was mostly cylindrical with round teat tip. The hoof shape was oval and medium size. The switch has dominantly black color positioned at pastern.

19. On-Farm Phenotypic Characterization of Sheko Breed of Cattle and Their Habitat in Bench Maji Zone, Ethiopa

Takele Taye, Workneh Ayalew and B. P. Hegde
Year: 2005

Abstract: This study was initiated in response to the national concern emerged on the current status of the distinctive, however, endangered Brachyceros group of cattle, Sheko breed, for effective utilization in food and agriculture production. The objectives of the study were: 1) to undertake on-farm phenotypic characterization of Sheko breed of cattle in their natural habitat; 2) to assess the population trend; 3) to assess trait and breed preferences of the community and 4) to document some husbandry practices and constraints in utilization of the breed. The field study was carried out in Bench Maji Zone, southwestern Ethiopia, which is the main natural breeding tract of Sheko cattle. Purposive sampling was employed as sampling technique. Semi-structured interviews, focus group discussions, field observations of animals and secondary data collection were employed to generate the data. Statistical Analysis System software was employed to analyze the data. The geographical distribution of Sheko cattle is generally restricted mainly to Bench Maji Zone and partly in the adjoining parts of Kaffa and Shaka Zones. The current population of Sheko cattle is estimated to be about 4040, which is far less compared to the previous estimates. This indicates that the Sheko cattle population is decreasing. The identified main threats to the survival of Sheko cattle were interbreeding with Zebu cattle, scarcity of feed resources and shrinkage of grazing land, lack of conservation program, lack of reliable information on the actual status of the breed and lack of interest by the community owing to the aggressive behavior of this breed. Sheko cattle do have specific morphological appearance, which can be utilized in identifying this breed. Polledness is common in Sheko cattle. They are generally short and have compact body. Their eyes are prominent and have folded eyelid. They have broad and short horizontally oriented ears. Their muzzle is broad and their facial profile is predominantly straight. They are alert and strong. They have small cervico-thoracic hump. The coat color is dominated by red with glossy appearance. The average linear body measurement taken on a total of 167 female animals for chest girth, body length, height at withers and pelvic width was 136.5, 110.2, 99.4 and 33.5 cm respectively, averages of these variables for 46 males were 141.2, 114.6, 103.6 and 32.8 cm, respectively. The reported average age at maturity in male and female Sheko cattle were 41.6 and 42.1 months, respectively and the associated average age at first calving was 54.1 months. The average reproductive lifespan of a cow was reported to be 14.7 years with a total average calf-crop of 8.3. The mean calving interval was reported to be 15.6 months. Bulls were said to have average reproductive lifespan of 6.5 years. The males were castrated at an average age of 5.7 years. The reported average lactation milk yield was 698.3 liters with average lactation length of 9.9 months, with significant differences in lactation yield between herds in the Shei Bench with both Sheko and Bench districts. The Sheko ox on average starts ploughing at the age of 3.4 years with average work life of 8.5 years. In terms of breed preferences, 43.2 percent of the respondents made Sheko their breed of choice, and milk production was the most frequently (49.6%) preferred trait, followed by breeding efficiency (20.8%). In spite of these special qualities the breed is under serious threat and hence an integrated and community driven participatory in-situ and ex-situ conservation and genetic improvement program of the Sheko breed is proposed to reverse the present genetic erosion of the breed, which otherwise threatens its mere existence

20. On-Farm Phenotypic Characterization of Cattle Genetic Resources and Their Production Systems in Awi, East and West Gojjam Zones of Amhara Region, Ethiopia

Fasil Getachew, Workneh Ayalew and B.P. Hegde
Year: 2006

Abstract: This study was conducted in Awi, East and West Gojjam Zones of Amhara region, Ethiopia, to identify and describe the cattle genetic resources and production systems and assess the relative importance of on-going genetic improvement programmes in the area. General linear model procedure employed separately for male and female sample populations showed significant ($P < 0.0001$) differences. The level of association of site with most categorical variables was medium except for a few cases where it was found higher. The Mahalanobis distances between sites were highly significant ($P < 0.0001$). The maximum and minimum distances were observed respectively between Ankasha and Enemay (2.49) and Gozamen and Metekel (42.26) for female sample population and again between Ankasha and Enemay (1.38) and Gozamen and Metekel (32.37) for male sample population. Discriminant analysis was run to classify sample cattle populations from all sites into their respective sites with an overall matching rate of 80.9 % and 79.9% for females and males, respectively. The cluster analysis led to identification of two cattle breed types. These are the Gojjam Highland Zebu (cattle from Gozamen, Ankasha and Enemay) and the Fogera (cattle from Bahir Dar Zuria and Metekel ranch). The Gojjam Highland Zebu cattle are small body sized animals adapted to the highland climatic conditions. On the other hand, the Fogera are relatively bigger animals that belong to the Zenga (Zebu x Sanga) cattle breed group. While the dominant coat colour pattern among the Gojjam Highland Zebu is plain, spotted animals are more common among the Fogera. Results of focus group discussions revealed that most farmers give first priority to adaptive traits. The major functions of cattle according to their importance are supply of traction power, milk production, income generation and beef production. Observed variations in the performances of animals of the same breed possibly indicate the influence of environment. Most of the farmers in the study area practiced natural, unplanned and uncontrolled mating system. Selection of male or female breeding animals is rarely practiced. Under some circumstances, farmers select animals for breeding purposes considering body size, hump size, coat colour, sheath width, udder size and pelvic width. Except in few urban and peri-urban areas where crossbreeding is practiced, pure breeding is the most common breeding system throughout the study area. No breeding programme to improve indigenous cattle has been operational. The average herd size per household in the different sites included in this study varied from 3.0 to 4.4. The male to female ratios were found to be almost equal for the two sexes. The number of adult breeding bulls in each herd gave a ratio of one bull to less than three breeding females. Indicative reproductive and productive performances of cattle in the study area were found low for many of the parameters. While the estimated milk productions for first and second lactations were found to be higher for the Fogera, the lactation periods for first and second parities were longer for the Gojjam Highland Zebu. The average values for all reproductive parameters except lifetime calf production were found to be larger for the Fogera breed. The average ages at first calving were found to be about 49 and 63 months for the Gojjam Highland Zebu and the Fogera, respectively. Indicative average calving intervals were about 24 and 37 months for the two breeds, in that order. The overall average daily milk yield was predicted to be 1.5 and 1.6 liters for the first and second parities respectively with an overall lactation length of 4 and 3.7 months for first and second lactations, respectively. The overall reported average lifetime calf production was estimated to be 5.6. The reported overall average age at culling of breeding animals during normal years was 9.5 and 12 years for male and female animals, respectively. Disease and genetic admixture by other breed types have posed serious threat to the declining population of the Fogera. In many areas, success from introducing improved cattle genotypes seems unlikely unless the problems of feed shortage and disease are overcome. Pure breeding of indigenous cattle types such as the Fogera is a necessity to succeed in crossbreeding ventures. Village breeding prgrammes need to be run side by side.

21. Evaluation of Artificial Insemination Service Efficiency and Reproductive Performance of F_1 Friesian Crosses in North Gonder Zone, Ethiopia

Haileyesus Abate, B.P. Hegde and Zeleke Mekuriaw
Year: 2006

Abstract: The reproductive performance of F_1 Friesian crossbred dairy cows owned by project supported and non-supported farmers and efficiency of artificial insemination service among different categories of technicians (farmers, project, private and government employed technicians) were evaluated. The evaluation was based on data compiled between 2001 and 2005 and 1998 to 2004 from project supported and non-project supported smallholder dairy cows and artificial insemination (AI) centers, respectively in North Gonder Zone, Ethiopia. The proportion of illiterate household heads were 41.66 and 62.96 percent for AI beneficiary and AI non-beneficiary farmers, respectively. In general, the average landholding and herd size of AI beneficiary farmers were lower than non-beneficiary farmers and total numbers of bulls were higher with non-beneficiary farmers. However, the numbers of crossbred bulls were higher with AI beneficiary farmers. This may be due to the use of the bulls as back up bulls because of inefficiency and/or frequent interruption of AI service. The average number of AI application per technician per year was found to be 153 and the overall percentage of conception was 54.15 out of 10,169 inseminated animals. This value is less than half of the value of 311 inseminations per technician per year in the country. The conception rate (CR) and number of inseminations per conception (NSC) for Project technician was significantly ($P < 0.001$) higher than government employed and farmer technicians and similar with private technicians and the conception rate and number of inseminations per conception had no significant difference between farmer and government technicians. Number of cows inseminated varied significantly ($P < 0.001$) among the seasons. The proportions of animals inseminated during long, small rainy and dry season were 27.06, 39.06 and 33.06 percent, respectively of 10,169 total inseminations. Thus, apparently 12.61 and 6 percent more of cows were inseminated during the small rainy season than dry and long rainy seasons, respectively. Year had significant effect on CR and NSC. In general during last three years lower CR and highest NSC indicates deteriorating AI service. The result indicates that almost all semen distributed in the study area were from dairy breeds, of which 78.21 percent were Holstein Friesian, 21.69 percent Jersey and 0.28 percent local Fogera breed. Fogera semen was not used on crossbred cows. Total number of insemination for local and crossbred dams were significantly ($P < 0.001$) higher in mid altitude than highlands and proportion of inseminated local cows were significantly ($P < 0.001$) higher than crossbred cows in both highland and mid altitude areas. On average local and crossbred cows from mid altitude area had 13.20 and 23.66 percent greater conception rate than the highlands altitude. Local and crossbred cows from mid altitude area required significantly ($P < 0.001$) less NSC than cows from highland altitude area. Non-return rate of Project technicians were significantly lower than private ($P < 0.001$), farmer ($P < 0.01$) and government technicians ($P < 0.05$). The non-return rate for farmer AI technician was significantly higher than Project Cattle Collection Centre and government technicians and similar with the private technician. The results for reproductive performance trait indicated that the mean age at first calving was 36.41 months. The difference between farmers category was not significant but agro-ecology ($P < 0.05$), year (<0.05) and season (<0.001) of birth affected significantly the AFC. Least square means for AFC were 33.64, 39.11 and 37.03 months for long, short rainy and dry season, respectively. Agro-ecology significantly affected ($P < 0.05$) AFC and mean values were 37.65 and 35.53 months of age at first calving for high altitude and mid altitude agro-ecologies. The overall mean NSC was 1.88. The difference between farmers' category, agro-ecology, season and year in NSC was not statistically significant but parity affected NSC significantly ($P < 0.001$). The least square means for days open and calving interval were 6.54 and 15.55 months, respectively. Both traits were not significantly affected by any of the fixed effects considered.

22. In-Situ Phenotypic Characterization of Kereyu Cattle Type in Fentalle District of Oromia Region, Ethiopia

Shiferaw Garoma, B. P. Hegde and Workneh Ayalew
Year: 2006

Abstract: The study was carried out in Fentalle district of east Shoa zone, southern part of the northern Rift Valley of Ethiopia. The objectives of the study were: to undertake on-farm phenotypic characterization of Kereyu cattle type in their natural breeding environment; to characterize the production systems of their natural breeding environment and to evaluate the breeding practices and trait preferences of the cattle owners in the study area. Data were gathered through semi-structured questionnaire, focus group discussions, field observations and linear body measurements of sample populations and secondary data collections from different sources. The home tract of the Kereyu cattle type is Fentalle district. Their breeding environment is characterized by low input-output, high environmental stress and no infrastructure for livestock development programs. The current estimated total cattle population in Fentalle district is 125 thousand. Maya cattle (Kereyu x Arsi) are prevalent in the district and the proportion of pure Kereyu breed of cattle was not determined in this study. However, a gradually decreasing trend of pure Kereyu breed was reported. Recurrent drought, rangeland degradation, population pressure, feed and water shortage, interbreeding with the surrounding local zebu cattle and lack of conservation program were among the identified threats to the Kereyu cattle type. Individual variations were observed in qualitative and quantitative traits of the Kereyu Sanga breed. They have specific morphological appearance and unique behavior that can be used in identifying them from the surrounding local zebu cattle. They are very aggressive but very loyal to their owners. They have long horns. Most of them have straight facial profile. Hump size was medium (58.3%) in males, whereas it was small (73%) in females. Their coat color patterns were plain, patchy and spotted. They have long thin legs and long tail with bushy end. Most of them have straight back with sloppy rump. Their hair is short with glossy appearance. Majority had medium (43.3%) and large (45%) preputial sheath. Navel flap was absent in 43.2 percent of the observed sample female population and was small (48.6%) in the majority of the rest of them. On average, the sample male population (N=60) stand 118.9 cm height at withers and 121.5 cm height at rump; have a body length of 128.3 cm, a heart girth of 151.8 cm, a flank girth of 172.2 cm and a horn length of 43.5 cm. Similarly, for the sample female population (N=222) the mean measured values were 113.2 cm for height at withers, 116.1 cm for height at rump, 121.6 cm for body length, 141.6 cm for heart girth, 163 cm for flank girth and 48 cm for horn length. Female comprise about 75 percent of the total cattle in the herd in both pastoral and agro-pastoral production systems. The overall fertility rate was 55.4 percent. The average reported age at puberty, age at first calving, lactation length and calving interval for Kereyu cattle were 47.5, 54.1, 8.53 and 18 months, respectively, with associated lifetime calf crop production (in number) of 7.1 and reproductive lifespan of 13.2 year. The mean reported age at puberty and reproductive life span for Kereyu male cattle were 49 months and 9.2 years, respectively. The average age at castration was 5.4 year. The mean reported daily and lactation milk yield of Kereyu cattle were 1.8 and 463.1 liters, respectively, whereas the mean measured third parity daily and lactation milk yield were 2 and 543 liters, respectively. Relatively better performing breeding bulls were selected and retained in the herd to maintain the desired quality of the herd. Such type of traditional husbandry practices would help in sustainable use and genetic improvement of this cattle type through selection in their home tract. The majority of the respondents had particular preferences for Kereyu Sanga cattle (69.3%, N=114) and some of their traits. Milk yield (95.6%), color (85.1%), drought resistance (72.8), fertility (71.1%), heat tolerance (63.1%) and diseases resistance (60.5) were among the frequently reported preferred traits by the respondents. Based on this facts, an integrated and community driven participatory in situ conservation and genetic improvement program of Kereyu cattle is proposed to improve the performance of this cattle type in their home tract and to curb the interbreeding of Kereyu cattle with the surrounding local zebu breeds.

23. In Situ Characterization of Gumuz Sheep, under Farmers Management in North Western Lowland of Amhara Region

Solomon Abegaz, B.P. Hegde and A.K. Sharma
Year: 2007

Abstract: A study on characterization of Gumuz sheep breed of sheep of Ethiopia and production system was conducted at Metema Woreda of the Amhara National Regional State. Metema Woreda is lowland where temperature ranges from 22 to 43^0 C. The survey report based on 135 households having Gumuz sheep revealed that the herd size ranged from 2 to 112 heads. The major feed resource was natural pasture and source of water was from river. Enclosure or shelter was used to house the sheep and goat together or as single species. The flock management is without separation of sex or age groups, while mating was random. The reported production constraints were disease, theft and predators and labour shortage. Feed resource was not a limiting factor. The coat color patterns of Gumuz breed varies from plain (50.5 percent) of white to reddish brown, black , brown or grey, patchy (29.5 percent) or spotted (20.0 percent) with above color combinations. The tail was thin, head profile was convex and wattle was absent in both sexes. In 86 percent of males horn were rudimentary or absent and females were polled. The average body length for mature females and males were 66.95 cm and 68.31 cm, height at wither were 63.59 cm and 67.31 cm and chest girth were 76.07 cm and 77.94 cm, respectively. According to farmer's report, the average age at first lambing was 13. 67 months, lambing interval was 6.64 months and ewes yielded lamb crop of 13.74 in 8.57 years of reproductive life span. In the 27 monitored flocks, breeding male to female ratio was 1:6.7 and females of breedable age formed 47.78 percent of flock. The estimated litter size was 1.17. The average birth weight was 2.79 ± 0.028 kg and males, single born lambs and lambs born to later parity were significantly superior to females, twin born lambs and lambs born in first or second parity, respectively. The average weight of lambs at one, two and three months of age was 6. 61± .15 kg, 7.74± .22 kg and 12.64 ± .24 kg, respectively and the adjusted daily weight gain was 109.3 ± 14 .3 g. The yearling weight was 23.05 ± 6.53 kg and marketing age was less than one year. The average weight at one and half years (29.5 kg) was statistically similar to weight at the later age groups. The dressing percentage of yearling stock ranged from 42.48 to 44.01 percent. In Comparison to many other breeds of Ethiopia, the Gumuz breed has ability to produce large number of progeny, grow fast and put on higher weight at younger age and breed has good potential for meat production.

24. Characterization of Menz and Afar Indigenous Sheep Breeds of Smallholders and Pastoralists for Designing Community-Based Breeding Strategies in Ethiopia

Tesfaye Getachew, A. K. Sharma, Markos Tibbo and Aynalem Haile

Yaar: 2008

Abstract: This study aimed at understanding of existing sheep breeding practices, identifying sheep breeding goals and characterizing the morphological and biometrical characters of Menz and Afar sheep breeds in their habitat as a step towards developing sustainable sheep breeding strategy. The study was conducted by implementing single visit questionnaire, observing and recording of sheep morphological characters, and by recording body weight and body measurements. The survey revealed that the mean sheep flock size per household was 31.6 in Menz and 23.0 in Afar area. Nearly half of the pastoralists in Afar area and one-fifth of smallholder farmers in Menz area do not have breeding ram. The survey revealed the predominance of uncontrolled mating, small flock size and less proportion of breeding male (especially in Afar sheep). Mixing of different sheep flocks within a village was varying by season in both production systems. When flocks are mixed, the inbreeding coefficient could be reduced by 86% in Menz and 78% in Afar sheep flocks. Menz and Afar rams were castrated at the age of 1.7 and 1.5 years, respectively. After castration sheep were kept for longer period of time, 1.9 years (range of 0.25 to 5 years) and 3.1 years (range of 1 to 6 years) for Menz and Afar sheep breeds, respectively. Appearance/conformation was the most important trait in choosing of breeding ram for both Menz and Afar sheep owners. Lambing interval and mothering ability in both crop-livestock and pastoral systems and milk yield in pastoral systems were important traits for the choice of breeding ewes. Sexual maturity age of Menz ram was 10.5 months whereas Afar ram attains sexual maturity at average age of 7.1 months. Age at first lambing, lambing interval, twining rate and lifetime productivity of Menz sheep were 470.1 days, 255.1 days, 1% and 9.3 lambs, respectively. The corresponding values for Afar sheep were 405.6 days, 270.5 days, 5%, 12.1 lambs, respectively. The average market age of male and female Menz sheep were 11.3 and 11.9 months, respectively. Afar sheep were marketed at average age of 6.7 and 8.4 months for male and females, respectively. Afar ewes had mean (standard deviation) milk yield of 224 (54) ml per day with lactation length ranging from 1.5 to 6.0 months. The purpose of keeping sheep in Menz area was to generate income followed by meat, manure, coarse wool and as means of saving, in that order. For Afar pastoralists milk production, meat consumption and income generation are the purposes for keeping sheep. In both production systems, feed shortage, frequent drought and disease were the most important sheep production constraints. Menz sheep are fat tailed (100%) and the tail was curved upward at the tip (99.5). Plain red, white and black coat colours were the dominant colours observed in Menz sheep with proportion of 29.3%, 21.6% and 15.8%, respectively. Almost all (99.1%) of the Menz ewes had no horn whereas most (92.3%) of the rams had horn. About 18.5% of the Menz rams had ruff (long hair around the neck region of the inner part) whereas females had no ruff. Menz rams had no wattle while 6.1% of the ewes had wattle. About 15.4% of the Menz sheep had rudimentary ear, 35.3% had short ear showing a tendency to incline downward and the remaining about half (49.3) of the sheep had larger and dropping/semi-pendulous ears. Afar sheep breed is fat tailed and the tail was curved upward having a wider tail both at the base and at the tip. The major (90%) coat colour of Afar sheep varies from white to light red; white with red patch along the back (41.9%), plain light red (30.9%), plain white (17.2%). Plain dark red accounted for 7% and the remaining few proportions were black, mixture of black and white; and dark grey. Almost all of the Afar sheep (99.2%) had straight head profile. Both sexes of Afar sheep breed are polled. About 2.4% of the female had wattle while all of the males had no wattle. The breed has no ruff, but dewlap is present in both sexes. Majority (78.6%) of the Afar sheep were short eared showing a tendency of inclination downwards and about 19.7% were with rudimentary ear. Long dropping ear found rarely (1.7%). Sex and age of the sheep had a significant ($P < 0.01$) effect on body weight and many of the body measurements. Generally, body weight and measurements were higher for males and also increased as the age increased from the youngest or 0 pairs of permanent incisor (PPI) to the oldest age group (2 and above PPI). Body weight of mature (having 2 and above PPI) Menz ram and ewes were 24.9 ± 0.67 kg and 22.3 ± 0.13 kg, respectively. The corresponding values for Afar rams and ewes were 29.0 ± 0.84 and 24.5 ± 0.14 kg, respectively. Positive and highly significant ($P < 0.01$) correlations were observed between body weight and most of the body measurements. Chest girth had consistently the highest correlation coefficient (0.81 to 0.97%) with body weight in all age groups of both sexes of Menz and Afar sheep. Chest girth also the first variable to enter in to the model of stepwise regression analysis in both males and females of Menz and Afar sheep breeds by explaining the highest variation than other measurement. Thus chest girth could be used for the prediction of body weight, could serve as indirect selection criteria for body weight or it could help to measure progress of selection. The prediction of body weight could be based on regression equation $y = -23.42 + 0.67x$ for Menz rams, $y = -23.29 + 0.67x$ for Menz ewes, $y = -30.77 + 0.82x$ for Afar rams and $y = -31.0 + 0.80x$ for Afar ewes, Where y and x are body weight and chest girth, respectively. It was concluded that genetic improvement programs targeting smallholder farmers in mixed crop-livestock and in the pastoral production system need to incorporate trait preference of farmers/pastoralist, multipurpose role of sheep and the existing traditional herding and breeding practices.

25. Characterization of Bonga and Horro Indigenous Sheep Breeds of Smallholders for Designing Community Based Breeding Strategies in Ethiopia

Zewdu Edea, A. K. Sharma, Markos Tibbo and Aynalem Haile
Year: 2008

Abstract: In the framework of designing community-based breeding strategies for indigenous sheep breeds of smallholders in Ethiopia, a survey of production system and on-farm characterization of Horro and Bonga sheep breeds, was undertaken in the Horro and Adiyo Kaka districts, respectively. Purposive and random sampling was employed as sampling technique. Detailed structured questionnaires, focus group discussions, field observations of animals, body measurements, and secondary data collection were employed to produce the data. Body weight, linear body measurements, and qualitative records were taken and observed from 762 Bonga sheep and 816 Horro sheep. For the analyses of quantitative data, the main effects of breed and dentition were fitted to the model within each sex groups. Results revealed that the mean flock sizes for Adiyo Kaka and Horro districts were 11.28 ± 1.27 and 8.20 ± 2.05, respectively. Sheep have multi-purpose roles in both production systems. Among the reasons for keeping sheep, source of income was ranked highest. Age at first lambing for Bonga and Horro sheep was 14.9 ± 3.1 and 13.3 ± 1.7 months, respectively. Average lambing intervals were 8.9 ± 2.1 and 9.2 ± 2.4 months, for Bonga and Horro, respectively. Disease, feed shortage, and predators were the most pertinent constraints for sheep production in that order for farmers in Horro. In Adiyo Kaka, disease, labor shortage, predators were ranked as first, second and third based upon their significant influence on sheep productivity. The mean body weight, body length, chest girth, wither height, tail circumference and tail length for Bonga females were 31.87 ± 0.19 kg, 69.16 ± 0.15 cm, 72.92 ± 0.17 cm, 68.12 ± 0.14 cm, 15.92 ± 0.30 cm and 32.07 ± 0.37 cm, respectively. The corresponding values for males of the same breed were 29.70 ± 1.17 kg, 68.27 ± 0.89 cm, 70.0 ± 1.026 cm, 66.53 ± 0.85 cm, 20.85 ± 0.97 cm and 35.40 ± 0.96 cm, respectively. For Horro females, the values in the same order were 27.65 ± 0.21, 67.40 ± 0.164 cm, 73.81 ± 0.19 cm, 69.43 ± 0.16 cm, 16.08 ± 0.15 cm and 37.52 ± 0.95, respectively. The values of the measurements for males, on the other hand, were 31.66 ±1.23 kg, 69.30 ± 0.94 cm, 76.12 ±1.08 cm, 71.66± 0.90 cm, 23.46±0.97 cm and 37.52 ± 0.95 cm, respectively. Within each sex, it was found that breed had significant effect on live body weight and most of the body measurements. Accordingly, Horro females had significantly ($P < 0.01$) greater values for chest girth, wither height and tail length than Bonga females. On the contrary, Bonga ewe's had significantly ($P < 0.01$) higher values than Horro with respect to body weight, body length, chest width, pelvic width and ear length. Horro male had higher values ($P < 0.01$) for chest girth; wither height and scrotal circumference than Bonga males. With the exceptions of ear length, tail circumference, tail length and body condition score, within the range of age studied, age was found to have a significant influence ($P < 0.01$) on most body measurements in females. The mean body weight and body measurements of animals at dentition 1 and 2 were significantly lower than those of the dentition class 3 to 4-years-old sheep. The correlations between body weights and body measurements at different ages were positive and significant ($P <0.01$). The highest correlation coefficient was found between body weight and chest girth in both of the breeds, sexes, and age groups. The regression analysis to predict body weight from linear measurements indicated that body weight, in most of the cases, could be predicted with a higher level of accuracy from more than one independent trait. However, for practical point of view, the use of chest girth as estimator variable for body weight was suggested due to ease of measurement under farmers' conditions. To realize full benefits of the forthcoming breeding strategies, concurrent improvement in the non-genetic factors (disease and feed) is central.

26. Phenotypic Characterization of Indigenous Sheep Breeds in the Amhara National Regional State of Ethiopia

Sisay Lemma, Aynalem Haile and Mengistu Urge
Year: 2009

Abstract: The extensive within-and between-population variations exhibited by indigenous sheep populations of Ethiopia make distinction between populations difficult. In this study, an exploratory sheep breed survey was undertaken to phenotypically describe the population of indigenous sheep populations kept under the traditional production systems in the Amhara National Regional State of Ethiopia. In this investigation, morphological data were recorded for a total of 11 747 individual adult animals from 190 sampling sites clustered within 34 sampling units. A considerably high level of morphological heterogeneity in qualitative and quantitative traits both within- and between- the sheep population units was established. Systematic patterns of covariation discerned amongst morphological traits were consistent with agro-ecological variations and revealed the important role of environmental differences in the diversification and discontinuity in variation between sheep population units. The results of the clustering procedure produced five distinct major sheep groups, namely, the Central Highland sheep, the North Western Highland sheep, the Afar (Rift Valley) sheep, the Abergelle (Sekota) sheep, and the Gumez (North Western Lowland) sheep, adapted to different agro-ecologies and exhibited identifiable combinations of phenotypic characters, which could be linked to specific environmental conditions and human influence. The most important discriminating variables identified include type of tail, ear form, coat colour type and pattern, facial profile, body length and body weight. The basic important component of this phenotypic characterization of indigenous sheep breeds was the delimitation of major sheep groups and has given baseline information on the phenotypic diversity of indigenous sheep resources in the study area for further study involving in-depth phenotypic and genotypic evaluations among identified major sheep groups as well as with other breeds.

27. Phenotypic Characterization of Indigenous Sheep Types of Dawuro Zone and Konta Special Woreda of SNNPR, Ethiopia

Amelmal Alemayehu, Yoseph Mekasha and Solomon Abegaz
Year: 2010

Abstract: The study was conducted to physically characterize indigenous sheep population in Dawuro zone and Konta special woreda of South Nations Nationalities and Peoples Regional State of Ethiopia. A total of 180 households were selected purposively for characterization of the production system and 630 mature sheep were sampled randomly for characterization of phenotypic traits. Sampling frame was established in a multistage clustered sampling procedure in compliance with the main indigenous sheep types of the study area. A structured questionnaire, group discussion, field measurements and secondary sources were used to gather qualitative and quantitative data on sheep production system and husbandry practices. Sampled animals were identified by sex, age and location. Adult sheep was classified into four age groups as one pair of permanent incisors (age group I) ; two pairs of permanent incisors (age group II), three pairs of permanent incisors (age group III); four pairs of permanent incisors (age group IV). The result showed that most of the households heads are males (83.3%-96.7%) and mixed crop-livestock system is the dominant production system. Among the livestock species, sheep accounted for the largest proportion (35.9%-50.2%) in the study area, and the average sheep flock size ranged from 9.72 in Mareka to 11.35 in Tocha. Breeding ewes accounted for the largest proportion in Tocha (20%) and Konta (20.2%) Woreda, but it was next to ram lambs and castrates in Mareka (15.3%). The major purpose of keeping male sheep across all the woreda was primarily for to be used as an asset (saving), with an index ranging from 0.18 to 0.30, followed by income generation, with an index ranging from 0.18-0.25. The purpose of keeping male sheep for breeding is moderate. Farmers in Tocha and Konta keep female sheep primarily for breeding (index=0.32-0.48), but for income generation in case of Mareka (index=0.32). Most of the farmers in Tocha (48.3%) and Mareka (60%) owned one breeding ram but most of Konta farmers do not have breeding rams (63%). The major criteria considered for selecting breeding rams and ewes across all the three woreda was reported to be physical appearance. Natural pasture and crop residue were the main feed sources and rivers and spring water were main water source for sheep in the study areas. The age at puberty of male sheep was 11.05±1.6, 10.88±1.7 and 9.5±1.4 months while for females it was 11.13±2.7, 10.8±1.9 and 9.5±1.4 months in Tocha, Mareka and Konta, respectively. The average lambing interval for Tocha, Mareka and Konta sheep was 11.62±3.8, 10.33±4 and 11.02±3.8 months, respectively. Feed shortage and disease are the major production constraints in all the studied woreda. From the sampled farmers, majority of them (90-96.7%) practiced docking. Majority of the ewes and rams across all the three woreda had plain coat colour pattern (52-62.9%) followed by patchy (24.5-48%). Among the sampled sheep population, brown, brown and creamy, and brown and white coat color are dominant. Majority of female and male sheep in the study areas had medium and smooth coat cover, and all of them had no horn. All the sampled sheep population in all the three woreda has characteristics of fat tailed type. Body weight of female sheep in age group 1, age group 2, age group 3 and age group 4 were 22.48±0.21 kg, 28.27±0.21 kg, 33.73±0.19 kg and 34.24±0.45 kg, respectively, and the values for males in the same age groups were 21.45±0.34 kg, 28.20±0.35 kg, 33.71±0.32 kg and 37.24±0.66 kg, respectively. Tocha sheep (30.18±0.20 kg) were slightly heavier than Mareka sheep (29.48±0.23 kg) but comparable to Konta sheep (30.09±0.2 kg). Konta sheep had significantly wider pelvic width, tail width, tail circumference and chest width ($P < 0.05$). The tail length of Tocha sheep is shorter ($P < 0.05$) than Konta sheep but Mareka sheep had the same ($p>0.05$) tail length with Tocha and Konta sheep. Except body condition score ($P < 0.05$), sex of the sheep had no significant ($P > 0.05$) effect on the body weight and the other measurements. Age group had strong significant effect ($P < 0.01$) on body weight, tail length, scrotal circumference, height at wither, heart girth and body length. Location was found to strongly influence ($P < 0.01$) to pelvic width, tail circumference and chest width. Similarly body weight, tail length, ear length and body length was also influenced ($P < 0.05$) by location. However, scrotal circumference, height at wither, heart girth and body condition score were not influenced ($P > 0.05$) by location. The interaction of sex and age group was significant ($P < 0.01$) for body weight of the sheep. The

interaction of age group and location was highly significant ($P < 0.01$) for body weight and also significant ($P < 0.05$) for chest width and body length. Differently, the interaction was not significant for pelvic width, tail circumference ,chest width, tail length, ear length , scrotal circumference, height at wither, heart girth and body condition. In general, positive and highly significant ($P < 0.01$) correlations were observed between body weight and most of the body measurements. Heart girth and body length were found to be the most important variables for estimation of body weight in sheep. All squared Mahalanobis' distances obtained among districts populations for females and males were significant ($P < 0.0001$), indicating the existence of measurable differences between females and males district populations or districts. For males and females, most individuals were classified into their source population. For any breed improvement program and to boost productivity of indigenous sheep, characterization is the baseline so; this preliminary work could be used to support genetic analyses to determine variation between and within these small populations.

28. Phenotypic Characterization of Indigenous Sheep Types in Kaffa and Bench-Maji Zones of Southern nations Nationalities and Peoples Region (SNNPR), Ethiopia

Dejen Assefa, Yoseph Mekasha and Solomon Abegaz
Year: 2010

Abstract: A study was conducted to describe the production environment, traditional sheep husbandry practices and major sheep production constraints, to characterize the indigenous sheep resources using morphometric and biometrical characters, and to categorize more homogenous sheep populations in Kaffa and Bench- Maji zones. Data was collected by using single visit questionnaire, focus group discussion and field measurements. The small sheep flock size is within the range of most studies. The flocks are mainly enclosed year round in the separate sheep house. The major feed resource was natural pasture and the source of water was from rivers. About 50% and above 65% of sheep owners in Kaffa and Bench areas, respectively, do not have breeding ram. The survey result revealed the predominance of uncontrolled mating and less proportion of breeding male. Farmers access breeding males by renting having different forms with 2-5 Eth. Birr. Docking the fat fail of ewe lambs is a common practice. Appearance/size /color, prolificacy, and growth of the ram were the important traits in choosing of breeding ram by farmers in the study area. Whilst twinning ability, appearance/size, color and lamb survival were the preferred traits for ewe selection. The age of sexual maturity of ram ranged from 7.33$\pm$0.3 to 8.5$\pm$2.46 months. Whereas for females the range was from 6.94$\pm$2.21 to 9.17$\pm$3.32. Age at first lambing, lambing interval, productive life time, number of lambing per ewes life time and twining rate of sheep in the study area were in the range of 13.4 months, 6.8 months, 7.1 years, 10.3, and 36.9 %, respectively. Next to source of income, the purpose of keeping sheep was for meat production in Kaffa while it was for saving in Bench area. In both areas, disease prevalence and feed shortage are the main production constraints. Based on the correspondence analysis, the sheep in Bench area clustered together with slightly convex head profiles, short to medium ear size, twisted tip of tail positioned above the hook, very thin to average body condition, and white with red brown or plain red brown (red) and white color. The Kaffa area was also closely associated with sheep having straight head profile, long ear size, straight tipped tail positioned below the hook, best body condition, and brown (red or dark) with white or plain black color. The univariate analyses for most quantitative traits considered have shown highly significant difference between sample populations ($p<0.0001$) and between age classes ($P < 0.005$). Most measurements including body weight were lower for males and increased as age advanced. The samples sheep populations in each zone were found non-significant for most measurements. On the basis of multivariate analysis, the sample populations in each zone had shown a distribution which is homogenous. However, the individuals sampled from geographically proximal areas of the two zones, showed somewhat an intermediate distribution. Positive and highly significant ($P < 0.001$) correlations were observed between body weight and most of the body measurements except scrotal circumference. Heart girth had consistently the highest correlation coefficient with body weight in all ages of both sexes of Bench-Maji and Kaffa sheep populations. Thus, heart girth could be used for the prediction of body weight with different quadratic equations, than the linear ones, for different age groups with different accuracies. It was concluded that different ethnic communities have somewhat different sheep management practices and trait preferences. All analyses (univariate, correspondence, and multivariate) showed the difference between the sheep populations handled by the two ethnic communities even though there is some common characteristics shared between geographically proximal individuals. Thus, this preliminary work could be used to support genetic analyses to determine variation between and within these small populations to develop an effective conservation and utilization program.

29. Community-Based Participatory Characterization of the Short Eared Somali Goat Population around Dire Dawa

Grum Gebreyesus, Aynalem Haile and Tadelle Dessie
Year: 2010

Abstract: Characterization of the Short-eared Somali (locally known as Issa) goat population and the production system around Dire Dawa was undertaken in this study in a community-based and participatory approach. Purposive and random sampling techniques were employed to select sample PAs and respondent households. Range of PRA tools, semi-structured questionnaires, body measurements and categorical observations were employed to collect the data. Participatory definition of the breeding objective and breeding goal traits was undertaken. The prospects by which a feasible breeding scheme could be implemented were outlined. The Issa community maintains a perception of special association towards the Issa goat type, claiming a historic role in its development and adaptation. The community generally practices selective pure breeding where by the own flock, flocks in the neighborhood as well as flocks of distantly located community members (relatives) were the units of selection for bucks. Mean number of 32.8 $\pm$ 21.6 goats were owned per household. Feed and water shortages, diseases and predators were the major production constraints. The major feed resource was the natural pasture with no practice of supplementation. The locals employ a range of ethno-veterinary practices to mitigate disease problems. Patchy color patterns were generally dominant (59.8%) in the goat population, while 34% of the patched goats had black spots on the center core of the face and a black stripe across the spine. White coat color, either in plain (20.9%) or as first dominant color in patchy patterns (47.5%), was the prevailing single coat color. Average reported age at first service was 14.6 $\pm$ 7.4 months for males and 14.9 $\pm$ 7.17 months for females. Average age at first kidding was 19.9 $\pm$ 7.93 months while the average kidding interval was 6.1 $\pm$ 1.09 months. The quantitative traits recorded from linear body measurements of the female population averaged 17.58 $\pm$ 0.11 kg, 51.39 $\pm$ 0.16 cm, 59.91 $\pm$ 0.15 cm, 57.04 $\pm$ 0.12 cm, 7.43 $\pm$ 0.04 cm, 12.4 $\pm$ 0.04 cm and 13.08 $\pm$ 0.04 cm for body weight, body length, chest girth, height at withers, chest width, pelvic width and ear length, respectively. The corresponding values for the male population were 19.36 $\pm$ 0.33 kg, 52.67 $\pm$ 0.42 cm, 61.41$\pm$ 0.47 cm, 58.88 $\pm$ 0.4 cm, 7.6 $\pm$ 0.1 cm, 12.29 $\pm$ 0.14 cm and 13.37 $\pm$ 0.1 cm, respectively. Most of the linear parameters depicted positive and highly significant ($P < 0.01$) correlation with body weight. Chest girth had the highest correlation with body weight. Chest girth was also the only regressor that consistently significantly ($P < 0.01$) contributed to the regression models across all age and sex groups. Goats were kept for multifaceted purposes ranging from products like milk, meat and live-sale to functions in socio-cultural, financial and ritual state of affairs. Milk formed significant portion of the household staple diet while sale of goats constituted considerable fraction of the household cash income. The breeding objective is to ensure improved milk production, through increased daily yield per doe and increased fertility per flock, and increased net income per flock, through increased number of marketable animals. Most owners favored traditional criteria such as conformation, behavior and adaptation than most "production" traits in selecting breeding animals. The breeding goal traits considered were, accordingly, milk production, conformation and reproductive traits. Village breeding schemes, where-by flocks and breeding groups in a village are taken as the focal points, is recommended as the strategic way forward in genetic improvement.

30. Estimation of Genetic Parameters for Growth Traits of Horro Cattle and Their Crosses with Holstien Friesan and Jersey at Bako Agricultural Research Center, Western Oromia, Ethiopia

Habtamu Abera, Solomon Abegaz and Yoseph Mekasha
Year: 2010

Abstract: The present study was carried out to estimate non genetic and genetic parameters and growth curve from growth records (birth, weaning, one year weight and weight gains) of Horro cattle and their crosses (Horro-Friesian (HF) and Horro-Jersey (HJ)) at Bako Agricultural Research center. The data used in the study included pedigree and weight records of animals born between 1980 and 2008. Least squares means and growth curves were analysed using General Linear Model (GLM) of Statistical Analyses System (SAS) while genetic parameters were estimated by ASREML. Crossbreeding Effects (CBE) was used to analyze crossbreeding parameters of growth traits. Breed, sex, year of birth and parity were the main non genetic effects that influenced birth weight (BW), weaning weight (WW), one year weight (YW), pre-weaning average daily gain (DG) and post-weaning average daily gain (PDG). The overall least squares means BW, WW, YW, DG and PDG were: 18.34±0.14 kg, 39.8±0.39 kg, 70.5±1.14 kg, 270.8±4 gm and 86.3±2.8 gm for Horro, 22.13±0.14 kg, 47.5±0.38 kg, 94.7±1.14 kg, 314.7±4.5 gm and 131.9±2.8 gm for Horro-Friesian and 19.1±0.19 kg, 42.9±0.5 kg, 85.5±1.5 kg, 295.1±6.3 gm and 119.7±3.8 gm for Horro-Jersey breeds, respectively. Direct heritability estimates from univariate analyses of the best model for each trait were: 0.68±0.09 for BW, 0.53±0.097 for WW, 0.29±0.08 for DG, 0.77±0.12 for YW and 0.57±0.11 for PDG, respectively. Direct maternal heritability estimates were BW (0.12±0.10), WW (0.21±0.08), DG (0.21±0.07), YW (0.26±0.09) and PDG (0.19±0.083), respectively. The ratio of permanent maternal environment was 0.17 to 0.18 for BW, 0.018 to 0.03 for WW, 0.016 to 0.023 for DG, 0.00 to 0.039 for YW and 0.0 to 0.024 for PDG, respectively. Direct-maternal genetic correlations were: -0.76, -0.71, -0.89, -0.84 and -0.85 for BW, WW, DG, YW and PDG, respectively. The genetic correlations between BW and the other four traits were: 0.75±0.06, 0.25±0.11, 0.66±0.07 and 0.54±0.09 with WW, DG, YW and PDG, respectively. Individual breeding values for the total year ranged from -6.6 to 15 kg, -11 to 14.5 kg, -23.9 to 55 kg, -76 to 87.5 gm and -50 to 96 gm, respectively for BW, WW, YW, DG and PDG. The average individual heterosis estimated for Friesian and Jersey were -2.6±0.49 and -3.8±0.86 kg for BW, -0.59±1.3 and -1.8±2.6 kg for WW, 26.04±3.9 and 21.6±6.7 kg for YW, 28.9±15 and 27.4±26 gm for DG and 61.8±9.9 and 68.8±16.6 gm PDG, respectively. The overall means of growth curve parameters were 83.7±0.93 kg, 1.4±0.012 and 0.015±0.00 for mature weight (A), proportion body weight gained after birth (B) and maturing rate (k), respectively. High direct heritability estimates observed for birth and one year weight indicated that in Horro and their crosses faster genetic improvement through selection is possible for these traits. However, the results suggested that both the direct and maternal effect should be taken into account simultaneously during selection because of the high negative direct and maternal genetic correlation. The high positive genetic correlation among growth traits revealed that genetic improvement in any one of the traits will improve the other in a desired direction and helping the breeding processes. The results also suggested that improved environment and management should accompany genetic improvement works. It could be concluded that there was a significant additive breed influence on the growth traits of the crossbred calves, particularly of the Friesian crossbreds. The estimate of the A parameter of the growth curve which represent the mature weight was found to be low. This is as a result of use of weight to only one year of age. Accurate estimate of growth curve parameters require weight to maturity and further investigation is warranted.

31. Phenotypic Diversity and Production System of Sheep in Southern, South Eastern and Eastern Zones of Tigray, Ethiopia

Mulata Hayelom, Solomon Abegaz and Yosef Mekasha
Year: 2010

Abstract: The study was carried out in Atsibi wonberta, Wukro kilteawlaeo, Ofla, Alamata, Enderta and Degua Temben woreda of Tigray Regional State of Ethiopia. The objectives of the study were to characterize the sheep breeds based on their different qualitative and quantitative traits in their natural environment and to describe the sheep production system and assess the major constraints of sheep production. Data were gathered through semi-structured questionnaire, focus group discussions, field observations and linear body measurements of sample populations. Body weight, linear body measurements and qualitative records were taken and observed from 600 sheep. The major feed resource was natural pasture and source of water were from rivers, wells, natural ponds. In the study area there was no separate house for young, male and female sheep. The reported sheep production constraints were persistent drought, disease, feed and water shortage. The coat color patterns of sheep breed includes patchy, pied and plain. Sheep types of Atsibi-Wonberta (54 %), Ofla (33 %) and about 20 % of Degua-Tembien had course wool type of fiber, whereas, the types of sheep found in Alamata (100 %), Enderta (91 %), Wukro-kilteawlaelo (89 %), Degua-Tembien (66 %), Ofla (55 %) and Atsibi (31 %) were hair type. Greater than 80 % of the sheep types found in the study woredas were hornless and had concave and flat (straight) face profile except few types of sheep which have convex face profile. The most frequent sheep types were the short fat tailed and fat rumped type of sheep. These include Begie- Degua (common highland) sheep breed which is found in Atsibi-wonberta, Wukro-Kilteawlaelo, Ofla and Degua-Tembien woredas, Elle (Afar) sheep breed mostly found in Alamata woreda and mixed sheep breeds found in Enderta woreda. Age at first lambing for Elle (Afar) and mixed sheep breeds was 16.83 and 17.77 months, respectively. While the age at first lambing of common highland sheep in Atsibi-wonberta, Wukro-kilteawlaelo, Ofla and degua-Tembien woredas was 18.15, 16.77, 16.7 and 16.77 months, respectively. The highest lambing pattern was occurred in December and November with an index of 0.34 and 0.26, respectively. For Elle sheep, Sex of the sheep had highly significant ($P < 0.01$) effect on Heart girth (HG), Wither height (WH), tail length (TL). Whereas body weight (BW) and Body length (BL) was affected by sex of the sheep ($P < 0.05$) and ear length (EL) of Elle sheep were not affected ($P > 0.05$) by sex of the sheep. Differently in Common highland and mixed sheep breeds, BW, BL, HG, WH, TL and EL were not affected ($P > 0.05$) by sex of the sheep. Chest girth had consistently showed the highest correlation coefficient ($r= 0.22$ to 0.84) in the Elle, common highland and mixed sheep breeds in this study. The prediction of body weight could be based on regression equation $y = -32.05 + 0.48x$ for Elle rams, $y = -36.05 + 0.59x$ for Elle ewes, $y = -16.01+ 0.41x$ for common highland rams, $y = -13.28.0 + 0.31x$ for common highland ewes, $y = -63.93 + 0.77x$ for mixed sheep and $y = -27.32 + 0.76x$ Where y and x are body weight and heart girth, respectively. The regression analysis to predict body weight from linear body measurements indicated that body weight, could be predicted from more than one independent variables. However, from practical point of view, the use of heart girth as estimator variable for body weight was suggested due to ease of measurements under farmers' condition and relatively larger contribution in body weight by heart girth (consisting of bones, muscles and viscera).

32. Estimation of Genetic Parameters, Breeding Values and Trends in Cumulative Monthly Weights and Average Daily Gains of Ethiopian Horro Sheep

Temesgen Jembere, Solomon Abegaz and Aynalem Haile
Year: 2010

Abstract: Phenotypic and genetic parameters, breeding values, genetic and environmental trends and effects of inbreeding were estimated for average daily gains and cumulative monthly weights of Ethiopian Horro sheep from the data collected through 1978 to 1995 at Bako Agricultural Research Center. Traits studied included birth weight (Bwt), cumulative weight to age of one (CMW1), two (CMW2), three (CMW3), four (CMW4), five (CMW5), six (CMW6), seven (CMW7), eight (CMW8), nine (CMW9), ten (CMW10), eleven (CMW11) and twelve month (CMW12), average daily gain to one (ADG1), two (ADG2), three (ADG3), four (ADG4), five (ADG5), six (ADG6), seven (ADG7), eight (ADG8), nine (ADG9), ten (ADG10), eleven (ADG11) and twelve months (ADG12). The least squares means were analyzed and trends were estimated using SAS (2002) whereas breeding values, correlations and heritability were estimated using ASREML. The coefficients of inbreeding were calculated using FSpeed2 and studied by fitting as a linear covariate and by categorizing the flock into inbred and non-inbred. Overall least squares means for Bwt, CMW1, CMW2, CMW3, CMW4, CMW5, CMW6, CMW7, CMW8, CMW9, CMW10, CMW11 and CMW12 were 2.70±0.51, 6.58±1.23, 9.88±2.00, 11.99±2.51, 13.32±2.61, 14.74±2.83, 15.61±2.93, 16.60±2.99, 17.83±3.23, 18.86±3.30, 20.17±3.48, 21.41±3.63 and 23.36±3.87 kg, respectively. Likewise, overall least squares means for ADG1, ADG2, ADG3, ADG4, ADG5, ADG6, ADG7, ADG8, ADG9, ADG10, ADG11 and ADG12 were 123±3, 125±2, 102±0.7, 88±0.6, 71±0.3, 71±0.5, 70±2, 69±1, 61±0.4, 62±2, 62±1 and 64±1 g, respectively. Total heritability estimates from the best model were 0.17±0.04, 0.10±0.03, 0.10±0.03, 0.16±0.03, 0.19±0.04, 0.18±0.05, 0.23±0.04, 0.24±0.05, 0.20±0.04, 0.25±0.05, 0.28±0.05, 0.32±0.05 and 0.29±0.06 for Bwt, CMW1, CMW2, CMW3, CMW4, CMW5, CMW6, CMW7, CMW8, CMW9, CMW10, CMW11 and CMW12, respectively. Similarly, total heritability from the best model for average daily gains were 0.05±0.02, 0.09±0.03, 0.16±0.03, 0.20±0.04, 0.20±0.04, 0.21±0.04, 0.21±0.04, 0.22±0.05, 0.21±0.04, 0.24±0.05, 0.44±0.06, 0.31±0.06 and 0.29±0.06 for ADG1, ADG2, ADG3, ADG4, ADG5, ADG6, ADG7, ADG8, ADG9, ADG10, ADG11 and ADG12, respectively. Phenotypic, genetic and environmental correlations among all weights at different stages varied between 0.20 to 0.90, 0.33 to 0.99 and 0.14 to 0.92, respectively. All correlation values among average daily gains were found to be positive and moderate to high except for the genetic correlation value between ADG2 and ADG6 which was 0.15. In all traits studied, the genetic trends had been improving. Regardless of the presence of genetic gain, all phenotypic values were found to be negative and had shown a declining pattern following the environmental effect values. The mean annual genetic improvement in Bwt, CMW1, CMW2, CMW3, CMW4, CMW5, CMW6, CMW7, CMW8, CMW9, CMW10, CMW11 and CMW12 was 3.54, 0.56, 0.72, 1.57, 1.70, 1.48, 1.84, 1.40, 1.56, 1.68, 1.80, 1.38, and 1.16 percent of the base year least squares means of 3.11, 8.94, 13.89, 17.81, 20.60, 22.92, 22.28, 23.63, 25.59, 27.46, 28.31, 29.75 and 32.76 kg, respectively. Similarly, mean annual genetic improvement in ADG1, ADG2, ADG3, ADG4, ADG5, ADG6, ADG7, ADG8, ADG9, ADG10, ADG11 and ADG12, in respective order, was 0.35, 1.54, 1.69, 1.98, 1.43, 1.95, 1.46, 1.56, 3.4, 1.41, 1.30 percent of the base year least square means of 222, 193, 170, 157, 143, 126, 109, 102, 101, 80, 87 and 87 g, respectively. Generally, the effect of individual inbreeding had no statistically significant ($p>0.05$) effect on all traits studied especially when fitted as a linear covariate. In contrast to this, there was statistically significant difference between inbred and non-inbreed animals with respect to weights at different ages and average daily gains in fact for few traits. It is concluded that selection can be applied to early growth weights like CMW4 or CMW5 and by so doing marketable weights like CMW9, CMW10, CMW11 and CMW12 could be improved as the genetic correlation amongst these traits is high. The relatively low annual genetic progress made in Horro sheep breeds for both growth traits (weights at different ages and different average daily gains) reflected the actual lack of consistent directional selection for clear selection goals and any improvement was possibly caused by culling of inferior animals. Increasing the number of breeding rams and (or) frequently replacing them and increasing the flock size are suggested way outs to reduce inbreeding and its effects.

33. Assessment of On-Farm Breeding Practices and Estimation of Genetic and Phenotypic Parameters for Reproductive and Survival Traits in Indigenous Arsi-Bale Goats

Tesfaye Kebede, Aynalem Haile and Hailu Dadi
Year: 2010

Abstract: This study was conducted to evaluate the reproductive performance and survivability of Arsi-Bale goats both at station and on-farm condition, to estimate genetic parameters for reproductive and survival traits and to identify farmers' trait preferences (selection criteria), define their breeding objectives and characterize breeding practices of goat keepers' in the study area. A total of 792 kidding records that were collected over nine years (1999 to 2007) were used for on-station study. For on-farm study, multi-stages sampling techniques were employed to select study sites, 202 respondents and 542 breeding female goats. Reproductive history of each of the selected doe was narrated individually by the owners to collect biological data. Semi-structured questionnaire and group discussion were used to collect both quantitative and qualitative data. Least squares analyses were performed by applying the general linear model procedure of SAS to determine effects of fixed factors on the traits studied. Derivative-Free Restricted Maximum Likelihood (DFREML) method was used to estimate genetic parameters for reproductive and survival traits. Indices were calculated for purposes of keeping goats and for selection criteria used in breeding goats. The non-genetic factors were found to be the most important source of variation for most of traits studied. The overall means for age at first kidding (AFK), kidding interval (KI), litter size at birth (LSB) and litter size at weaning (LSW) were 574.85±8.3 days, 280.03±13.65 days, 1.6±0.03 and 1.37±0.03 kids, respectively for on-station study while the corresponding values for on-farm study were 441.3±4.2, 232.2±3, 1.65±0.02 and 1.57±0.02. The overall means for total litter weight at birth (TLWB) and weaning (TLWW) were 3.7±0.08 and 9.11±0.38 kg, respectively. The overall survival rate of kids from birth to three, 3-6, 6-12, 3-12, birth to six and birth to twelve months of age were 68.2±3.2, 74.5±4.7, 81.3±4.4, 60.9±5.2, 53.5±3.7 and 44.9±3.8%, respectively on-station while the pre-weaning survival rate of kids at farm condition was 90.4±1.08%. On average each respondent hold around 12 goats in which 30.7, 66.6 and 2.7% of them were males, females and castrates, respectively. The most important purpose of goat production in the study area was mainly for their contribution to the diets of farmers in the form of milk. Only 39.1% (n=79) of respondents have their own breeding bucks. None of the respondents practiced controlled mating/breeding. Farmers have multiple breeding objectives and they considered both subjective and objective selection criteria with slightly more emphasis on morphological characteristics for buck selection than replacement doe selection. The direct heritability and repeatability estimates of reproductive traits generally varied from low to medium while direct heritability range from negligible too low for survival traits. The permanent maternal environmental and maternal genetic heritability estimates of the investigated traits varied from negligible to low. The influence of maternal genetic effects was observed on survival than reproductive traits. Direct and maternal heritability for survival traits decreased with increase in age of kids. Genetic correlation estimates between reproductive traits vary in magnitude from medium to high, ranging from -0.43 between AFK and KI to 0.99 between LSW and TLWW while their phenotypic correlations ranged from -0.07 between KI and LSW to 0.32 between LSW and TLWW. Permanent maternal environmental correlations among reproductive traits ranged from 0.12 between AFK and LSW to 0.81 between LSB and TLWB. Therefore, due attention should be given for non-genetic factors to improve the reproductive and survivability this breed. To get sustainable genetic gain from selection, estimates of heritability and correlations between reproduction and productive traits need to be studied. Regular monitoring is required to ascertain the reported levels of tolerance/resistance of this to some of the environmental factors. Breed improvement strategies that consider the currently identified traditional breeding practices need to be initiated to improve the performance of the breed.

34. Characterization of Mursi Cattle Breed in Its Production Environment, in Salamago Wereda, South-West Ethiopia

Endashaw Terefe, Tadelle Dessie, Aynalem Haile and Woudyalew Mulatu
Year: 2011

Abstract: This study was conducted to characterize Mursi cattle breed in its production environment in Salamago Wereda, South-west Ethiopia. The objectives of the study were: to describe the production system of the area; on-farm phenotypic characterization of the Mursi cattle in its natural production environment; to assess the prevalence of trypanosome; and to identify the types and apparent density of tsetse flies in the study areas. Two locations were selected; Bodi and Mursi area. Data were collected through semi-structured questionnaire, focus group discussions, field observations, and linear body measurements of Mursi cattle. A total of 102 households were randomly selected to fill the structured questionnaire and 201 cattle were sampled for morphological description and linear body measurements. Blood was sampled from 409 (both male and female) cattle of different age groups and body conditions. The study result revealed that the cattle herd size was found to be 51.92±2.98 heads per household and were significantly different ($P < 0.01$) between locations. The main purposes of keeping cattle in both locations were milk and blood sources for home consumption, source of income, and dowry. The coat color type of male Mursi cattle was found to be plain (52.0%), pied (36.0%), and spotted (12%). Plain coat colors of male cattle are white (38.5%), red (38.5%) and black (15.4%), and some gray (7.7%). The pied coat color types are white and red colors (33.3%), white and black (11.1%), black dominant white (33.3%), red and white (22.2%). The female Mursi cattle population also possesses 62.9% plain and 23.5% pied coat color pattern. The dominant plain coat colors of female cattle are red (35.8%), white (28.4%) and black (18.3%). White dominated with red (20.0%), red dominated with white (27.5% and black dominated with white (25.0%) were the dominantly observed pied coat color types of female cattle. Mursi breed is large size with long body frame. Body length, chest girth, withers height, rump width and length, canon bone length and circumference and horn length of Mursi cattle were measured to be 122.09±0.95, 144.47±0.89, 112.98±1.10, 36.92±0.31, 20.41±0.25, 19.62±0.19, 15.10±0.14, and 30.77±1.05 cm respectively. Chest girth, rump width, and horn length were found to be significantly different ($P < 0.001$) between Bodi and Mursi locations. Moderate and significant ($P < 0.01$) positive correlation was found among the body measurements. The AFS of male Mursi cattle was found to be 3.61±0.08 years and were significantly differ ($P < 0.01$) between locations. The AFM and AFC of female cattle were 3.51±0.08 and 4.79±0.09 years respectively. AFC was significantly different ($P < 0.001$) between Bodi (4.31±0.15 years) and Mursi (5.28±0.12 years) locations. The CI of Mursi cow was estimated to be 14.64±0.56 months and showed no significant difference between locations. The fertility of female Mursi cattle was calculated to be 60.19±5.74%. The mean productive life time and number of calves born per female productive lifespan were found to be 14.08±0.32 years and 10.97±0.22 calves respectively. The total fertility rate of Mursi cow was calculated to be 81.20±2.61%. The daily milk yield of Mursi cow was estimated to be 2.11±0.06 liters and the cows are milked for a mean lactation length of 7.79±0.25 months. Both daily milk yield and lactation length did not differ between locations. The lactation milk yield was estimated to be 491.13±21.48 liters. Natural and uncontrolled mating is the main breeding system in the two locations and breeding bull to breeding female ratio was 1:9.71. The main sources of breeding bull were home bred, donated or borrowed bulls. The effective population size and inbreeding coefficient were estimated to be 9.17 and 5.4% and 911.3 and 0.06% for household herd and combined population respectively. The main trait preferenced by the community on Mursi cattle breed were its milk yield, coat color, feed efficiency, adaptability, body size, fertility, growth rate, and less temperament. Mursi cattle have high adaptable character to temperature (60.4%), medium adaptable character to external (77.0%), and internal (53.3%) parasites, low adaptable character to feed (42.6%) and water (45.0%) shortage. The major cattle production constraints were animal diseases and parasites, seasonal water and feed shortage, drought, shortage of Veterinary service, wild predators, and conflict in the comparative ranking order from major to minor constraints. The reported main cattle disease problems of the area were Trypanosomosis (100%), Blackleg (89.2%), Anthrax (81.37%) and Skin diseases (72.6%).

Trypanosomosis prevalence rate study revealed that T. congolense and T. vivax were the main trypanosome species identified in the study locations. The prevalence rate of T. congolense was found to be 1.0% and 5.8% in dry and late rainy season respectively. Whereas, T. vivax prevalence rate was found to be 1.0% and 3.5% in dry and late rainy seasons, respectively. Trypanosome prevalence rate were significantly different ($P < 0.01$) between dry (2.0%) and late rainy (10.1%) seasons; between male (9.6%) and female (5.1%) cattle; and between lean (11.9%) and medium (2.4%) body condition of Mursi cattle. The overall mean packed cell volume (PCV) % of Mursi cattle were found to be 24.15±1.06%. It was found significantly ($P < 0.01$) vary with season, sex, body condition, and parasitism. The PCV% value of parasitaemic cattle was 22.52±1.36% and significantly ($P < 0.01$) lower than aparasitaemic cattle (25.78±0.96%). Strong interaction effect ($P < 0.01$) was observed between season and location on cattle PCV%. The percentage of tsetse flies caught during dry and late rainy seasons were Glossina fuscipes (52.94 vs 2.06 %), Glossina morsitans submorsitans (23.54 vs 0.52) %, Glossina pallidipes (11.76 vs 91.23%), and other biting flies (11.76 vs 6.19 %), respectively. The apparent tsetse fly density was calculated to be 1.13 and 87.24 fly/trap/day in dry and late rainy seasons, respectively. The apparent catch of G. pallidipes was 0.15 fly/trap/day during the dry season and 87.24 flies/trap/day during the late rainy season. It can be concluded that Mursi cattle possess its own unique breed characteristics features that able to distinguish it from other breeds. The breed produces and reproduces in the environment where there is low or no input, high disease and parasite challenge with preferable traits to the pastoralist. Moreover, the breed survives and produces in high tsetse fly challenge and trypanosome prevalent area.

35. On-Farm Phenotypic Characterization of Indigenous Sheep and Sheep Production Systems in West Wollega, Oromia, Ethiopia

Kedjela Tessema, Solomon Abegaz and Yoseph Mekasha
Year: 2011

Abstract: This study aimed at understanding of existing sheep breeding practices, identifying sheep breeding goals and characterizing the physical and morpho metrical characters of indigenous sheep in Nedjo and Jarso districts of Western Wollega zone, in their habitat as a step towards developing sustainable sheep breeding strategy. The study was conducted by implementing single visit survey using questionnaire, observing, recording and measuring of sheep physical and morphometrical characters. The survey revealed that the mean sheep flock size per household was 5.87 in Nedjo and 4.39 in Jarso area. About 45.2% of sheep in Jarso area have short tail type 13.7% long and 41.1% medium tail size, while the corresponding proportion of tail size in sheep of Nedjo area was 31.6% short, 17.9% long and 50.5% medium size. The coat colors of sheep in Nedjo area are plain red (49.5%), white and red (shaded) (19.9%) and spotty (22.7%), were the dominant colors observed in Nedjo indigenous sheep. In addition, the remaining few proportions were black and white. All of the Nedjo and Jarso ewes had no horn whereas 37.1% and 36.2% of the rams in the respective districts had horns. About 15.7% of the rams in Nedjo had ruffed . Whereas females had no ruff at all. 2.9% of Nedjo rams had wattle while the ewes had no wattle. The head profiles of indigenous sheep of Jarso were concave (38.9%), straight (56.9%) and convex (4.2%). About 5.2% of the Jarso rams had ruff whereas females had no ruff. Both sex had no wattle. About 70.1% of the indigenous sheep of Jarso had dropping ear while the rest 29.9% had semi-pendulous ear. So there was no significant difference in ear type of sheep in both districts. In all age groups of sheep in Nedjo and Jarso males were lighter in body weight ($P > 0.05$) than females. All linear body measurement in females and males in the oldest age group were significantly ($P < 0.01$) different, while males and females had similar ($P < 0.01$) measurements in the youngest and intermediate age group of sheep in both district. Scrotum circumferences of the oldest age group were significantly ($P < 0.01$) higher than the youngest and intermediate age groups. The rams in both districts were shorter in stature than females at maturity and that could explain lighter weight of mature rams than ewes. Generally, the study shows that the live weight of indigenous sheep between Nedjo and Jarso has no significant different. In this study the presence of horn in sizeable proportion of rams and their short stature along with other morphological characteristics makes them different from Horro breed. Positive and highly significant ($P < 0.01$) correlations were observed between body weight and most of the body measurements. Chest girth was shown to have higher correlation with body weight than other linear measurements. Therefore, it could be used for the prediction of body weight, could serve as direct selection criteria for body weight or it could help to measure progress of selection. For the prediction of live weight of the animal from live animals, the quadratic regression was the best model. Thus, prediction equation for live weight of Jarso male and female sheep from live animal measurements were $Y=12.38 + 0.01x^2 + (-0.56)\ x$ and $Y=29.18 + 0.014x^2 + (-1.09)\ x$, respectively. While the corresponding value for Nedjo male and female sheep were $Y=10.09 +0.011x^2 +(-0.55)\ x$ and $Y=43.70 + 0.017x^2+ (- 1.48)\ x$, respectively. Where y and x are body weight and chest girth, respectively. In conclusion, the result of this study indicates that as compared to literature description of Horro, Gumuz and Fulani sheep which are found in adjacent areas, the sheep in Jarso appear to have more or less interbred with that of Fulani sheep breed while sheep in Nedjo area are interbred with Gumuz and Horro. Further confirmation of this finding through molecular characterization is required.

36. On-Farm Phenotypic Characterization of Boran Cattle Breed in Dire District of Borana Zone, Oromia Region, Ethiopia

Solomon Tekle, Tadelle Dessie and Kefelegn Kebede
Year: 2011

Abstract: The study was carried out in Dire district of Borana zone, Southern part of Oromia Regional State, Ethiopia. The objectives of the study were: to undertake on-farm characterization of Boran cattle breed in their natural environment and to assess the constraints preventing the proper utilization and conservation of the breed. Field studies and collection of data were carried out through questionnaire, focus group discussions, key informants, observations and linear body measurements of sample animals and secondary data collection from different sources. A total of 152 households were used for semi structured interview. SAS software was used to analyze the data. Dire district is one of the home tracts of Boran cattle breed in Borana zone and southern Ethiopia. Pastoralism and agro-pastoralism are the main livelihood systems in the district. The estimated total cattle population in the district is 173,650. A gradual decreasing trend of pure Boran cattle was reported by the households and key informants. The identified main threats to the survival of Boran cattle were recurrent drought, feed shortage, water shortage, disease, market problem, interbreeding, bush encroachment, conflict, overstocking etc. They have specific morphological appearance and unique behavior that can be used in identifying them from the surrounding local zebu cattle. They are very docile. They have short horns. They are generally medium to large and have well developed body. They have straight facial profile. Hump size was large (56.2 %) in males, whereas small (58.8 %) in females. Their coat color patterns were plain and shaded. They have laterally oriented ears and long tails. They have straight back with sloppy rump. Majority had large (68.7 %) and medium (31.3 %) preputial sheath. Naval flap was small in 9.2% of the observed sample female population, medium (52.6 %) and large (38.2 %) in the rest of them. On average, the sample male population (N=64) have a heart girth of 155 cm, a flank girth of 161.53 cm, a body length of 127.8 cm and stand 117.9 cm height at withers and 125.3 cm height at rump; have a horn length of 13.7 cm. Similarly, in the sample female animals (N=228) the mean measured values were 149.2 cm for heart girth, 157.9 cm for flank girth, 120 cm for body length ,114.8 cm for height at withers, 123.1 cm for height at rump, and 14.3 cm for horn length. Female cattle comprise 72.6 percent of the total cattle in the herd in pastoral production system but it was 68.9% in agro-pastoral. The overall fertility rate was 58.1%. The average reported age at puberty, age at first calving, lactation length and calving interval for Boran cattle were 42.7, 55.5, 10.1 and 15.3 months, respectively, with associated lifetime calf crop production (in number)of 7.3 and reproductive lifespan of 12.7 years. The mean reported age at puberty and reproductive lifespan for Boran male cattle were 47.4 months and 11.4 years, respectively. The average age at castration was 4.2 years. The mean reported daily and lactation milk yield of Boran cattle were 1.8 and 520 liters, respectively. Breeding bull and cow selection is a common traditional practice in Borana community. All the respondents (N=152) prefer the Boran breed and some of their traits. Milk yield (98.7%), drought tolerance (97.4%), walk ability (94.1%), color (91.5%), fertility (90.1%), longevity (87.5%), meat (84.9%), growth rate (83.6%) and heat tolerance (72.4%) were among the reported traits. In spite of these special qualities the breed is under threat and hence an integrated community based participatory in-situ conservation program of the Boran breed is proposed to reverse the present genetic erosion of the breed.

37. Phenotypic Characterization of Black Head Somali Sheep and Their Production System in Yabalo District of Borana Zone, Southern Oromia, Ethiopia

Abraham Abera, Kefelegne Kebede and Negasi Amaha
Year: 2013

Abstract: The study was carried out in Yabello districts of Borana zone. The objectives of the study were to undertake phenotypic characterization of BHS sheep under farmers' management condition and to identify and describe sheep production system and major constraints to promote sheep product and productivity in the study area. A total of 148 households from four peasant association were selected purposively for characterization of production system and 478 sheep were sampled for phenotypic characterization. Data was gathered through semi-structured questionnaire, focus group discussions, field observations and linear body measurements of sample populations. The Sampled sheep were classified by sex (female, male) and by dentition in to four age group (0PPI, IPPI, 2PPI, ≥3PPI). Major farming activities in the study district were livestock rearing followed by crop livestock production. Livestock and livestock products are the major sources of income and home consumption in the pastoral area; whereas, crop farming was the leading in agro-pastoral communities. The main feed resources of sheep reported were natural pasture (Rangeland). The main sources of water during dry and wet seasons were bore hole, well, pond and rain water. Majority of the pastoralist sheltered their sheep in corral and in fenced enclosure called (dhkoba). The population trend of livestock species over the last ten years in the study area was decreased because of drought, disease, feed and water shortage. Body size has given high priority in selecting breeding males and female. It was reported that ewe lambs reach puberty at 14.5 months of age and Ram lambs reach puberty on average at 13.5 months. In this study lambing interval of 8.22 months, average reproductive lifespan of 8.77 year with 12.56 lamb crops during the productive life time were observed. Disease, feed shortage, drought and water shortages are the major constraints of sheep production in the study area. The most observed coat color type was black head with white color of the body. Sex of the animals had significant effect on body weight and all the LBMs except Ear length, width height , Pelvic width and Tail Length; whereas, Body weight and all the body measurements were significantly affected by age group except Ear Length. Female sheep were consistently higher than male in some significantly affected variables except some variables that were not significant. The interaction of sex and age group was significant for body weight and LBMs except Wither height and Cannon Circumference. Almost all of the parameters considered had positive and significant correlation with live body weight. It was concluded that genetic improvement programs targeting smallholder farmers in agro pastoral and in the pastoral production system need to incorporate trait preference of pastoralist, multipurpose role of sheep and the existing traditional herding and breeding practices.

38. Evaluation of Artificial Insemination Service Efficiency and Reproductive Performance of Crossbred Dairy Cows in North Shewa Zone, Ethiopia

Belayneh Engidawork, Yoseph Mekasha and Kefelegn Kebede
Year: 2013

Abstract: The study was carried out to evaluate efficiency of artificial insemination (AI) service and reproductive performance of crossbred dairy cows under smallholder farmers' conditions in North Shewa zone, Oromia National Regional State, Ethiopia. The study involved retrospective evaluation of the efficiency of AI using 9 years recorded data of 576 cows from the District AI centers. A total of 240 households (120 AI beneficiary and 120 non-beneficiary households) were selected purposively from 2 districts (Berek=120; Kimbibit=120) for the study, and interviewed using structured and semi-structured questionnaire to generate data on household characteristics, dairy cattle management and reproductive performance of dairy cows. Forty straws of frozen semen was sampled from both districts, thawed and evaluated at the district level for its quality (motility, viability and morphology) following standard procedures. The survey indicated that 77.5% of AI service beneficiary and 75.8% of non-beneficiary households were literates. The mean number of crossbreed cows per household was 2.7 and 2.3 for AI service beneficiary and non-beneficiary households, respectively. The overall mean (±) percentage of frozen semen motility at district level was 44.5±0.64, and varied ($P < 0.01$) between the districts Artificial Insemination centers (AIC). While semen production period (batch) had significant ($P < 0.05$) effect on frozen semen motility, the effect of breed was not apparent ($P > 0.05$). The mean (±) percentage of viable (live) spermatozoa was 57.6±0.95. Sperm viability was influenced by Batch ($P < 0.001$), whereas breed had no effect ($P > 0.05$) on frozen sperm viability. The overall mean percentages of major and minor sperm morphological defects were 4.8% and 20.9%, respectively, and it was affected ($P < 0.05$) by district AIC, whereas the effect was not significant ($P>0.05$) for breed and semen production period. The mean number of insemination per conception (NIC) at AI service centers was 1.3±0.023, where it was higher ($P < 0.001$) for Berek than Kimbibit district AIC. However, there was no difference in NIC between the different dam breeds (crossbred and indigenous). There was also no variation in NIC among the different seasons of insemination. Year of insemination had significant ($P < 0.001$) effect on NIC. Non-return rate value in Berek and Kimbibit districts were 79.2% and 70.8%, respectively. Constraints of AI service delivery system in the study area were poor heat detection, distance of households from AIC, insufficient perception about AI technology, and service charge for AI service. The mean AFC was 39.8±0.18 months. Season and year of birth had a significant ($P < 0.01$) effect on AFC. However, district and farmers category had no effect ($P > 0.05$) on AFC. The overall mean NSC was 1.6, and was influenced by district and farmer category ($P < 0.01$). However, previous season of calving, previous year of calving and parity had no effect ($P > 0.05$) on NSC. Overall mean of CI and DO were 493.5±6.74 and 214±6.69 days, respectively, and were influenced by district, previous calving year and parity ($P < 0.01$). However, both traits were not affected ($P > 0.05$) by farmers category and previous calving season.

39. On-Farm Phenotypic Characterization of Indigenous Sheep and Their Husbandry Practices in Selale Area, Oromia Regional State, Ethiopia

Bosenu Abera, Kefelegn Kebede and Solomon Gizaw
Year: 2013

Abstract: The study was conducted to physically characterize indigenous sheep population in North Shoa (Selale) Zone of Oromia Regional State of Ethiopia. A total of 300 households were selected purposively for characterization of the production system and 560 mature sheep were sampled randomly for characterization of phenotypic traits. Sampling frame was established in a multistage purposively sampling procedure in compliance with the main indigenous sheep types of the study area. A semi-structured questionnaire, group discussion, field measurements and secondary sources were used to gather qualitative and quantitative data on sheep production system and husbandry practices. The result showed that most of the households heads are males (77.33%) and mixed crop-livestock system is their production system. The most frequent sheep types were the indigenous long fat tailed with dominant brown color identified as Horro sheep breed. Among the livestock species, sheep accounted for the largest proportion (46.18%) in the study area, and the average sheep flock size ranged from 8.80 in Debre Libanos to 10.14 in Wuchale. Breeding ewes accounted for the largest proportion in Debre Libanos (48.14%) and Wuchale (49.89%) districts. The major purpose of keeping male sheep across both districts was primarily for to be used as an income with an index ranging from 0.46 to 0.50, followed by meat with an index ranging from 0.16-0.18. Most of the farmers in Debre Libanos (63.3%) and Wuchale (51.3%) do not owned breeding ram. The major criteria considered for selecting breeding rams and ewes across the two districts was reported to be physical appearance/size. Natural pasture and crop residue were the main feed sources and rivers and spring water were main water source for sheep in the study areas. The estimated age at sexual maturity in Debre Libanos female sheep was 6.11 ± 0.53 months whilst 6.35 ±0.86 months in Wuchale. Average age at first lambing of 13.91 ± 1.50 months and 13.27 ± 1.41 months were reported for Debre Libanos and Wuchale sheep, respectively. The average lambing intervals for Debre Libanos and Wuchale ewes were 8.64 ± 1.20 and 8.51 ± 1.09 months, respectively. The average reported reproductive life span of ewes was 8.27 ± 1.22 years in Debre Libanos and 8.41 ± 1.26 years in Wuchale. On the average ewes produced 12.71 ± 2.39 lambs in her life time in Debre Libanos district and 12.83 ± 2.42 lambs in Wuchale district. Feed shortage and disease are the major production constraints in both districts. Majority of the ewes and rams across both districts had plain coat color pattern (57.42-64.67%) followed by patchy (29.33-38.71%). Majority of female and male sheep in the study areas had medium and smooth coat cover, and most of female had no horn. All the sampled sheep population in both districts has characteristics of long fat tailed type. Body weight of female sheep in age group 1(0PPI), age group2(1PPI) and age group 3($\geq$2PPI) were 24.3± 0.6 kg, 25.8±0.5 kg and 28.7±0.2 kg, respectively, and the values for males in the same age groups were 25.7±0.3 kg, 31.9±0.8 kg and 38.2 ±2.0 kg, respectively. Wuchale sheep (27.9±0.20 kg) were comparable with Debre Libanos sheep (27.6±0.2 kg). Debre Libanos sheep had significantly higher linear body measurements ($P < 0.05$) than Wuchale sheep population. Sex of the sheep had no significant ($P > 0.05$) effect on the body weight, ear length and rump length. The interaction of sex and age group was significantly ($P < 0.05$) influence all linear body measurements except ear length of the sheep. The interaction of age group and location was significant ($P < 0.05$) for all linear body measurements. Heart girth and body length were found to be the most important variables for estimation of body weight in sheep. For any breed improvement program and to boost productivity of indigenous sheep, characterization is the baseline so; this preliminary work could be used to support genetic analyses to determine variation between and within these small populations.

40. Evaluation of Awassi-Menz Sheep Crossbreeding Schemes at Amed Guya Sheep Breeding and Multiplication Center and Farmers Perception towards Cross Breeding

Demeke Haile, Solomon Gizaw and Kefelegne Kebede
Year: 2013

Abstract: The study was carried out in Basonawerena and Angolelatera districts and Amed Guya sheep breeding and Multiplication Center in north shoa zone of Amhara region. The objectives of the study were to assess the perception of the farmers on the distribution of crossbreds and to evaluate 1/4 Awassi 3/4 Menz, 3/8 Awassi 5/8 Menz crosses and purebred Menz sheep on growth performance including birth weight, weaning weight and six month weight. A total of 150 households were selected purposively to assess perception of farmers. Data were gathered through semi-structured questionnaire. The results showed that the major feed resources during dry and wet seasons were natural pasture and crop residue. The majority of the farmers in both districts (94.44% in Basonaworena and 93.33% in Angolelatera) provide special management for the crossbred lambs. The major diseases in both districts are Fasciola (liver fluke), pasteurolosis and sheep pox in order of importance. The primary trait preferences of the farmers in selection of rams in the two districts were appearance. The farmers preferred white coat colour in both districts. The unwanted colour was black. Farmers comparative ranking of crossbreds and local sheep showed that crossbred rams were better in growth, wool production, and appearance but have higher feed requirements, whereas locals were better in meat quality (taste) and resistance to disease in both districts. Analysis of the on-station data showed that birth weight of lambs did not differ significantly ($P > 0.05$), and it was 2.49 ± 0.03, 2.38 ± 0.04 and 2.37 ± 0.04 for Menz. 1/4 Awassi 3/4 Menz and 3/8 Awassi 5/8Menz lambs respectively. However, there were significant differences ($P < 0.05$) in weaning weight, six month weight and average daily gains (ADG) between purebred Menz and crossbred lambs, but not between the crossbreds. Weights at weaning for Menz, 1/4 Awassi 3/4 Menz and 3/8 Awassi 5/8 Menz, respectively were 9.29 ± 0.15, 10.35 ± 0.21 and 10.22 ± 0.21. The respective weights at six months were 12.60 ± 0.20, 16.12 ± 0.27 and 16.48 ± 0.28, and for Menz, 1/4 Awassi 3/4 Menz and 3/8 Awassi 5/8 Menz respectively. In birth weight, weaning weight and six month weight, males were heavier than females ($P < 0.05$). Males were heavier than females in ADG between birth and six months and also between weaning and six months. However, there was no significant difference in ADG between birth and weaning age. These results suggest that there is no significant differences in growth between 1/4 Awassi 3/4 Menz and 3/8 Awassi 5/8 Menz lambs. Therefore, it can be concluded that the Awassi crossbreeding program could follow the crossbreeding scheme with distribution of 1/2 Awassi 1/2 Menz rams. However, these results may have to be verified under village conditions. Furthermore, farmers assessment revealed that crossbreds have higher feed requirement and this indicates that crossbred ram distribution needs to be in full package, including improved feed production and health management components.

41. On-Farm Phenotypic Characterization of Indigenous Chicken and Chicken Production Systems in Horro and Jarso Districts, Oromia, Ethiopia

Eskinder Aklilu, Tadelle Dessie and Kefelegn Kebede
Year: 2013

Abstract: This study was carried out to generate information on village based indigenous chicken management practices, opportunities and challenges, the underlying factors that determine the choice of genetic stock used, to identify, characterize and describe the phenotypic variation of two indigenous chicken ecotypes together with egg quality analysis and carcass characteristics in Horro and Jarso districts, Oromia Regional State. The survey included both questionnaire survey and a participatory group discussion. In total, 200 households participated in the interviews, which were conducted using a structured questionnaire and for phenotypic characterization four hundred forty eight individual chickens (138 female and 86 male from Horro, 68 male and 156 female from Jarso) were characterized under field conditions to describe qualitative and quantitative traits following standard chicken descriptors. Descriptive statistics (frequency procedure), Generalized Linear Model (GLM) procedures and multivariate statistics were used to analyze the data. The result revealed that the mean flock size of chickens per household was 7 and 6.3 (ranged 2-28) with the average male to female ratio of 1:2.1 and 1:3.2 in Horro and Jarso, respectively. Scavenging was the major feeding system encountered in both districts with some sort of supplementary feeding mainly home grown grains and household food leftovers. The majority of the respondents (92.06%) indicated that they keep their chicken at various night sheltering places in the main house including: perches inside the house (77.89%) and perches in the kitchen (11.56%). The average age of cockerels at first mating and pullets at first egg were 6.75 months and 7.10 months, respectively. The average number of eggs laid/clutch was 13.97 and the number of total clutch periods/hen/year was 3.94, accordingly the annual egg production performance of local hens, under farmer's management condition, was 55 eggs/hen/year. The results of the rankings had shown that Seasonal diseases outbreaks mainly Newcastle disease and predator were the major and economically important constraint for the existing chicken production system of the districts and village chicken owners used only traditional means to treat sick birds. The result in this study revealed that farmers gave more emphasis on reproductive traits, plumage color and comb type than monogenic qualitative and adaptive traits. Hens predominantly selected on the bases of egg production, and followed by mothering ability, hatchability, large body size and color while cocks predominantly selected based on body size, sexual desire, plumage color and comb type. Regarding body plumage color brown and red body plumage colors were identified as the two important component traits used for selecting on the basis of body plumage for hen and cock, respectively. Large phenotypic variability among ecotypes was observed for plumage color. A total of 19 plumage colors was identified in both districts in which brown mottled (20.7%) and red (16.4%) were the predominant color of the body from the local ecotypes, beside a large diversity, other plumage color including: white-laced black, black-laced white, multicolor, golden yellow mottled also observed. Most of the local chickens had white (73%) skin color followed by yellow (25.3%) and bluish black (2%). Variations were also observed in qualitative characteristics such as shank color, eye color, and earlobe color and comb type. The average body weight of local hens in Horro and Jarso ecotypes were 1,289 and 1,116 gm respectively, while the respective values for mature male were 1,692 and 1,429 gm. Variations were also observed in quantitative characteristics such as shank length, back length, breast circumference, body length, keel length and wingspan The study revealed that body length, shank length, keel length, back length, comb height and breast circumference could best be used to show the morphological variation of cocks in the study site, whereas in hens shank length, body length, comb width and body weight were best discriminating variables. All squared Mahalanobis' distances obtained between ecotypes for female and male population were

significant ($P < 0.01$), indicating the existence of measurable differences between the two ecotypes. Light brown egg color was met with a higher frequency in Horro ecotypes than Jarso ecotypes (54% vs 40%) and it was followed by cream color, largely more represented in Jarso (40%) than in Horro (26%) while, white shell color in Horro and brown shell color in Jarso found to be absent. The mean egg weight was 42 g and the average egg shape index percentage in both districts shows similar pattern of 74.1 %. . The mean shell thickness obtained in the present study was 0.31 mm in Horro and 0.24 mm in Jarso. Regarding Haugh unit a higher value was obtained for eggs collected from Jarso (77.38%) so, it can be concluded that eggs from Jarso had good quality compared from Horro (55.93%) as for Horro average Haugh unit value (<72) might be attributed to poor handling and storage of eggs until sale or genetic differences between ecotypes. The average slaughter weight of indigenous cocks in Horro and Jarso were 1,296 gm and 1,183 gm with carcass weight of 820.5 gm and 745.8 gm, respectively. Accordingly the mean dressing percentage of indigenous cocks was 63.44% in Horro and 62.63% in Jarso. The present phenotypic information complimented with genetic analysis may serve as a basis for designing appropriate conservation, breeding and selection strategies.

42. Phenotypic Characterization of Indigenous Afar Goat Breed and Husbandry Practices of Pastoralists in Afar Region

Seifemichael Mamo, Kefelegn Kebede and Negassi Ameha
Year: 2013

Abstract: The purpose of this study was to describe the qualitative and quantitative traits of the extensively managed indigenous Afar goat breed, the production environment and the traditional husbandry practices of pastoralists in managing the breed in Gewane and Amibara districts of Afar region. Purposive and random sampling techniques were employed to select sample PAs and respondent households. Ranges of participatory rural appraisal (PRA) tools, semi-structured questionnaires were used to collect data from 192 households. Linear body measurements (LBMs) and physical feature observations were collected from 800 goats. Three age categories, based on dentition were examined: milk (0PPI), young (1PPI), and adults (≥2PPI). Generally, the present study revealed that the flock structure of Afar goat were mainly based on maintaining large number of female goats. Types of goat houses were not varying throughout the year. Breeding was not controlled in both districts. Indigenous Afar goats were reach sexual maturity at about 6 to 12 months of age and give birth for the first time at about 12 to 18 months of age with a kidding interval of at about 7 months. Generally Pastoralists practiced selection of breeding flock based on body condition, growth, pedigree and premium dairy characteristics. Based on the dimensions identified the sample goat population in Gewane district clustered together uniform coat color pattern, black coat color type, medium hair length, and absent of toggle, whereas, the sample goat population in Amibara district clustered together with pied coat color pattern, grey coat color type, short hair length and presence of toggle. Phenotypic correlations among body weight and LBMs were positive except ear length of males. The estimated optimum regression model for predicating the mean body weight of male Afar goat breed was $y= -17.29+ 0.35BL+0.45CG-0.14RH$ with R^2 value of 0.883 and for female was $y= -16.27+ 0.13BL-1.94(0PPI)$ and $y=-16.27+ 0.13BL-1.13(1PPI)$ with R^2 value of 0.797.

43. Characterization of Hararghe Highland Goat and Their Production System in Eastern Hararghe

Mahilet Dawit, Kefelegn Kebede, Yoseph Mekasha and Sanjoy Kumal Pal
Year: 2013

Abstract: This study was conducted to undertake characterization of Hararghe Highland goat and their production system in Eastern Hararghe, to undertake phenotypic characterization of Hararghe Highland goat, to identify farmer's trait preferences, their breeding objectives, breeding practices of goat keepers in Eastern Hararghe and to study haemoglobin and serum albumin polymorphism of Hararghe highland goat. Data were collected through questionnaire, focal group discussion, field measurement and blood sample. A total of 648 goats were used for measurement, 450 households for interview and 108 blood samples. Using samples of goat blood variation / similarity in their blood proteins, haemoglobin and albumin were studied based on horizontal gel electrophoresis. Data collected via questionnaire were analyzed by descriptive statistics. Chi–square test was employed for categorical data. Indexes were calculated to provide ranking. General Linear Model (GLM) procedure of SAS (2003) was employed on metric data to study sex, district and age class effect. The effects of Age, sex and District were expressed at least square means (LSM) ± SE. Correlation between body weight and linear body measurements were computed for the population within each sex in one age group. The REG procedure of SAS (2003) was used to regress body weight from linear body measurement for male and female goats. Multivariate analysis was conducted using quantitative variables for mature female and males separately. Among the multivariate analysis canonical and discriminant analysis were employed. Gene and genotypic frequencies were established by direct counting from the phenotypes. The mean goat flock structure in the study area was 7.91 ± 0.23 in Meta, 8.11±0.33 in Babbile and 8.36±0.36 in Gurawa district. According to the respondents, they keep goat for multipurpose use namely for saving, income, manure, ceremonies, milk, meat and skin respectively. The survey result indicated, that the trait preference of farmers was body conformation of the animal, absence of horn and Growth rate were ranked 1st, 2nd and 3rd , respectively, by farmers in Meta and Gurawa districts; while in Babbile district Size / appearance, absence of horn and color ranked 1st, 2nd and 3rd. Cat geraba and crop residue was the main feed source during dry season both in Meta district (Index=0.26) and Gurawa district, while natural pasture is the main feed source during dry and wet season in Babbile. The overall mean of age at first service for Hararghe highland female goat was 10.81±0.13 month and for male 12.67±0.09 month, Age at first parturition 15.80 ± 0.13 month, average reproductive life time of doe 7.45 ± 0.09 year, average parturition interval 6.56±0.04 month and average weaning age of kids 4.38±0.05 month. In the study area uncontrolled mating system is significant in all study area, while 20.89% of respondents were practiced controlled mating system by physical restriction and tethering of female goat during oestrus period. The LSM ± SE for the effect of sex male goat were consistently higher than females and district was found to strongly affect body measurements while Body Weight and Heart Girth were not affected by location of the animal. Positive correlation ($P < 0.05$) between body weights, height at whither, heart girth, body length, chest depth, while tail length were not significant ($P > 0.05$). The highest association between chest girth and body weight were observed (r=0.74, 0.84) for male and female population, respectively. On the basis of multivariate analysis, across the sample populations, all squared Mahalonobis' distance obtained were significant ($P <.0001$), where the largest distance was found between the population, i.e. the population sampled from the same agro ecology were homogenous. Gene frequency of the Hb-A was 0.93 and that of Hb-B was found to be 0.07. Albumin part gene frequency of the Alb-A was 0.98 and that of AlB-B was 0.02. In both cases, the observed genotype frequencies were not in Hardy Weinberg equilibrium. It was concluded, across all the study districts, there was similar management practices and trait preferences. The analyses (Univariate, correspondence, and multivariate) showed that goat population from Babbile district were different from Gurawa district. The molecular analysis showed that goat population from Babbile were different from Meta and Gurawa district while similar phenotype were observed for Meta and Gurawa population.

44. On-Farm Phenotypic Characterization of Native Sheep Types and Their Husbandry Practices in North Wollo Zone of the Amhara Region

Tassew Mohammed, Kefelegn Kebede and Yoseph Mekasha
Year: 2013

Abstract: This study was aimed to generate organized information on physical characteristics, selective breeding objectives, traits preferences and production system of native sheep types in Habru and Gubalafto districts of North Wollo Zone under smallholders' management conditions. The study was performed based on household survey and field measurements. For household survey, 180 households were involved whilst body measurements were taken from 450 sheep of both sexes. Dentition was used to estimate the age of the sheep. Among the livestock species, sheep accounted for the largest proportion in the study area and the average sheep flock size was 7.02 in Habru and 18.08 in Gubalafto. The primary reason of keeping sheep was for cash income in both Habru and Gubalafto. Growth rate, body size, coat color, tail type and mating ability were the most frequently reported traits in selecting breeding rams across the two districts; whereas lambing interval, mothering ability, coat color, body size and twinning rate were mentioned as traits given due emphasis in choosing future breeding ewes. The production constraints in order of importance as perceived by farmers were: feed shortage, diseases and parasite prevalence, land shortage and poor performance in Habru. Similar production constraints were recorded from Gubalafto districts except for land shortage and genotypes which were ranked as 4th and 3$^{rd.}$ In the Habru sheep, unlike to Gubalafto, coat hair type is hairy and it is short. The fat tail has wide base and reaches near the point of hock. Horn is absent in 90% of the males and 100% females. Majority of the animals have plain brown coat color (40.9%) and they are docile in temperament. Average observed heart girth, wither height, body length and scrotal circumferences for male sheep were 73.4, 63.5, 59.7 and 22.7 cm, respectively, while that for female sheep, was 67.5, 57.4 and 55.9, respectively, and male sheep in the same district weighed about 28.1 kg whereas female sheep weighed about 24.0 kg. Indigenous sheep in Gubalafto, however, had mainly plain coat color pattern (67.5%) and about 35.7% of the sheep showed black coat color type. The body is compact and mostly covered with coarse medium hair with a wooly undercoat. About 87.5% of rams have curved horns with backwards as the dominant horn orientation while ewes are usually hornless. Average observed heart girth, wither height, body length and scrotal circumferences for male sheep were 70.0, 64.7, 57.4 and 24.5 cm, respectively, while that for female sheep it was 66.6, 61.8, and 53.2 cm and male sheep weighed about 25.9 kg whereas female sheep weighed about 22.6 kg. For males and females, most individuals were classified into their source population. The present phenotypic information could be complemented with genetic analyses; and serve as a basis for designing appropriate conservation, breeding and selection strategies for sheep. To realize full benefits of a breeding strategy; approaches should be holistic with concurrent improvement in the non-genetic factors (disease resistance and feed efficiency) as well.

45. On-Farm Phenotypic Characterization of Hararghe Highland Sheep and Their Production Practices in Eastern Hararghe Zone, Ethiopia

Wossenie Shibabaw, Kefelegn Kebede and Yoseph Mekasha
Year: 2013

Abstract: The study was carried out in Metta, Gorogutu and Deder districts of eastern Hararghe zone. The objectives of the study were to undertake phenotypic characterization of Hararghe highland sheep under farmers' management condition, to describe production practices and production constraints and to evaluate breed and trait preferences of the sheep owners in the study area. A total of 360 households were selected purposively for characterization of the production practices and 585 mature sheep were sampled randomly for characterization of phenotypic traits. Data were gathered through semi-structured questionnaire, focus group discussions, field observations and linear body measurements of sample populations. The Sampled sheep were identified by sex, age and district. The result of the study showed that the major feed resources during dry and wet seasons were natural pasture and crop residue. The most important trait preferences of the farmers in all the three districts were, appearance, tail type and color with this order. In the study area, there is also black head Somali sheep breed distributed in lower density but the farmers prefer Hararghe highland than black head Somali sheep. According to them this is because of its slow growth rate in the existing production environment, poor cold tolerance and lower market value. The dominant coat color pattern in the sampled male and female populations were plain while the most observed coat color type was light brown followed by light brown with white patch; Sex of animals had significant effect on all of the body measurements. Matured males were heavier than females (31.6 kg vs. 26.5 kg) and had higher chest girth (80 cm vs. 74.5 cm), height at withers (62.4 cm vs. 59.1 cm), and body length (62.7 cm vs. 56.7 cm). District effect was not significant ($P > 0.05$) for most of the body measurements except the observed higher body weight in Metta than Deder district. Dentition classes of animals contributed significant differences to body weight and most of the linear body measurements. Body weight and most of the linear body measurements increased with age up to the third dentition and started to decline at four dentition class. The result of the multiple regression analysis showed that chest girth alone could accurately predict body weight both in female and male Hararghe highland sheep with the equation $y = -22.16 + 0.65x$ for females and $y = -43.24 + 0.94x$ for males, where y and x are body weight and chest girth, respectively. The result of the multivariate analysis showed that the sheep populations from the three study districts are almost homogenous. As a conclusion, the result of this study may provide preliminary information for further research, either genotypic or molecular level characterization of Hararghe highland sheep which would be undertaken to investigate characteristics of the sheep type and estimate its genetic potential.

III. Range Ecology and Management

1. Assessment and Utilization Practices of Feed Resources in Basona Worana Wereda of North Shoa

Ahmed Hassen, Abule Ebro and Mohammed Yosuf
Year: 2006

Abstract: A study with the objectives of assessing and evaluating the utilization practices of different feed resources and pasture condition determination was carried out in Basona Worana Wereda situated in North Shoa Administrative Zone of the Amhara National Regional State, Ethiopia. The utilization practices of different feed resources were studied using group discussions, structured questionnaire and personal observations while the condition of the pasture was assessed using different vegetation and soil parameters. Furthermore, assessment of the chemical composition of major feed resources was also undertaken. The size of the grazing land and their dry matter yield obtained was found to be decreasing from time to time due to expansion of farmland, and continuous grazing with large size of herd. Consequently, the feed obtained from the grazing land was inadequate both in quality and quantity. Therefore, raising the pasture land productivity by adopting sound management practices, growing productive and nutritious forages in association with food crops and identifying and correcting the most limiting feed nutrients using supplements are among the options for resolving animal feed shortages. Although crop residues are the major feed resources in the study area, their use for livestock feed has been hindered by many problems such as economic problems and inadequate know-how in handling and processing these resources. Thus, training of farmers about methods of collection, storage and treatment of crop residues, principles of supplementation are suggested as vital measures that might lead to efficient utilization of these low quality feed resources. For effective implementation, the involvement of the government in terms of improving the financial capabilities of farmers and their improved technologies related to feeding crop residues is suggested as an important strategy. Chemical analysis on crop residues indicated that they have low crude protein (CP) content (2.92-6.80) and are composed of high lignin content ranging from 8.53 to 15.85. Despite such

2. Floristic Composition and Diversity of the Vegetation, Soil Seed Bank Flora and Condition of the Rangelands of the Jijiga Zone, Somali Regional State, Ethiopia

Belaynesh Debalkie, Lisanework Nigatu and Abule Ebro
Year: 2006

Abstract: A study was conducted in Jijiga, Kebribeyah and Harshin districts of the Jijiga zone, Somalia Regional State of Ethiopia, with the objectives of studying the species composition and diversity of the vegetation cover, the composition and density of plant species in the soil seed bank and extent of rangeland degradation based on the vegetation and soil condition. A single visit survey was conducted in the study area to document the pastoralists' perceptions on overall livestock and rangeland management practices through visual observation, group discussions and structured questionnaire. A total of 34 quadrats, in 17 sampling sites, each measuring 20 m x 20 m (400 m^2) were laid out, at an interval of 5 Km along two parallel transects, each 90 Km long that run east–west and 400 m apart from each other, in order to collect data on the herbaceous and woody vegetation covers, the soil condition and seed bank flora. Descriptive statistical analyses of both the preliminary and secondary data demonstrated that the rangeland has been deteriorated over time and space mainly due to overgrazing, drought, shortage of and erratic rainfall and tree cutting, which in turn affected the livelihood of the local pastoralists and agro pastoralists in the study area. There was significant ($P < 0.05$) difference for soil erosion and compaction among the sample sites. The study has also indicated that significant ($P < 0.05$) variations between sample sites for the basal cover, grass species composition, age category and dry matter biomass of the herbaceous species. A total of 27 species of grasses and 43 non-grasses species, which belong to 24 families, were identified and the floristic composition and diversity of the herbaceous vegetation cover (grass species) was significantly different ($P < 0.05$) between sites. A small number of grass species were dominating the rangeland in most of the degraded sample sites. However, in relatively better study sites 1, 2, 11, and 13, most of the important grasses species such as: C.aucheri, C.dactylon, C.iliaris, D.aegyptium, D.annulatum, L.senegalensis and P.coloratun were found in a better proportion. While A. mutabilis, D. adscendens, D. abyssinicum, E. haplochoides, E. cenchaides, E. tenuifolia, H. minor, H. hirta, P. atrosandguneum, P. glabrum, S. vertcillata, S. pyramidalis and T. heptahuron occurred frequently forming the major proportions of the herbaceous layer in the other 13 study sites. The grass dry weight of the study sites ranged from 220.45 - 1293.41 g m^{-2}. In the study sites a total of 25 woody species were recorded and the One-Way ANOVA showed that significant ($P< 0.05$) difference between the sample sites for number of trees/shrubs, species composition and crown area coverage. A. etbaica and A. nilotica were the common and frequently occurring trees/shrubs in most of the study sites and most of the trees/ shrubs recorded were from less grazed sites 1, 2, 11 and 13. Correlation analysis revealed that the number of trees/shrubs has significantly influenced the tree/shrubs composition, grass species composition, basal cover and age distribution. Besides, the tree/shrub crown cover negatively affected the grass species composition and basal cover. It was revealed that a total of 737 seedlings belonging to 40 species and 14 families were recorded from soil seed bank germination study. The species composition of the seed bank was dominated by forbs (80%) and only one tree (Croton macrostechys) germinated from all 34 quadrats each with three soil depth layers. Two- way ANOVA revealed that a significant ($P < 0.05$) difference of seedling densities and composition both between the sites and along the soil depth layers. Seedling density in the study sites and along the soil depth layers ranged from 187-857 seeds m^{-2} and 881-6052 seeds m^{-2} respectively. There was lower similarity between the species composition and size of seed banks and the standing vegetation (Jaccard index of similarity = 17%). Moreover, the number of species in seed bank and in the standing vegetation was also poorly correlated ($rs = 0.014$). Taking in to account all the above mentioned variations between sample sites, it may therefore, be suggested that most of the sampled sites have shown the highest level of soil and vegetation cover degradation as well as low seedling size and composition of soil seed bank flora. Therefore, necessary interventions are recommended, in addition to general improvement of the rangeland condition in the sample sites of the study districts, in particular, and the Jijiga zone in general.

3. Impact of Land use/Land Cover Dynamics on the Ecology of Borana Rangelands, Ethiopia

Getachew Haile, Mohammed Assen and Abule Ebro
Year: 2006

Abstract: Reliable land use/ land cover information/ database are needed for timely monitoring land use/ land cover changes and trend forecasting. In this study, three activities were undertaken in two purposively selected districts in Borana lowland, Ethiopia, with objective of determining land use/land cover changes and their impact on the ecological characteristics in order to come up with possible recommendations of the potential and limitations of the existing land use type to minimize further degradation. The rangeland use/cover changes were studied using remote sensing data such as aerial photographs of 1966/67 and 1986/87, and ETM+ land-sat satellite imagery of year 2002. The images were exported to Arc-view GIS software for change detection analysis after all the digital image processing was thoroughly done in ERDAS Imagine 8.6. Vegetation samples were collected from four sites stratified into two altitude zones. These were, highland (>1500 masl) and lowland (<1500 masl). Different rangeland use systems that had impact on rangeland conditions were considered for investigations of their influence. Data analysis was done using General Linear Model (GLM) and regression procedures of SAS computer software and descriptive statistics for analysis of range condition factors and overall rangeland condition. This study also appraises the effects of land use/ land cover on soil properties. Soil samples were collected from major land use/ land cover types in the study area at two-altitude zones. These were, communal grazing land, enclosures cultivated land, bare land, and surrounding watering points. Two government ranches were also incorporated in the study. Soil samples were taken at a depth of 0-20 cm in all land use/ cover types and analyzed for the range of soil properties. The pastoralist's perception of the rangeland use/cover changes were studied through group discussion and by using a structured questionnaire where the head of encampment (Aba Olla's) was taken as a unit of analysis (60 household, ten per peasant association). The results of the GIS analysis showed a great increase in woody cover (7%) in Yabello and 15% in Areero sampling site. Areas under cultivation, bare land, and settlement increased by 2%, 5%, and 3% in Yabello site, respectively. The changes were 6%, 7% and 6% in Areero sampling site in the last three to four decades. On the contrary, the grass cover showed great decline by 8% and 34% in Yabello and Areero sites, respectively in these periods The assessment of range condition was based on the botanical composition of herbaceous layers, basal cover, litter cover, relative number of seedling, age distribution of the dominant grasses and on soil conditions (erosion & compaction). The overall result showed that different grazing systems had significant effects on rangeland conditions. The total rangeland condition score was higher in ranches (30.87±2.89) and lower in warra grazing areas (19.78±5.99) and in the selected ponds (18.42±6.06). Soil characteristics showed higher sand content (62-84%) and lower clay fraction (2-14%). Silt content was higher for Dida Tuyura ranch (24%). The organic content of all land use/ cover types were very lower except for Dida Tuyura Ranch (5.42%). The Bulky density of soils for all land use/ land cover types was higher except for Dida Tuyura Ranh other land units. The total nitrogen (0.29%)) and available phosphors (19.5 ppm) were higher in Dida Tuyura ranch. All the pastoralists (n=60) interviewed considered that in the past they had an excellent rangeland condition with good plant composition and growth. The current condition indicated deteriorating and which further complicated traditional management systems. The view of pastoralists suggested that the deteriorating conditions of the current rangelands as compared to the one in the past was due to drought, bush encroachments, over grazing and mismanagement of rangelands. The study area has faced a land use/cover changes over the last thirty-forty years. A large portion of the grassland had been changed into woody cover in-terms of vegetation due to increase in the density of bushes/shrubs. Moreover, areas had been degraded in-terms of vegetation as a result of decrease in grass cover due to over grazing and clearing for cultivation. Soil erosion had been gone worse due to grass cover removal. In general, declining grass cover, increase in bare land cover and abandonment of cropping fields were the outcomes of the recent settlements, expanding cultivation and recurrent droughts in the study area.

4. Effects of Seeding Rates and Harvesting Stages on Forage Yield and Quality of Triticale (X *Tritico secale* Witt Mack): Vetch (*Vicia vilosa* R.) Mixture under Rain fed Conditions of Dembia Area of North Gondar Zone, Ethiopia

Malede Birhan and Berhan Tamir
Year: 2006

Abstract: The experiment was carried out to assess forage yield and quality of triticale (X *Triticosecale wittmack*) and vetch (*Vicia vilosa* R.) mixture grown under different seeding rates and stages of harvesting during 2004 cropping season at Dembia Woreda, Northwestern Ethiopia. The objectives of the research were to evaluate the optimum stages of harvesting and seeding rates for the maximum biomass production and biological compatibility as well as to evaluate forage chemical composition of triticale/vetch in the mixture and pure stands. The experimental design employed was a split plot design with three stages of harvesting (boot, milk and dough stages) as a main plot and five seed proportions in the ratio of (triticale /vetch) 100:0 (SP1), 75:25 (SP2) 50:50 (SP3) 25:75 (SP4) and 0:100 (SP5) as a sub plot and replicated three times. The plot size was 2 x 5 m subplot and 12 m x 5 m as main plot treatments. Data was subjected to analysis of variance using MSTATC statistical procedure for morphological characteristics and forage yield and quality parameters. Higher forage DMY of the mixture 11.85 t/ha was observed at HS3 and SP3. SP3 for triticale was found to have slightly higher ($P<0.01$), leaf area, leaf length and leaf to stem ratio than the other SPs. Relative yield total (RYT) was also found to be more than one in all HS at SP3. In SP3 at HS2, the highest value of 1.72 indicating yield advantages of 72% for triticale/vetch mixture as compared to sole cropping of either of the two forage species. The highest CP of 24.15% was recorded at HS1 and SP5 followed by CP of 22.37% at HS1 and SP3. Highly significant variation ($P<0.01$) CP yields of 1.55 t/ha were obtained at HS2 in SP3. In all observation the higher the vetch, proportion the relatively lower the neutral detergent fiber (NDF) up to (50: 50) ratio. Contents of ADF were high at HS3 and SP1. Acid detergent lignin (ADL) was found to be higher at HS3 and SP1 and the lowest value was obtained at HS1 and SP3. In general, the fiber contents were increased with increasing the stages of harvesting as a whole. In vitro dry matter digestibility (IVDMD) was higher with the value of 78.5 at HS1 and SP5 and followed by HS1 at SP3 with the value of 72%. The highest metabolizable energy value was recorded at HS1 and SP3, digestible CP was also higher at HS1 and SP3, with the value of 3.57%. With all these findings the experiment result of this study, the combination of SP3 and harvesting at milk stage could be considered as the best association of triticale/vetch for forage mixture as it resulted in highest CP yield, leaf area, leaf length and leaf to stem ratio, IVDMD, high in RYT especially aggressivity index becomes zero at HS2 and SP3 and better DMY would be a Benefit for forage biomass production in the mixture.

5. Traditional Utilization Practices and Condition Assessment of the Rangelands in Rayitu District of Bale Zone, Ethiopia

Teshome Abate, Abule Ebro and Lisanework Nigatu
Year: 2006

Abstract: A study was conducted in Rayitu district of Bale zone, Oromiya Regional State, with the objectives of assessing the traditional rangeland utilization practices, identifying and describing the herbaceous and woody vegetation composition and determining the condition of the grazing lands. The traditional pastoralists rangeland utilization practices was assessed through structured questionnaire (90 households), group discussions and visual observations. To study the condition of the rangelands, the district was stratified by altitude (765 to 1070 m and >1070 to 1350 m) and grazing types (communal, enclosures and benchmark grazing sites). Data on grass species composition, basal cover, litter cover, number of grass seedlings, age distribution of grasses, soil erosion, soil compaction and woody parameters such as density, plant height, canopy cover and hedging were gathered .Pastoralism (35.5%) and agro-pastoralism (63.3%) were the dominant production system in the study district. Livestock are the main assets of the community upon which the livelihood of the pastoralists depend. The sale of livestock and livestock products (86.7%) was the main source of income. Free grazing of communal land, use of enclosure during the dry season, division of herds based on species, migration during dry and drought period and seasonal assessments of the condition of range land were the basic traditional grazing practices of the pastoralists in the study district. Migration was the first measure taken to cope up with shortage of feed, water and drought. Most respondents indicated that migration was undertaken with full of hardship. About 91% of the pastoralists indicated that the condition of their rangelands was poor and the main problems were drought, overgrazing and bush encroachment. In the district, pastoralists use woody plants for a wide range of uses. Use for construction followed by browse and medicinal values were among the major ones. About 80 % of the respondents replied that the status of woody vegetation cover has declined. Drought (52.8%) and deforestation for the expanding farmland (39.4%), and construction (26.8%) were reported to be the major causes. Over 86% of the respondents replied that compared to past, their grazing lands are now covered with bushes and shrubs. Drought and overgrazing were reported to be the main factors for bush encroachment. A total of 44, 2, 2, 8 and 45 species of grasses, legumes, sedges, other herbaceous plant and woody species were identified in the district, respectively. Aristida adscension, S. panicoides, S. pyramidalis, and T. berteronianus were the frequent species in the communal grazing lands, whereas A. vestita, C**.** ciliaris, S. panicoides, S. pyramidalis, and T. cencriformis were the frequent and/or most frequent species in the enclosure**.** In the benchmark grazing sites, B. radicans, C. ciliaris, C. dactylon, E. tenuifolia, P. maximum and S. pyramidalis were the frequent and/or most frequent species**.** Furthermore, A. tortilis, A. bussie, C. collinum and C. erythraea were the common and/or dominant woody species in the communal grazing area, whereas A. bussei, A. mellifera, A. oerfota, A. senegal, A. tortilis, and C. erythraea in the enclosures. A. bussei, A. seyal, A. tortilis, C. collinum and G. penicillata were the common and/or dominant species in the benchmark sites. About 18% of bare ground area was recorded in the study district, the highest was in communal (21.76%) while the lowest in benchmark (14.13%). The mean woody density in communal, enclosure and benchmark sites of the study district were 2,651.05, 2,667.2 and 2,041.7 plants per hectare, respectively. Thus, the wood species density indicated that communal and enclosure grazing sites were bush encroached. The study also showed that total dry matter biomass (DM), DM of grass, and DM of highly desirable grass species were significantly ($P \leq 0.05$) higher in benchmark (1,332.72, 1,144.90 kg/ha and 611 Kg/ha) followed by enclosures (695.47, 350.31 kg/ha and 102 kg/ha) which is significantly ($P \leq 0.05$) higher than in the communal (491.3, 119.6 kg/ha and 21.40 kg/ha). Mean total range condition score in the communal, enclosure and benchmark grazing sites of the study district were 23.40 $\pm$1.35, 39 $\pm$ 1.35 and 50.42 $\pm$0.9, respectively. Thus communal, enclosure and benchmark grazing sites were classified as poor, fair and good condition, respectively. Both the household and the field vegetation studies confirmed that the condition of the communal grazing land has deteriorated and there might be a need for further improvement. The enclosure sites of the study district were in transitional state from poor to fair condition, which also needs further improvement intervention while the benchmark sites need maintenance of their present condition. Therefore, appropriate interventions should be planned to improve the rangeland condition of the study district.

6. Plant Species Composition, Biomass Production and Condition Assessment in Montane Grasslands of Kokosa District of Bale, South Eastern Ethiopia

Bekele Mechalu, Lisanework Nigatu and Abule Ebro
Year: 2007

Abstract: The study was conducted in Kokosa district, Bale zone, Oromia Regional State of South eastern Ethiopia. The objectives of the study were to investigate the plant species composition, aboveground plant biomass production and assess the present grassland condition and traditional grazing land management practices based on vegetation and soil parameters and agro-pastoralists' perception of the study district. Vegetation, soil and household data were collected by stratifying the district into three different land use systems based on secondary data and physical observations of the area. A single visit formal survey was conducted to document the perceptions of agro-pastoralists on overall livestock and grassland management practices using group discussion, structured questionnaire and visual observations. Vegetation and soil data were collected from four grazing areas of the respective land use systems (dominant livestock-enset, enset-livestock and enset-livestock-cereal). Furthermore, assessment of the major soil chemical and physical properties was undertaken. Based on the descriptive statistics, the average family size per household in the district was 9.3 with 3.2 ha of land holding per household. The overall mean grazing area per household was 1.8 ha which accounted for 56.6% of the size of the total land holding. The mean ratio of land holding to total family size in the district was 0.39 ha. The average livestock holding per household was 13.8 TLU. The overall share of animal for individual person in the district was about 3.1 TLU. Natural pasture was the major feed resources in the study district accounting for about 84.5% of the feed resources. Pasture enclosure (kalo), rotational grazing, kraal rotation method of grassland fertilization, seasonal animal movement, sale disposal of animals, pastureland renting, enset leaves and foliages supplementation were among the basic traditional grazing land management and feed conservation practices in the district. A total of 34 species of grasses, 4 species of legumes, 3 species of sedges and 9 species of other herbaceous plants (forbs) that belonged to 11 families were identified in the study district. The desirability of the plant species was determined based on the opinion of agro-pastoralists on the palatability of plant species to livestock and succession theories of Dyksterhuis (1949). Poaceae family comprised about 68% of the total species identified with 58%, 24% and 19% of highly desirable, desirable and less desirable species, respectively. Majority of the grass species in the district shared the three land use systems and few grass species were found dominating most of the grazing areas regardless of the land use and grazing types considered. There was higher percentage of least desirable grass species in dominant livestock-enset land use system, which might be attributed to the dominance of least desirable Pennisetum schimperi. The two-way analysis of variance also showed that grassland condition of the district was good to excellent in benchmark sites, good in enclosures (kalos) and fair both in stream bank and communal grazing areas. About 16.67%, 33.33% and 50% of the sampled sites in the district were in excellent, good and fair grazing conditions, respectively. The grassland condition in enset-livestock-cereal land use system was found to be better than that of the dominant livestock-enset and enset-livestock land use systems. The differences between land use systems might be attributed to the differences in grazing intensity and management inputs undertaken by agro-pastoralists. The aboveground biomass of plant species varied with the intensity of grazing pressure with peaks of biomass production at light grazing pressure. Significantly higher ($P < 0.05$) grass dry matter biomass and total dry matter biomass were obtained in enset-livestock-cereal land use system. The mean species richness in a sample quadrat of 1 m^2 in the study areas was varied slightly across grazing types and land use systems. Significantly the highest ($P < 0.01$) richness was observed in enclosures followed by communal grazing areas while significantly ($P < 0.01$) the least richness was observed in benchmark sites. The sampled soil in the study district was found to be loam in textural class. The pH was strongly acidic ($pH < 5.5$) with low available phosphorus and total nitrogen (N) content in the soil. High OM content of soils was found throughout the sampled grazing areas of the district that might be attributed to the cool temperature of the area that might have reduced the decomposition of OM in the soil. Both household and vegetation studies indicated that conditions of both communal and stream bank grazing areas were deteriorated which may call for an immediate improvement intervention. The enclosure areas were in transitional state between fair and excellent condition indicating the need for further improvement while the benchmark sites need a sustainable conservation of their present condition.

7. Species Composition and Seed Bank Flora in Montane Grazing Lands of Eastern Zone of Tigray, Ethiopia

Gebrewahd Amha and Lissanework Nigatu
Year: 2007

Abstract: The study was conducted in Kiltew awelaelo wereda eastern Tigray, Ethiopia. The study aimed at assessing species composition, diversity, and density of standing vegetation and soil seed bank flora, comparing standing vegetation and soil seed bank flora, and determining the woody vegetation regeneration trend. A total of 45 quadrats measuring 20 m×20 m (400 m^2) were laid out in 15 sample sites from three corresponding land use types (i.e. ten year enclosure, five year enclosure and open grazing land). From each land use type five sites having 3 quadrats were investigated. Each quadrat was laid out at an interval of 400 m in five parallel transects each 200 m apart from other. In order to collect data on the herbaceous and woody vegetation covers, soil condition and soil seed bank were sampled. There was significant ($P < 0.05$) difference for soil erosion and compaction between the land use types, high degree of soil erosion and compaction exhibited in the open gazing land use. The study was also revealed that significant ($P < 0.05$) variation occurred between land use types in grass species composition, basal cover, age category, and herbaceous richness. Relatively higher mean values were recorded for all these parameters in the ten year enclosure land use type and intermediate value scored in five year enclosure followed by those in the open grazing land use type. A total of 23 species of grasses and 53 none-grass species were recorded and very few grasses occurred in open grazing land use type. Whereas in the two enclosure land use types important grasses such as Bracharia Sp, Bromus pectinatus, Chloris gayana, Cenchurs cilarias, chloris radiata, Cynodon dactylon, Dactyloctenium aegyptium, Digitaria Velutina, Eragrostis teniufolia, Lintonia nutans, Setaria pumila, Seteria verticillate, and Tragus racemosus all occurred frequently forming the major constituents of the sites . In all sample sites of the three land use types 30 species represented in 18 families of woody (trees/shrubs) species were identified. There was no significant ($P < 0.05$) variation in woody species composition and crown coverage. Crown coverage was positively correlated with grass species composition and basal cover, while the number of trees and shrubs significantly ($P < 0.05$) varied between land use types and least mean value was recorded in open grazing land use type. Whereas relatively adequate proportion of important woody species such as Acacia ethbacia, Oncoba spinosa, Dodonaea angustifolia, Euclea schimperi, Maytenus senegalensis, Rhus vulgaris, Senna singueana, Grewia ferruginea and Lucas oligocephala were recorded in ten year enclosure land use type followed by the five year enclosure lan use type. The study revealed that, a total of 1949 seedlings belonging to 65 species and 29 families germinated in the green house experiment. The forbs comprised 60.66%, grass 16.66%, legumes 13.11%, trees/shrubs 4.80%, 3.20% climbers and 1.60% sedge of the total germinated plant species. There was significant ($P < 0.05$) difference in seedling density and species composition along land use type and layers but species composition did not significantly vary in layer 3 (6-9 cm). The seedling density in the land use type and along depth ranged from 275-876 and 49-333 seedling m^{-2}, respectively. There was lower similarity between species composition and soil seed bank flora and standing vegetation (Jaccards similarity index=15%). In conclusion, the present study revealed that, the two enclosure land use type in the montane grazing land of the study area have shown relatively higher level of soil and vegetation cover, woody species regeneration potential and soil seed bank flora. Therefore, expansions of enclosure with proper management and planting native woody seedling are recommended for better improvement of the montane grazing lands.

8. Biomass Production, Utilization Practices and Range Condition in the Nuer Zone of Gambella, Ethiopia

Ketema Tilahun, Lisanework Nigatu and Solomon Mengistu
Year: 2007

Abstract: The study was conducted in Nuer zone of Gambella Regional State, with the objectives of assessing the indigenous grassland utilization practices, investigating the herbaceous and woody vegetation composition and biomass production of the grassland and evaluating the condition of the major grazing lands. The traditional pastoralists' rangeland utilization practices were assessed using a structured questionnaire, group discussions and visual observations. For the vegetation survey the pastoral zone was stratified by districts namely: Itang and Jikawo and each district further divided into major grazing types (less, seasonal, communal grazed and river basins). Data were collected on grass species composition, basal cover, litter cover, number of seedlings, age distribution, soil erosion, soil compaction; woody species composition, density and height. In the study districts, the pastoral production system included sedentary (26.3%), transhumance (52.6%) and pastoralism (21.1%). For Nuer pastoralists' livestock were the mainstay of life. The purpose of keeping livestock was primarily to get social values and cultural benefits. The most accepted and widely applied traditional methods of rangeland management and utilization practices in the community were communal grazing, burning and seasonal migration. The majority of the respondents (91.2%) reported that flooding escalates their mobility during the rainy season and it has been a threat in their livelihood. In the past 10 to 15 years, the grasslands coverage might be sparse according to the perception of 63% of the respondents. Based on the indigenous rangeland condition assessment criteria, half of the respondents stated that the current condition of the grassland being 'poor'. The Nuer pastoralists expressed their concern about the deterioration of their rangelands and they pointed out and prioritized the potential causes as: over grazing, recurrent drought, increased livestock and human population, erratic and low rainfall and restricted seasonal mobility. The vegetation survey in the districts showed a total of 42 grass species, 5 legume species, 3 sedges and 9 non-grass herbaceous species and 31 tree/shrub species. Hyparrhenia rufa dominated the less grazed areas of the two districts. Digitaria adscense and Pennisetum clandestinum dominated the less grazed areas of Jikawo and Itang, respectively. In seasonally grazed areas of Itang and Jikawo districts, H. filipendula and H. hirta, respectively were dominated. Echinochloa species were the dominant in communally grazed areas and river basins of both districts. Accacia and Grewia species were common and Combretom species were observed in the districts. There were significant ($P < 0.05$) differences among the major grazing areas of the two districts in their woody vegetation density. In Itang, there were 379; 300 No/ha, in less and moderately grazed areas and < 80 No/ha in the communal lands and river basins. While, in the stated grazing areas Jikawo the density of trees/shrubs were: 408; 329 and <90 No/ha, respectively. There were a highly significant ($P < 0.05$) differences in the total range condition scores among the major grazing areas of the districts. The mean condition scores of less, moderately, communally grazed and river basins were: 36.23±0.10, 28.78±0.20, 21.76±0.16 and 15.82±0.16, respectively in Itang and 34.91±0.10, 27.20±0.10, 18.69±0.16, and 13.58±0.16, respectively in Jikawo. Biomass of standing grass and total biomass in the districts were significantly ($p<0.05$) affected by grazing. Accordingly, with the highest in less grazed areas (2,044 and 2,216 kg/ha) followed by moderately grazed areas (1,006 and 1,137 kg/ha) the least in river basins (467 and 563 kg/ha). In Jikawo district, total biomass of less grazed, moderately grazed and heavily grazed communal lands and river banks were 1678; 1032;652 and 457 kg/ha, respectively. The standing grasses biomass of these major grazing areas was with the order of 1513; 897; 573 and 369 kg/ha, respectively. The annual DMY of the herbaceous vegetation layer in the study districts under the grazing land use category may be estimated as 243,950.0 t DM/annum for Itang and 173,470.0 t DM/annum for that of Jikawo. According to the estimated biomass production of the grazing lands, the carrying capacity of the rangeland in Itang and Jikawo would be 0.16 and 0.13 TLU/ha, respectively. However, rangelands in Jikawo district support large number of livestock beyond their maximum capacity (0.85 TLU/ha) compared to the estimated CC. On the other hand, in Itang there was underutilization of the grassland due to lower livestock population depended on the available grassland feed resources (i.e., 0.05 TLU/ha). In general, the present study confirmed that the condition of the communally grazed areas were in precaution and has deteriorated. To this end, an attempt to employ appropriate management systems along with monitoring of the grassland condition might be needed to promote the productivity of the grassland of the study areas to the level of the carrying capacity to ensure its sustainable utilization.

9. Woody and Herbaceous Species Composition and the Condition of the Rangelands in Shinile Zone of Somali Regional State, Ethiopia

Lishan Tsehay, Abule Ebro *a*nd Lisanework Nigatu
Year: 2007

Abstract: A study with the objectives of assessing the perceptions of the community towards range-livestock management practices, the woody and herbaceous species composition as well as the condition of the rangelands was undertaken in Shinile and Dembel districts representing a pastoral and an agro-pastoral production systems, respectively in Shinile zone of the Somali Regional State. A single visit survey was conducted to assess community perceptions towards range-livestock management practices in both districts, using structured questionnaires, group discussions and personal observation. Each district was further stratified by major grazing types (communal, riverside and enclosures) for detailed range condition and vegetation composition assessments. The parameters considered for range condition assessment were grass species composition, basal cover, age distribution, soil erosion, soil compaction, hedging effect, canopy cover and woody vegetation density. Furthermore, the different woody species found in the grazing lands of the study districts were categorized into eight height classes namely, > 0 - 0.5 m; >0.5 - 1 m; >1 – 1.5 m; >1.5-2.0 m; > 2 -3 m; > 3-4 m; > 4-5 m and >5 m. The average family size in the study districts was 7.88 persons/household. The main sources household revenue for the pastorals of Shinile district was from the sale of live animals and their product, while for the agro-pastorals of Dembel district it was from Crop production, sales of animals and milk. The agro-pastorals keep more number of cattle than the pastorals while more number of sheep and goats were recorded in the pastorals than the agro-pastorals. The herd composition in the study districts showed the proportion of small ruminants per household or in the herd to be generally higher than that of large ruminants. Drought has been a common phenomenon in both study districts and the sale of animals, clan interdependence and migration are the common coping mechanisms in both districts as mentioned by most of the respondents. Communal rangeland management is widely practiced in both districts; nevertheless private ownership was also practiced to some extent by the agro-pastorals of Dembel for cropping purpose and as a dry period grazing reserve for their stocks, which are not migrating. Based on their own subjective judgment, the majority of the respondents in both districts disclosed that their rangeland was in poor condition due to climatic factors and overuse of natural resources. The entire respondent of both districts mentioned migration as part of their livelihood and both study groups had the opinion that migration was a practice with considerable hardship. In the study districts, a total of 36 woody plant species were identified. The percentage compositions of highly palatable, palatable, less palatable and unpalatable species were 42,28,16 and 14, respectively. Acacia and Grewia species contributed the highest to the percentage of highly palatable species in both districts. The woody vegetation density per hectare in Dembel and Shinile districts respectively varied from 520-4,300 and 0-5,400 for communal; 280- 400 and 350- 450 for riverside and 400- 2100 and 350-500 for enclosure areas. The majority of woody vegetation in both districts fell into the four consecutive height classes, i.e, > 0.5- 3 m. In the communal grazing types of both districts fair distribution of the height classes starting from >0-0.5 m to >3-4 m was observed than in the rest two grazing types. A total of 74 species of herbaceous vegetation were recorded in the study districts, of which 47 were grass species, 6 legumes, 2 sedges and 19 species of other forbs. Fifty five percent of the identified grass species were highly desirable, 36% desirable and 9% less desirable. There was a significant difference ($P \leq 0.05$) among the grazing types in the proportion of bare areas in the study districts. The percentage bare areas in the enclosures, communal and riverside grazing areas, of Dembel district, varied from 8-17%, 13-40% and 25-50%, respectively and in Shinile district, 3 - 10%, 10 - 32% and 21-44% respectively. The proportion of bare ground in the enclosure areas of both study districts was significantly ($P \leq 0.05$) lower than the values in the rest two grazing types. From this study result the positive influence of trees sub- habitats to grass layer was observed. In general, the condition of the enclosure, communal, and riverside grazing areas was good, fair and poor, respectively in both study districts. It might be suggested that, rangeland improvement measures would be needed for sustainable livestock production in the study area. Establishment of enclosures was found to be one of the ways to improve the condition of the rangelands.

10. Impact of Parthenium (*Parthenium hysterophorus* L.) on the Range Ecosystem Dynamics of Jijiga Rangeland, Ethiopia

Shashie Ayele, Lisanework Nigatu and Tamado Tana
Year: 2007

Abstract: A study was conducted in Jijiga, Kebribeyah and Harshin districts l; effect of parthenium was assessed through structured questionnaire, group discussion and visual observations. A total of 200 quadrats, in 20 sample sites were used to collect data on herbaceous vegetation and soil seed bank flora, Based on the data obtained, the rangeland was stratified in to five categories, i.e. none, very low, low, moderate and high parthenium infestat sites. The competitive ability of selected forage species was evaluated and aboveground biomass of all species was collected. According to the view of the respondents, parthenium reduce the carrying capacity of the grazing land by reducing composition and diversity of palatable species. Furthermore, this plant adversely affects milk and meat quality and marketing of animal products. In addition, this weed exerts problems on human and animal health in the study area. A total of 63 herbaceous species in 20 families were identified in five infestation levels. Out of which 41, 41, 33, 23 and 22 herbaceous species were found in NIS (None Infested Site), VLIS (Very Low Infested Sites), LIS(Low Infested Sites), MIS(Moderately Infested Sites) and HIS (High Infested Sites), respectively. Of the total species identified, the proportion of grasses were 62.72, 62, 55.93, 39.97, and 16.6% in NIS, VLIS, LIS, MIS and HIS, respectively. Similarly, the proportion of parthenium was 0, 1.5, 14.27, 30.72, and 66.98% in NIS, VLIS, LIS, MIS and HIS, respectively. In all infestation levels Asystasia schimperi,Cassia occidentalis, Cynodon dactylon, Eragrostis papposa, Chrysopogon aucheri, Ocimum basilicum and Tragus berteronianus had better proportion than the other herbaceous species .On the other hand, Erucastrum arabicum and Euphorbia hirta had better proportion in HIS than the other sites. Species composition of (grasses and forbs), aboveground biomass, evenness and diversity indices were significantly different ($P < 0.05$) among infestation levels. The highest number of the above variables was obtained in NIS and the least at HIS. The study also indicated that the parthenium percent coverage was negatively correlated with species composition, aboveground biomass and evenness and diversity indices. The total number of species in the soil seed bank was 59 belonging to 16 families. Out of which, 81.62, 6.7 and 1.96% were herbaceous, woody herb and tree species, respectively. The most dominant species were Eragrostis papposa, Digitaria abyssinica and Parthenium hysterophorus in NIS, VLIS and LIS, MIS and HIS, respectively. Parthenium hysterophorus accounted for 0.58, 7.39, 54.46, 87, and 94% in NIS, VLIS, LIS, MIS and HIS, of the total species recoded, respectively. Species diversity and evenness among infestation levels in soil seed bank showed significant ($P < 0.05$) difference. Highest species diversity was obtained at VLIS and the least at HIS. Two way ANOVA of seedling density revealed a significant ($P < 0.05$) difference along depths and between sites. The similarity between above ground vegetation and species in soil seed bank between infestation levels showed significant ($P < 0.05$) difference along infestation level and the highest mean similarity was obtained at NIS and the lowest at HIS. The competitive ability of grass species with that of parthenium based on crowding coefficient and an aggrassivity index showed that Bothriochloa insculpta strongly outcompeted parthenium followed by Cenchrus ciliaris, Cynodon dactylon, Panicum coloratum and Chloris gayana in that order. Taking into account all the above variations between infestation levels, it might be concluded that Parthenium hysterophorus strongly affected species composition, diversity and biomass production in the rangelands of the study area. The competition result also suggested that grasses would be able to outcompete up to a level greater or equal to density of parthenium and this might point out that proper use of grazing management practices might minimize the risk of parthenium infestation in a rangeland.

11. Pastoralists Perception about Range Resource utilization and Range Condition Assessment in Gewane District of the Afar Regional State, Ethiopia

Yosef Feye, Abule Ebro and Tessema Zewdu
Year: 2007

Abstract: The study was conducted in Gewane district, Afar Regional State of Ethiopia, with the objectives of assessing pastoralist's perceptions about range resource utilization, range livestock management practices, and the condition of the major grazing areas. The pastoralists' perception was studied through group discussions, personal observation, and structured questionnaires conducted among 100 households where each household was taken as a unit of analysis. The average family size was 6.87 persons/household with a range of 4 to 12. The occupation of the surveyed households included pastoralism (livestock raising) (81%), agro–pastoralism (both farming and livestock raising) (10%), and other non-pastoral activities (9%).The majority of the respondents agreed that, still a large portion of the rangeland is owned communally. The main source of income for the majority of households was from the sales of livestock followed by the sale of milk. However, the respondents reported that livestock production was constrained by drought (50%), disease (17%), and shortage of feed and water (33%).The major feed sources available for the entire livestock in the study district are natural grasses, bushes, shrubs and trees. Indigenous rangeland resource management strategies of the pastoralists included herd mobility (34%), herd splitting (22%) and livestock diversification (44%). In the rangeland condition assessment study, the grazing areas in the study district were stratified into two, based on altitude groups (i.e. 455-760 masl, >760-1000 masl). In each altitude group, the grazing areas were further stratified into enclosures, seasonal and communal grazing areas.The parameters considered for range condition assessment were grass species composition, basal cover, litter cover, age distribution, number of seedling, soil erosion, soil compaction, hedging effect and woody vegetation density. In the study district, a total of 44, 9, 2 and 12 species of grasses, legumes, sedges and other herbaceous plants were identified, respectively. The common and/or dominant grass species in the communal grazing areas were Cynodon dactylon, Bothriochola radicans, Aristida adscensionis and Sporobolus pyramidalis while in the enclosures were Panicum maximum, C. dactylon, and Chloris gayana. In the seasonal grazing areas, Cenchrus ciliaris, Chrysopogon aucher, Hyparrhenia spp and Chloris roxburghiana were the common and/or dominant grass species. The total grass biomass of communal, seasonal and enclosures (reserve) grazing areas in the different altitude categories of the study district ranged from 234.40-316.45;391.44-478.03 and 730.27-843.25 kg/ha, respectively. In the study district, a total of 38 species of woody plants were identified. In enclosures and seasonal grazing areas, the common and /or dominant woody species were Acacia species while in the communal grazing areas they were Prosopis juliflora, Calotropis procera and Solanum incanum. The results of the household survey and discussions made with the elders revealed that the woody species provide several benefits to the pastoral community in the study area. The woody vegetation density of communal, seasonal and enclosure grazing areas in the different altitude categories of the study district ranged from 700-3,750; 500-1,000 and 100-400 plants/ha, respectively. The total range condition scores of communal, seasonal and enclosures grazing areas in different altitude zones ranged from 21.68-27.36, 33.65-39.76, 47.42-52.46, respectively. In general, the condition of the enclosure, communal, and seasonal grazing areas was good, poor, and fair, respectively. Establishment of enclosures was found to be one of the ways to improve the condition of the rangelands. The opinion given by the pastoralists indicated that the condition of communally grazed areas was poor, and has deteriorated mainly due to drought followed by shortage and erratic rains, overgrazing and bush encroachment. Therefore, in order to improve the condition of the rangeland, extension service must be given to the pastoral community on proper rangeland management and improvement measures (e.g.,. proper grazing management, establishing dry season grazing reserves and bush control, and controlled burning). To this end, the indigenous ecological knowledge of the pastoralists and their experience in the management of range resources should be integrated while planning and implementing scientific range management and improvement programs.

12. Spatial Variation in Range Dynamics in Relation to *Prosopis juliflora* Invasion along River Awash, Gewane District, North East Ethiopia

Zelalem Getachew, Lisanework Nigatu and Tessema Zewdu
Year: 2007

Abstract: *Prosopis juliflora* is an invasive alien tree species introduced in Ethiopia at Amibara district of Afar Regional State 35 years ago. By now it has invaded considerable hectares of grazing land along the lower course of Awash River. The study was conducted to investigate the effect of prosopis on range condition and some selected physical and chemical characteristics of soil and to assess the traditional grazing management, impact of prosopis and intervention activities by pastoralists in the study area. For the investigation of rangeland condition and soil characteristics two sites were selected and blocked in to high, medium, low and no prosopis densities. In each site four transects of 200 m x 100 m were considered for the different prosopis densities. In each transect, four 20 m x 20 m plots were taken for woody stratum study and within each quadrat five 1 m x 1 m sub-quadrats were used to study the herbaceous stratum and soil parameters. A total of 12 herbaceous species were collected from the two sites. Species composition was highest at low prosopis density. With increasing prosopis density grass composition decreased and forb composition increased. At high prosopis density both grasses and forbs tended to disappear. Dry matter grass biomass was highest at low prosopis. Soil erosion was the maximum at prosopis free area. With increased prosopis density, there was a significant ($P < 0.05$) difference in herbaceous age distribution. Low and no prosopis densities had significantly ($P < 0.05$) higher basal cover than higher prosopis densities. Age distribution showed a highly significant correlation with dry matter biomass of grass ($r=0.424$), dry matter biomass of forb ($r=0.426$), and a highly negative correlation ($r=-0.610$) with woody vegetation canopy cover. The impact of prosopis on soil was reflected in two processes; namely, sodicity alleviation and fertility restoration. Reduced sodicity was observed described by ecrease in Ec, pH and SAR. There was a significant decrease in Ec from 3.69 dS/m at no rosopis to 0.35 dS/m at high prosopis density. The pH reduced with increasing prosopis density significantly ($P < 0.05$) from 10.22 at no prosopis area to 7.99 at high prosopis density. Exchangeable sodium also showed decrease from 6.89 meq/100 g at no prosopis density to 4.63 meq/100 g at high prosopis density. Soil fertility was observed to increase as described by increased Ca2+, Mg2+ K + levels from prosopis-free area to high prosopis area. There was no significant ($P > 0.05$) difference in total nitrogen and available phosphorus in no, low, and medium, prosopis densities but organic carbon exhibited significant ($P < 0.05$) increase from low prosopis to high prosopis density. The range condition rating showed better condition in LP and MP. However, the soil analysis result exhibited better soil chemical and physical conditions in high prosopis densities as compared to the low prosopis densities. Traditional grazing land management taken to alleviate prosopis invasion was clearing and burning but were not effective except at riverside where pastoralists use the land for cultivation after clearing.

13. Natural Pasture Condition, Utilization Practices and Improvement Methods in Kutaber Wereda of South Wollo Zone, Ethiopia

Aderajew Molla, Solomon Mengstu and Tessema Zewedu
Year: 2008

Abstract: The study was conducted in Kutaber Wereda, South Wollo Zone Amhara National Regional State, Ethiopia, with the objectives of assessing the condition of available grazing land, traditional grazing land management and utilization practices and the feasibility of applying the available techniques for the natural pasture improvements such as application of organic and inorganic fertilizers. The traditional grazing land management and utilization practices were studied on 90 household, using group discussions, structured questionnaire and personal observations, while the condition of the pasture was assessed using different vegetation and soil parameters. The different natural pasture improvement methods was evaluated using application of 50 kg/ha nitrogen fertilizer, 25 kg/ha nitrogen (urea) fertilizer plus 25 kg/ha phosphorus (DAP), 5 ton/ha farm yard manure and without fertilizer for comparison on privet hay land of randomly selected 9 smallholder farmers. Furthermore, assessment of the chemical composition (percentage of dry matter, crude protein and ash content) of herbaceous vegetation on the different grazing areas and fertilizer application responses were also undertaken. The average family size per household in the district was 5.3, with nearly 70.8% of the respondents without any kind of education. The main source of income in the study district was from the sales of livestock and their products and crop production. The major livestock reared in the study area include cattle, goat, sheep, and equines. Herd composition in the study district revealed that, the proportion of cattle (3.49 TLU) was higher than that of goats (0.24 TLU), sheep (0.4.TLU) and equines (1.03.TLU). A total of 18 grasses, 7 legumes, 2 sedges and 5 trees/shrubs species were identified in the natural pasture of Kutaber Woreda. In>1900-2300 m altitude a total of 9, 1, 3 and 4 species of grasses, sedge, legume and others, in>2300-2600 m altitude a total of 11, 2, 5 and 3 species of grasses, sedge, legume and others and in >2600 m altitude a total of 14, 1, 4 and 3 species of grasses, sedge, legume and others were identified. Grasses such as Andropogon abyssinicus, A. dychtes, A. pratensis, Aristeda keneyensis, Bothriochloa radicans, Eleusine flocifolia, Hyperrhenia rufa, Eragrostis tencifolia, Pennisetum reparium, and Sporobulos africanus and others were dominant and common in different altitude zones. The highest and lowest average total herbaceous biomass production was found in the different altitudinal zones of benchmarks (5.19 ton/ha) and communal grazing land (0.98 ton/ha), respectively. Pasture condition decreased as grazing intensity increased from less grazed as in the case of the benchmarks good (31.42) condition class in the different altitude categories to highly grazed communal grazing land (CGLs) very poor (11.21) condition class. The highest species composition and total score was observed in BMs, whereas the lowest in CGLs. This is due to management or grazing pressure that affected the pasture condition. Continuous overstocking of CGLs decreased the proportion of desirable species and encouraged infestation with unpalatable species such as Aristeda keneyensis and Eleusin flocifolie. The botanical compositions of herbaceous species in the study area were grasses, legumes and other herbage; however grass was the dominant species in the study area. The average percentage proportion of grasses and the total dry-matter herbaceous plants responded to 50 kg/ha N fertilizer (87.8% and 7394.8 kg/ha) in the sampled altitude (>2600 m, >2300-2600 m and >1900-2300 m) zones was significantly ($P < 0.05$) higher than herbaceous plants responded to 25 kg/ha N +25 kg/ha P fertilizer (83.8 and 6775.7 kg/ha), 5 ton/ha farm yard manure (86.4% and 5502 kg/ha) and without fertilizer (85.7 and 4874.3 kg/ha) in each altitude zones (>2600 m, >2300-2600 m and >1900-2300 m)respectively. The current study also showed that the mean percentage of DM and CP content obtained from the herbaceous plants responded to 50 kg/ha N fertilizer (93.09 and 7.97) in the sampled altitude zones were the highest and significant ($P < 0.05$) than recorded the mean percentage of DM and CP content of herbaceous plants responded to 5 ton/ha FYM fertilizer applications (92.24 and 6.65) and without fertilizer applications (91.53 and 6.05) respectively. Both household and vegetation studies indicated that condition, size and their dry matter yield obtained in both private, communal and riverside grazing areas were deteriorated which may call for an immediate improvement intervention, such as raising the pasture land productivity by adopting sound management practices, growing productive and nutritious forages in association with food crops while the bench mark grazing areas need a sustainable conservation of their present condition.

14. Soil Seed Bank Flora and Biomass Production Potential under Varying Moisture and Nitrogen Levels in Mieso Rangeland, Oromia Regional State, Ethiopia

Alemu Kebede, Lisanwork Nigatu and Kinde Tesfaye
Year: 2008

Abstract: The study was conducted in greenhouse and amid at assessing soil seed bank flora and biomass production potential at various nitrogen and moisture regimes from the soil sample collected at Mieso rangeland under different degradation situation. The area was categorized into three levels of land degradation sites using stratified random sampling procedure (D_1, D_2, and D_3), with low vegetation cover (0-25 %), medium vegetation cover (26-50%) and high vegetation cover (51-75%), respectively. In order to collect soil seed bank from each site, three transect line of 60 m in length were established and three one by one meter quadrat were laid on each transect line at every 30 m interval. Randomly three subplots, 15 cm *15 cm*15 cm, were marked in a triangular shape and soil samples were taken and brought to greenhouse. There was significant ($P < 0.05$) difference between soil seed bank germination and biomass production potential within each degradation sites. Forbs were found to be dominant in all degradation sites. The highest seedlings rate were recorded in degradation level three, whereas the lowest seedlings were observed in degradation level one. The highest seedling densities was also observed in soil layer 1(0-3 cm) with decreasing manner as depth increases. The highest means seedlings germinated in highly degraded, medium degradation and less degraded sites were 122.76, 217.33 and 271 per m^2 respectively. Brachiaria deflexa, Chenchrus ciliaris, Chrysopogon aucheri, cynodon dactylon, Dactyloctenium aegyptium, Digitaria abyssinica, Digitaria velutina, Eleusine spp Eragrostis cilaris were the most ones observed. This probably indicates that degraded rangeland could be possibly rehabilitated by using soil seed flora as a potential source. The present study revealed that, highest seedling and biomass production potential was observed at nitrogen regime two and moisture level three under soil layer 1. Therefore, usage of these levels on degraded rangeland with proper management is recommended.

15. Effect of Nitrogen Fertilizer and Harvesting Stage on Yield and Quality of Natural Pastures in Fogera District, North Western Ethiopia

Ashagre Abate, Solomon Mengistu and Tessema Zewdu
Year: 2008

Abstract: This experiment was carried out to assess botanical composition, DMY and chemical composition of Fogera upland natural pastureland under different application rates of N fertilizer and harvesting stages of natural pasture at smallholder farmer's condition. The experiment was conducted using 3 x 4 factorial experiment arranged in a randomized complete block design with three replications and the treatment consisted three stages of harvesting (60, 90 and 120 days) and four levels of N fertilizer application (0, 23, 46 and 69 kg N/ha) on the natural pasture land. The botanical composition of the natural pasture land that have been identified at the experimental site included thirteen grasses, seven annual legumes and seven other herbaceous species belonging to different families. The influence of stages of harvesting was significant ($P<0.05$) but application of N fertilizer was not significant on total DMY of the pasture. Natural pasture harvested at 120-days of harvesting and at a fertilizer application of 69 kg/ha results the highest DMY (9.97 t/ha) while the lowest level was (5.38 t/ha) from unfertilized plots at 120-days of harvesting. The effect of stage of harvesting and fertilizer level on DMY of legume components was highly significant ($P < 0.001$) but for the grass components stage of harvesting had non- significant effect, where as fertilizer had a highly significant effect ($P < 0.001$). The relative proportion of legumes in the pastureland reached highest at 90-days of harvesting at all levels of fertilizer application. The proportion of legumes varied from the highest mean of 56.18% to the lowest of 37.66% at 90 and 120-days of harvesting, respectively while that of grasses ranged from 58.09% to 40.24% at 120 and 90-days of harvesting, respectively. The relative proportion of grasses increased with increasing levels of N fertilizer and stage of harvesting up to 120-days. Significant effect of stage of harvesting ($P < 0.001$) on CP, NDF, ADF, hemi-cellulose, cellulose, P and IVDMD were obtained at all levels of fertilizer application. At 60-days of harvesting, highest values of 15.53%, 0.41% and 54.86% were obtained for CP, P and IVDMD, respectively. However, the lowest values 55.63%, 37.32%, 17.55% and 32.02% were obtained for NDF, ADF, hemi-cellulose and cellulose, respectively at the same stage of harvesting. The CP content was significantly ($P < 0.001$) lower (6.76%) at 120-days of harvesting compared with other stages of harvesting. At all levels of N- fertilizer, the mean CP content obtained were above the reported critical level for ruminant's microorganism's functioning (7%). The IVDMD at 90 and 120-day harvesting was 50.09% and 38.76%, respectively. The values at all harvesting stages were below the reported threshold value that ranged between 55 and 70% for medium quality forages from natural pastures. The results obtained in the present study revealed that fertilizer application increased the yield of natural pasturelands by 36.07%. Fertilizer applications at the level of 46 kg/ha resulted in higher mean dry matter yield of 9.58 t/ha and higher nutritional quality (11.89% CP, 1.08 t/ha CPY, 49.91% IVDMD and 4.65 t/ha IVDMDY) of the natural pasture. This level of fertilizer application combined with 90 days of (October) harvesting should be practiced for higher Pasture yield and quality parameters

16. Rangeland Resource Utilization and Condition Assessment in Afdem District of Shinile Zone, Eastern Ethiopia

Fikirte Hailu, Abule Ebro and Tessema Zewdu
Year: 2008

Abstract: This study was conducted to assess indigenous rangeland resource utilization and management practices as well as condition of the rangeland in Afdem district located in Shinile Zone, Eastern Ethiopia. Pastoralist utilization practices were assessed using structured questionnaire (90 households), group discussions, and visual observations. To study the condition of the rangeland, the district was stratified by major grazing types (communal, riverside and benchmark). Data obtained through interviews and those from rangeland condition assessment were analyzed by SPSS. LSD and correlation analysis was used for mean comparison and to study the relationships between different parameters and biomass respectively. The average family size per house hold in the district was 13.17, nearly 97.8% of the respondents without any kind of education. Pastoralism (96.7%) was the dominant production system in the study area. The natural grazing land was the major and only source of livestock feed and there is no privately owned land. 98.9% of the respondents chose communal ownership of the grazing land for the future. The most common rangeland management and drought copping strategies adopted by the pastoralists included seasonal migration and herd splitting as mentioned by the majority of the respondents. Most of the respondents (68.9%) considered the current condition of the rangelands to be 'poor'. A total of 27 species of grasses, 3 species of legumes, 1 species of sedge and 10 species of other forbs were identified in the district. A total of 19 woody species were identified in the study district and of the identified woody species, 63.16% fell into highly palatable and palatable categories. A higher ($p<0.05$) total dry matter biomass were obtained in the benchmark (1,054.42±7.16) areas than in the communal (321.10±1.99) and riverside (262.94±1.84) grazing areas. The study also showed that the rangeland condition of the district was good in benchmark, fair in communal and riverside grazing areas, which may call for all an immediate improvement interventions, while the benchmark area need a sustainable conservation of their present condition.

17. Growth Dynamics, Yield and Chemical Composition of Vegetatively Planted Napier Grass (*Pennisetum purpureum* Schumach L.) at Different Defoliation Frequencies and Stubble Height

Mehiret Jemberie, Solomon Mengistu and Tessema Zewdun
Year: 2008

Abstract: The experiment was conducted to determine the effect of different stubble heights (SHS) and defoliation days (DDS) for assessing growth dynamics, dry matter yield (DMY) and chemical composition of Napier grass (*Pennisetum purpureum*) in 2007/2008 cropping season at Haramaya University campus, Eastern Ethiopia in a 3 x 5 factorial experiment arranged in a randomized complete block design with 3 replications on 59 x 19 m (1121 m^2) area. The factors were three defoliation days (DDS) (60, 90 and 120) and five stubble heights (SHS) (5, 10, 15, 20 and 25 cm). Among the parameters, basal circumference per plant (BCPP), total leave number per plant (TLNPP), leaf length per plant (LLPP), internode number plant (INPP), leaf-to-stem ratio (LSR) and leaf number per tiller (LNPT), dry matter (DM) content, dry matter yield (DMY), crud protein (CP) content, crude protein yield (CPY), acid detergent fiber (ADF), hemicellulose (HC), cellulose, in vitro dry matter digestibility (IVDMD) and ash were significant ($P < 0.01$), number of tillers per plant (NTPP), DM content and acid detergent lignin (ADL) were significantly ($P < 0.05$) affected by DDS and LLPP, CP content, ash and CPY were significantly ($P < 0.05$) affected by SHS. In addition LSR and DM content were significantly ($P < 0.05$) and IVDMD ($P < 0.01$) affected by the interaction of DDS and SHS. In general DDS were more important than SHS and interaction because it was significantly ($P < 0.01$) influenced almost all parameters but SHS responded significantly for some of them, because of the variation for stubble heights were very narrow (5 cm between each of five stubble heights). DMY positively correlated to NTPP ($P < 0.05$), NDF, ADF, ADL, and cellulose ($P < 0.01$) among each other (0.31, 0.17, 0.74, 0.67 and 0.85 respectively). In the other way DMY showed negatively correlated with HC (-0.77), LSR (-0.44), NLPT (-0.61), CP (-0.69), ash (-0.66) and IVDMD (-0.49). Generally it can be concluded that less than 20 cm (5, 10 and 15) SHS) relatively less result than compared to 20 and 25 cm in both in morphological characteristics, DMY and chemical compositions; but IVDMD content of the plant defoliated at SH 25 cm was less compared to 20 cm SH. DMY can be significantly improved by defoliated at 120 days as compared to other DDS (60 and 90). On the other hand, significantly higher CP, total ash, HC and IVDMD observed at 60 DDS. However, higher CPY was observed at 90 days rather than 60 and 120 DDS. From chemical composition at 90 DD; similar lower DM content, higher CP, Lower NDF, lower ADF, lower ADL and higher HC, lower cellulose, higher IVDMD than 120 DDS. Therefore, defoliation of Napier grass at 90 days at stubble height 20 cm is recommended since it fulfills the average yield and quality of Napier grass rather than 60 and 120 DDS.

18. Traditional Grazing land Utilization, Floristic Composition and Condition Assessment of Babile-Erer Valley, East Hararghe, Oromia, Ethiopia

Negussie Tirfe, Lisanework Nigatu and Tamirat Bekele
Year: 2008

Abstract: The study was conducted in Babile-Erer Valley, East Hararghe Zone, Oromia Regional State of Southeastern Ethiopia. The objectives of the study were to investigate the floristic composition, traditional grazing land utilization practices and assess the present grazing land condition based on vegetation and soil parameters and agro-pastoralists perception of the study areas. Vegetation, soil and household data were collected by stratifying the valley into three different altitudinal zones. namely bottom, middle and upper altitude zones based on secondary data and physical observations of the area. Both a single visit formal survey and participatory rural appraisal technique was employed to document the agro-pastoralist perceptions on overall livestock and grazing land utilization practices using a well-structured questionnaire and visual observation. The vegetation and soil data were collected from three grazing areas of the respective altitude zones. Based on the descriptive statistics, the average family size per household in the study area was 8.22 individual and the landholding was 2.53 ha per household. The overall mean grazing area per household was 0.83 ha which accounted for 32.9% of total land holding. The average livestock holding per household was 25.85 tropical livestock unit. Natural pasture was the major feed resource in the study area accounting for about 62.5% of the feed resources. Pasture enclosure (kalo), rotational grazing, seasonal animal movement, sale of animals, pastureland resting during wet season, lopping tree leaves and foliages supplementation were among the basic traditional grazing land management and feed conservation practices in the Babile Erer Valley. A total of 20 species of grasses, 14 species of legumes, 65 species of other herbaceous plants (forbs), 45 species of shrubs, 29 species of trees and 6 species of shrubs/trees that belonged to 42 families were identified in the study area. The Poaceae families constituted 20.5% of the total herbaceous species, of these 19.96%, 72.13% and 7.92% were highly palatable, moderately palatable and less palatable, respectively. There was higher percentage of least desirable plant species in the upper altitude that could be attributed to the dominance of invasion by Acanthaceae, Euphorbiaceae and Solanaceae families, such as Achyranmes aspera, Amaranthus caudatus, Crabbea volutina, Cyathula orthacantha, Dicliptera verticillata, Lepidagathus aristata, Monechma debile, Phyllanthus maderaspatensis and Solanium nigrum species. The two-way analysis of variance showed that grazing land condition of the study area was good in Bench mark, fair in seasonal and poor in communally grazed areas. The grazing land condition in middle altitude was found to be better than that of the upper and bottom altitude zones. The differences between land use systems, grazing intensity, climate and management practices undertaken by agro-pastoralists could attribute to the differences in grazing land condition. The aboveground biomass of plant species varied with the intensity of grazing pressure with peaks of biomass production at bench mark site in the middle and bottom altitude was significantly the highest ($P < 0.05$) for grasses and total dry matter biomass. Both the household and vegetation studies confirmed deterioration the grazing lands condition which calls for further improvement. The seasonally grazed areas were in transitional state between fair and good condition indicating the need for further improvement, while the bench mark sites need a sustainable maintenance of their present condition.

19. Range Condition, Biomass Production and Plant Biodiversity of the Rangeland of Northen Omo-Gibe Basin in Gurage Zone, Southern Ethiopia

Tesfaye Shewage, Solomon Mengistu and Tessema Zewdu
Year: 2008

Abstract: The study was conducted in Enemore and Ener district, Gurage Zone, Southern Regional State, with the objectives of assessing the traditional grazing management practices, investigating botanical composition, bio-diversity of the vegetation and biomass production potential of the rangeland and evaluating the condition of the rangeland. The traditional grazing management practice and elders' perception of constraints of the rangeland were assessed using a structured questionnaire, group discussions and visual observations. For the vegetation survey the rangeland was stratified by altitude namely: Bottomland range site (1000-1400 masl.), Medium altitude range site (>1,400-1,600 masl.) and Upland range site (>1,600-1,800 masl.). Data were collected on grass species composition, basal cover, biomass of herbaceous species; woody species composition, density and height. The purpose of keeping livestock was primarily for income generation and milk production. The most widely used traditional rangeland management and utilization practices in the community were communal grazing, burning and seasonal short distance mobility. Based on the indigenous rangeland condition assessment criteria, 54% of the respondents stated that the current condition of the rangeland being 'excellent'. The respondents expressed that the cause of underutilization of their rangeland was loss of their livestock by trypanosomiasis and other diseases of livestock associated with trypanosomiasis, and human diseases particularly, malaria has been a challenge to herders. The vegetation survey in the rangeland of the district showed a total of 24 species of grass, 6 legumes, 4 sedges and 12 other herbaceous species and, 26 species of trees/shrub. Of which 12 grasses; 3 legumes; 1 sedges; 4 other herbaceous species and 19 trees/shrub species were identified in Bottomland range site; 12 grasses; 5 legumes; 2 sedges, 5 other herbaceous species and 12 species of tree/shrub were identified in Medium altitude range site and in the upland range site, a total of 21; 5; 4; 11 and 17 species of grasses, legumes, sedges other herbaceous species and 17 species of tree/shrub were identified respectively. There were significant ($P < 0.05$) differences among the three parts of the rangeland in their woody vegetation density. In bottomland range site, there was 422 No/ha, medium altitude, 417 No/ha and 347 No/ha in upland rangeland of the district. There were highly significant ($P < 0.05$) differences in index of plant bio-diversity among the three sites of the rangeland; the upper land being the most diversified (1/D=7.59) in herbaceous species whereas the bottom part was the most diversified (1/D=4.3) in woody species. There were highly significant ($P < 0.05$) differences in the total range condition scores among sites of the rangeland. The mean condition scores of bottomland, medium altitude and upland range sites were: 92.04±3.89; 80.20±3.05 and 61.4±3.85, respectively. In the upland range site the range condition was significantly ($P < 0.05$) affected by grazing intensity. Biomass of standing grass and total biomass of herbaceous species was significantly ($P < 0.05$) different in the three grazing sites of the rangeland, the highest was 10511 kg/ha for the bottomland range site of which biomass of grass species was 10397 kg/ha. The annual DMY of palatable herbaceous vegetation layer in the study rangeland under the three range sites estimated to be 125,840.0 t DM/annum for Bottomland, 62,274.0 t DM/annum for medium and 21590 t DM/annum for that of the upland range site. The carrying capacity of the rangeland: 1.31 TLU/ha; 0.77 TLU/ha and 0.67 TLU/ha for bottom, medium and upland range sites respectively, and the positive feed balance, 175,027 t/annum, confirmed underutilization of the grazing land due to lower livestock population associated with tsetse fly infestation. Lack of grazing to the bottom land range site also resulted in poor herbaceous species diversity. To this end Intervention is needed to control effect of tsesefly infestation and for efficient utilization of the pasture at its appropriate growth stage.

20. Rangeland Degradation and Livelihood Vulnerability of the Pastoralists in Erer District of Shinile Zone, Eastern Ethiopia

Selam Meseret, Abule Ebro and Tessema Zewdu
Year: 2008

Abstract: The present research was conducted in Erer district of the Shinile Zone of the Somali Regional State, Ethiopia. This study was undertaken to assess the perceptions of the communities about rangeland degradation and its effect on livelihood vulnerability; to identify the causes of rangeland degradation and influence of rangeland degradation on vegetation and soil. Data on community perceptions were collected through structured questionnaire (80 households), group discussions and visual observations. To study vegetation and soil parameter of the rangeland, the district was stratified by grazing types (communal, seasonal grazing and enclosure). Data on herbaceous species composition, life form, desirability and ecological classification, woody species composition and density, and some soil physical and chemical properties were gathered from the three major grazing types (communal, seasonal grazing and enclosure). The average family size per household in the district was 7.27. Health and school services are not accessible for 95% of the respondents. Regarding their income source, 52.5% of the respondents obtained their income from milk sale, 93.75% from sale of livestock, 37.75% from sale of agricultural products, 5% were employed in government farm land in Erer as daily laborer, 1.3% sale fire wood, 2.5% rent their camels for contraband transportation purpose. The major constraints for livestock production in the study area were disease, feed shortage and drought and rainfall shortage. All of the pastoralists indicated that the rangeland was degraded and the main causes were drought and overgrazing. Rangeland degradation reduced the income and made the communities vulnerable to even minor climatic shocks. Rangeland is the major feed resource for livestock and livestock is the backbone for the life of pastoralists, but the feed resource available for livestock has declined through time (animals did not get their feed requirement from the degraded rangeland). With the decrease in livestock number and productivity, the pastoralists livelihood is vulnerable to poverty. A total of 29, 6, 1, 21 and 26 species of grasses, legumes, sedge, other herbaceous plants and woody species were identified in the district, respectively. The mean woody vegetation density in enclosure, seasonal grazing and communal sites of the study district were 135, 420 and 916.2 plants per hectare, respectively. The mean percent bare ground were 9.03%, 18.79% and 38.29% in the enclosure, seasonal grazing and communal grazing types, respectively and the increased bare ground is a clear indication of rangeland degradation. Soil characteristics showed higher sand content (37-64%) and lower clay fraction (8-11%). Silt content was higher in the seasonal grazing areas (55%) than in the other grazing types. The pH result showed the soil to be alkaline in all the grazing types. For all grazing types the electrical conductivity (EC) was less than 4 ds/m. The organic matter content of all grazing types was very low (0.921% -2.299%). The total nitrogen content ranged from 0.124% to 0.188% and available phosphorous (5.39 ppm - 9.94 ppm). In general, the soil nutrient composition of the study area is low for plant growth and indicates a decline in the condition of the rangeland. In general, the results suggested that the rangeland in the study district have been degraded and pastoralist livelihood was also vulnerable due to their livestock number and production reduced and herbaceous percentage composition declining and increase in bare ground cover were the outcome of recurrent droughts, overgrazing, high human population and settlements. Conservation and rehabilitation of the rangeland resources is essential before the rangeland degradation reach to irreversible stage.

21. The Impact of Land Use/Land Cover Dynamics on the Ecology of Gode Rangeland, Somali National Regional State, Ethiopia

Muhidin Jemal, Lisanework Nigatu and Abule Ebro
Year: 2009

Abstract: The study was conducted in Gode district of SNRS to investigate the impact of land use/land cover dynamics in Gode rangeland. Data regarding community perceptions about land use/land cover changes were collected through structured interviews from 90 households, group discussions and visual observations. Vegetation composition data and soil physico-chemical properties were taken. To study vegetation composition and soil physico-chemical properties, the area was stratified into three soil types (Fluvisols, Gypsisols and Leptosols) and the soil types were further stratified to three grazing types (communal, enclosure and riverside). Four sets of satellite images were used to identify land cover categories of the study district. Ninety percent of the interviewed households reported that there were land cover changes in the previous years, i.e., grassland and bush land showed a reduction whereas woodland cultivated fields and settlement area increased. Livelihoods in Gode district are pastoralism and agro-pastoralism. The most important problems for crop production as indicated by the respondents were salinity, lack of arable land and inadequate and erratic rainfall. The major constraints for livestock production in the study area were drought, feed shortage, and animal diseases. The majority of the respondents pointed out that the trend in the rangeland condition is declining in time and this has been aggravated by prolonged drought and rising livestock population pressure accompanied by frequent absence of rainfall. A total of 33 herbaceous and 20 woody species were identified in the study area. Basal cover, soil erosion, soil compaction, woody vegetation and grass composition showed a significant difference among grazing and soil types but soil compaction among soil types ($P<0.05$).Enclosure grazing was significantly greater than the other grazing types. The sand and silt content of the soil was significantly different among the grazing types but it was not significant among soil types, whereas, clay content significantly varied among soil types ($P<0.05$). Soil organic matter, total nitrogen and available phosphorus were significantly different among grazing types whereas there was no significant difference among soil types except organic matter ($P<0.05$). Six land use/land cover categories were identified in the study area (grassland, bush land, woodland, cultivated fields, land for settlement and degraded land). Over the analysis period grassland and bush land cover showed a reduction of 15% and 11% at a rate of 0.45 and 0.33% per year, respectively. Contrary to this, through the analysis period woodland, cultivated field, land for settlement and degraded land showed a positive change with an increase of 12%, 5%, 5% and 4% at a rate of 0.36, 0.15, 0.15 and 0.12% per year, respectively.

22. Effect of Land Management on Vegetation Dynamics of Grazing Lands of Mana-Sibu District, West Wollega, Oromia

Alemayehu Dessalegn, Lissanework Nigatu and Tamirat Bekele
Year: 2009

Abstract: Land management is an indispensable activity in sustaining the food requirement of ever increasing population of our country. Hence, this study intended to investigate effect of land management on vegetation dynamics of grazing lands of Mana-Sibu, west Wollega, Oromia. The objectives of the study were to investigate the floristic composition and diversity, to assess the above ground herbaceous biomass and grass land condition as affected by the land management. Each managed land unit of year 9,7,5,3 and one unmanaged land (0 year) as a check were used for the study. Each management unit was further stratified in to upper, middle, and lower positions and used for data collection. A total of 60 quadrats (measuring 25 x 10 m) were laid out on all land positions representative area. Vegetation and soil data were collected from these quadrats. Group discussion and interview was also made with 45 farmers to document problems of livestock production in the area. Nested design using SAS and descriptive statics were used to analyze the collected data. The survey result revealed that natural pasture and crop residue accounts to all (100%) of the feed resource in the area. Both feed resources were highly threatened by termite since 30 years ago. Generally the study revealed significant variation ($P<0.01$) among vegetation and soil parameters. But there was no significant variation in the parameters within land positions of a management unit. A total of 22 species of grass, 16 non grasses, and 35 woody vegetation were recorded in the study area. The highest proportion of highly desirable grass species (44.1%) was observed in year five while the least (4.3%) grass proportion was from unmanaged land. Desirable grass species composition (1.4%) was least in unmanaged land and highest (58.7) in year 7 management unit. The mean grass dry matter biomass varied from 177.32 g/m^2 in the year nine management unit to 340.70 g/m^2 in the year seven managed land units. Few grass species like Brachiaria fulva, Cynodon dactylon, and Sprobolus pellucidus were found to be termite tolerant. The highest species composition (5.56) and species richness (2.59) was recorded in the management unit 7 and the least (1.14) species composition and species richness (1.04) was from the unmanaged land. Managed land units were not significantly different in species richness reflecting effect of termite on existence of termite intolerant species. The condition score for managed land units fall in category of fair to excellent. The unmanaged (open) land was all under poor condition. In conclusion, the present study revealed that there were significant differences in the parameters under consideration among management units. Therefore, expansion of physical and biological conservation measures with clear objectives and proper management are recommended for better improvement of degraded grazing land of the area.

23. Biophysical Factors as Impacted by Livestock Distribution in Relation to Watering Point in Allaidege Rangeland, Zone 3 of Afar Regional State, Northeastern Ethiopia

Asheber Tegegn, Lisanework Nigatu and Kidane Gebremeskel
Year: 2009

Abstract: Grazing changes plant species composition of rangeland ecosystem by selective removal and trampling. Grazing also alters soil condition properties through increased soil exposure to sunlight and erosion which can drastically change hydrologic processes that can impact water budgeting and quality. For this reasons, practical means are needed to assess grazing management practices and its impacts upon the rangeland. Objectives of this study were to provide data on vegetation and soil attributes and interpretations to support the development of site-specific management. This study examined the effects of grazing livestock distribution on the vegetation and soil attributes of the rangeland using remote sensing technique and ground based measurements on four study sites or degradation gradients which varies in their levels of degradation using transects laid at the center of each degradation gradients perpendicular to watering point. Moderate-resolution Imaging Spectroradiometer (MODIS) data, the Normalized Difference Vegetation Indices (NDVI) were used in the analysis of spatial and temporal vegetation cover change in the rangeland. Sites impacted by high livestock grazing pressure showed high spatial and temporal variations on NDVI values, hence vegetation cover, than sites less impacted by livestock grazing pressure. There also appeared to be relationships between grounds measured vegetation cover and NDVI values derived from remotely sensed imagery. The new rangeland health assessment method "Interpreting Indicators of Rangeland Health" was used to evaluate the effects of grazing livestock distribution on the status of three ecosystem attributes (soil/site stability, hydrologic function, and biotic integrity) based on their indicators at increasing distance from watering point in the rangeland. Quantitative data on ground cover, plant community composition, and litter amount were collected to aid the assessment process. Sites with potential vegetation dominated by varieties of annual herbaceous species had low scores (27.37% – 41.78%) of Range health Assessments with low scorings for all three ecosystems attributes and their indicators. A reduction of taller perennial grasses(i.e., reduced biotic integrity) due to heavy grazing resulted in reduced plant vigor which in turn added little or less litter (i.e., impeded hydrologic function) to the site and increased bare soil and accelerated erosion(i.e., increased soil instability). In contrast, sites with potential vegetation characterized by perennial herbaceous species (mostly Chrysopogon plumulosus and Panicum coloratum) had high scores (79.27% – 87.48%) of rage health assessments with high scoring for all attributes and their indicators. The increase in relative abundance of perennial grasses at these sites accompanied less concentration of impacted soil in interspaces among plants due to more vegetation cover and accumulated litter, which in turns decreased bare soil and accelerated soil erosion. The results obtained in this study will contribute to an understanding of factors contributing to patterns and processes of rangeland degradation.

24. Feed Resource Availability, Biomass Production, Nutritional Characterization and Pattern of Utilization in Gursum District, Somali Region, Eastern Ethiopia

Helen Asfaw, Abule Ebro and Lisanework Nigatu
Year: 2009

Abstract: The study was conducted in Gursum district which is situated in Jijiga zone of the Somali National Regional State. The objectives of the study were to assess the management and utilization practices of different feed resources and investigating the herbaceous and woody vegetation composition and biomass production and yield of crop residues. Furthermore, assessment of the chemical composition of the major feed resources was also undertaken. The utilization and management practice of feed resources were studied using group discussions, structured questioners and personal observations. The total households included in the survey were 90 of which 70 and 20 were male and female headed households respectively. The female headed households were included purposely whereas the male headed households were taken randomly from each Pastoral association (PAs). For the vegetation survey the district was stratified by grazing types (Communal, Riverside and bench mark). A plot of 20 m x 20 m were laid out randomly to accommodate both vegetation layers, i.e., woody and herbaceous. To collect data from the herbaceous plants 5 quadrat of 1 m X 1 m per 20 m x 20 m plot were placed. The leaf biomass of each woody plant was calculated using the Biomass Estimates from Canopy Volume (BECVOL) model (Smit, 1989a, 1989b, 1996). In the study district, natural pasture and crop residues are the main sources of livestock feed. The response of pastoralists and agro-pastoralists in the study district towards the amount and quality of livestock feed available throughout the year currently when compared to that of ten years back indicated that the feed resources have deteriorated (91.4% of male and 95% of female). Based on the indigenous rangeland condition assessment criteria by pastoralists and agro-pastoralists, the majority of the male (64.3%) and female (70 %) respondents replied that their rangelands are in poor condition. Among the major criteria employed in the study district, forage availability, accessibility to water, plant growth are given the highest priority. A total of 32 species of grasses, 1 species of sedges, five species of legumes, ten species of other herbaceous plants were identified in the study district. From the total herbaceous vegetation, the grass species accounted 61.33% and of the grass species composition, the highly desirable, desirable and less desirable species accounted for 40.42%, 41.72% and 17.85%, respectively. The benchmark grazing areas had the highest ($P \leq 0.05$) mean dry matter biomass of total herbaceous and total grass followed by communal grazing areas and which was significantly ($P \leq 0.05$) higher than riverside grazing areas. The grazing capacity decreased as one moves from the benchmark to communal then to riverside grazing areas. It means more land is required per unit of animal in the riverside grazing area than in the communal and benchmark grazing areas. A total of 20 tree and/or shrub species were identified in Gursum district. The woody vegetation density per hectare in the study district was higher in the riverside grazing area and it is followed by communal grazing area and the bench mark had the lowest. The total browse leaf DM obtained (539 kg/ha) in the benchmark grazing areas is the highest and it is followed by the communal grazing areas (460 kg/ha), the least was observed in the riverside grazing areas (430 kg/ha. The river side grazing area had the highest ha BU-1, which is followed by communal grazing areas and the least was found in the benchmark grazing areas. Chemical analysis of crop residues indicated that they have low crude protein (CP) content and are composed of high Crude fiber (CF) content. Despite such indications of low nutritional quality, some of the sampled households were not found to use improvement strategies such as physical and chemical treatment, concentrate or legume supplementation. The major constraints for such practices were shortage of labor, finance and lack of know-how as well as inaccessibility to these methods.

25. Assessment of Rangeland Degradation using Community Perception and Scientific Methods in Aba'ala District of Northern Afar, Ethiopia

Lemlem Kebede, Abule Ebro and Lisanework Nigatu
Year: 2009

Abstract: A study was conducted in the Aba'ala district of Zone two of North Afar to study rangeland degradation using community perception and scientific knowledge base. Data about the community perception with regard to rangeland degradation were collected through structured questionnaire on 90 households, where the households were stratified into pastoral and agro-pastoral. Group discussions were conducted and visual observations made. Data on vegetation, soil and land use/land cover changes were gathered to represent some of the approaches within the scientific knowledge. In addition, data on woody species composition, density, and height classes and soil physical and chemical properties were gathered from the three villages at three different distances from settlement (near, middle and far). The rangeland use/cover changes were studied using land sat and spot image of 1986 and 2006. The average family size per household in the district was 8.73±0.37 persons/household. The average livestock number owned per household was 7.28±0.67 and 6.27±0.94 TLU for the pastoral and agro-pastoral communities, respectively. The agro-pastorals keep more number of cattle and goats than the pastorals while the pastoralists keep more number of goats and camel. The main source of income of the pastoral group was from the sale of live animals, while for the agro-pastorals, it was from crop production, sale of animals, milk and milk by-products. The major constraints for livestock production in the study area were drought, feed shortage, and diseases. All of the pastoralists indicated that the rangeland was degraded and the main causes were drought, population pressure and deforestation. The entire respondents indicated that the condition of rangelands at the present time was poor and some of the range resources are depleted or degraded that is:- 43.5%, 39.5%, 9.5% and 7.5% of the respondents reported that herbaceous, woody vegetation, wild-life and soil are the most important range resources that are depleted or degraded from the study area, respectively. A total of 21 woody species were identified in the study site. There was a significant difference ($P< 0.05$) in woody vegetation density among the near, middle and far sample sites from settlement. The results of the GIS analysis showed that there was an increase in the size of cultivated land, bare land and settlement while there was a decrease in bush land, grassland, and shrub land over the last two decades. The soil characteristics showed relatively a higher sand content in sample sites near to settlement and lower clay and silt fractions in the sample sites far from settlement. The average soil bulk density of the study area was 1.14±.044 g cm^{-3}; it ranged from 0.98 to 1.3 g cm -3, and the analysis indicated that there is relatively high bulk density in the sample sites near to settlements than in sample sites far from settlement. The amount of available organic matter (<3%) phosphorus, potassium and nitrogen contents of the soil in all of the study area were low. Therefore, necessary interventions like effective soil and water conservation, enclosure of highly degraded areas, introduction of drought tolerant trees and grasses will be effective and for future development interventions by incorporating both the community perception and scientific knowledge as deem necessary. Furthermore, reduction of deforestation and negative impacts of the community on the vegetation could be reduce by participating the community and giving continuous training on the conservation and management of natural resources.

26. Assessment of Pastoral Perceptions, Range Condition and Chemical Composition of Major Feed Resources in Chifra District of Afar Regional State, Ethiopia

Mohammed Abdulatife, Abule Ebro and Solomon Melaku
Year: 2009

Abstract: This study was conducted to assess the perceptions of pastoralists' about range-livestock management practices, to determine the condition of the rangeland and the chemical composition of the major feed resources in Chifra district located in Afar Region. Pastoralists' perceptions about range and livestock management practices were assessed using structured questionnaires (90 household heads), group discussions and visual observations. To study the condition of rangelands, the district was stratified into two altitudes (>550-850 masl, lower altitude and >850-1100 masl ,upper altitude) and three grazing areas. The grazing areas were communal, riverside and enclosure. These represented the major grazing areas of the pastoral community. The parameters considered for range condition assessment were grass species composition based on ecological index and weighed palatability composition method, basal cover, age distribution, soil condition (erosion and compaction) and woody vegetation density. The socio-economic study revealed that average household size in the study district was 7.87 persons per household with a range of 3 to 15. The main sources of household income for the pastoralists was from the sale of livestock, their products and crop production. Rangelands are the major source of livestock feed in both altitudes and some pastoralists and agro-pastoralists used to make enclosures as a dry period grazing conserved for their stocks. Most of the respondents in upper altitude(50%) considered the current condition of the rangelands to be fair, while those in the lower altitude (60%) disclosed that the condition of their rangeland is poor. A total of 25 species of grasses, 3 species of legumes, 1 species of sedge, and 6 species of forbs were identified in both altitudes. The only grass species dominant in communal grazing area was Chrysopogon plumolosus (21.61% in lower altitude and 20.8% in upper altitude) whereas Cenchrus ciliaris (24.62%) was dominant in the enclosure area of the upper altitude. Digitaria milanjana was dominant in both altitudes, 20.83% in lower altitude and 21.47% in upper altitude. A total of 14 woody species were identified in both altitudes of the study district and of the identified woody species, 42.9, 28.6, 21.4 and 7.1% were highly palatable, palatable, less palatable and unpalatable, respectively based on the perceptions of pastoralists. Acacia nilotica, Cordia Africana, Grewia tembensis and Salvadora persica were some of the dominant woody species in the district. A higher ($P \leq 0.05$) grass dry matter (DM) biomass and total dry matter (DM) biomass were obtained in the enclosure areas than in communal and riversides grazing areas in both altitudes. The study of vegetation assessment also showed that the condition of the rangelands in the study district was good in enclosure (in both altitudes), fair in communal (in both altitudes) and poor (in lower altitudes), fair in riverside's grazing areas of the upper altitude. Cenchrus cillaris and Chrysopogon plumolosus were the best grass species with lowest content of ADF and higher content of CP, while from composite samples; the natural pasture in the enclosure areas had good forage quality with low content of ADF as compared to the rest. Grewia tembensis is a better quality with a higher CP content (22% in wet season and 17% in the dry season). In general, the result of the perceptions of the community and the vegetation studies indicated that the condition of both communal and riverside grazing areas have deteriorated which may need an immediate improvement interventions, while the enclosure areas need a sustainable conservation of their present condition. Therefore, rehabilitation and restoration of the grazing areas through establishment of community based enclosure or resting highly denuded areas and conservation of natural resources through re-seeding depleted grazing areas, developing water points on the grazing areas, introducing water harvesting mechanisms and selective thinning of invasive woody plant were crucial to improve the rangeland condition of the study district.

27. Regeneration Potential and Soil Seed Bank Flora Assessment In Relation To Three Encroaching Acacia Species in Borana Rangelands, Southern Ethiopia

Samuel Tuffa, Abule Ebro and Lisanework Nigatu
Year: 2009

Abstract: Seed bank species composition, density, diversity, richness and life form, as well as soil chemical properties and texture were examined under two habitats (canopied and un-canopied) along depth gradients (0-3 cm, 3-6 cm and 6-9 cm) relative to three encroaching acacia species (A. mellifera, A. drepanolobium and A. brevispica) in southern Ethiopian semi-arid Borana rangelands. Seedling density, diversity, species richness and life form were subjected to the SAS computer software while compositional and soil parameters were analyzed by descriptive statistics. Within all study sub-habitats of each acacia, there were more grass species than the non-grasses, except under the canopy of A. mellifera and the open area of A. brevispica. Of the total 60 plant species identified in the soil seed bank in the greenhouse, 33.3% were grasses and 67.7% were non-grasses at family level. The soil seed bank comprised of annuals, perennials and semi-annual/perennials with percentage contribution of 45%, 40% and 8.3%, respectively; but the life form of 6.7% of the species was unidentified. There was non-significant difference ($p>0.05$) in grass density between habitats relative to A. mellifera and A. drepanolobium. However, the density of grasses was higher ($p<0.001$) in the top layer in all sub-habitats of each study bush than in other layers. The density of overall herbaceous vegetation was higher under the canopy than the corresponding un-canopied habitat in each study acacia. Generally, the seedling density (m^{-2}) ranged from 0 to 500, when each soil depth is considered; and 217.5 to 757.5 when all layers combined per habitat. The degree of diversity among species from soil seed bank of the two sub-habitats was investigated using Shannon diversity index. Accordingly, there was more species diversity under the canopies of each study bush. Sørensen's similarity index was used to compare community similarity between the two sub-habitats of each acacia species. This similarity index showed that almost half of the communities in the habitats of A. mellifera were similar. There was more similarity among communities in the habitats of Acacia drepanolobium as well as Acacia brevispica with similarity index of 66.7% and 65.1%, respectively. Life form, density and species richness were correlated positively to each other under the canopies of the study bushes; the correlations were significant in most cases. However, there were negatives correlations between response variables in the un-canopied sub-habitats of all the study bushes, and this might be attributed to the bush species. The soil parameters considered, such as total nitrogen, organic matter, available phosphorus and potassium, were higher under the canopies of the study bushes than in the open area. However, C:N ratios were lower under the canopies compared to the corresponding open areas in each study bush. This might be attributed to high amount of nitrogen under the canopies compared to the open areas due to under-canopy soil enrichment. These variations in soil chemical characteristic can be ascribed to the presence of acacia species in the area. However, the soil textural class was not influenced by the study bushes. Generally, this study indicated that the study acacia species improved their under-storey vegetation production and soil fertility. This implies that if properly managed, the study bushes can contribute to better livestock production in the area.

28. Vegetation Composition, Utilization Practices and Condition of the Rangelands in Boke District, Oromia Region, Ethiopia

Wendwesen Belachew, Lisanework Nigatu and Abule Ebro
Year: 2009

Abstract: The study was carried out in Boke district of West Harerge Administrative Zone of the Oromia Regional State. The objectives of the research were to identify the floristic composition of major grazing areas, assess the rangeland condition in respect to vegetation cover and soil conditions and determine the chemical composition of major feed resources in the study area. It also focused on assessing the traditional rangeland management practices in the study district. Field survey, household survey and chemical analysis of feed samples were conducted to achieve the above stated objectives. Vegetation, soil and household data were collected by stratifying the study area into two different altitudinal zones, namely lower and upper altitude zones based on secondary data and physical observations of the district. A single visit formal survey was employed to document the perception of the communities on overall livestock and rangeland utilization practices using well-structured questionnaires, interviews and visual observation. The vegetation and soil data were collected from upper (three grazing types) and lower altitude zones (four grazing types). The Statistical Package for Social Sciences (SPSS, version 13.0, 2005) was used to summarize and analyze the household and vegetation survey data. According to this research finding, livestock production on rangelands is the major (62.2%) viable economic activity in the study district. Natural pastures and browsing plants contribute the largest share (86.6%) of all the feed resources available for livestock feeding. The household survey indicated that the livestock production systems in the study district were sedentary (62.2%) and transhumance (37.8%). A total of 87 plant species of which 42.5% grasses, 10.3% forbs, 9.2% shrubs/tree, 33.3% shrubs and 4.6% trees were identified in the district. The proportion of legumes in most of the grazing areas studied was very low and insignificant. The study showed that total dry matter biomass (DM), DM of grass, and DM of highly desirable grass species were significantly higher ($P < 0.05$) in benchmark (1657.6, 1522.9 and 744.9 kg/ha) followed by enclosures (1070.3, 873.8 and 237.2 kg/ha) which was significantly higher ($P < 0.05$) than in the communal grazing areas (644.9, 416.9 and 32.5 kg/ha) and significantly the least ($P < 0.05$) was observed in the riverside grazing areas (519.9, 293.5 and 0.00 kg/ha). The total biomass production (kg/ha) was also significantly the higher ($P < 0.05$) in the upper altitudinal zone (1259.9 kg/ha) as compared to the lower altitudinal zone (878.7 kg/ha). These comparisons showed that altitude and degree of disturbance have great contribution to biomass production. The study from both altitudinal zones further revealed that the condition score in the benchmark and enclosure grazing areas were (38.0)and (31.1), respectively, and this two registered significantly better ($P < 0.05$) range condition score as compared to communal and riverside grazing area which the score was found to be (23.3) and (14.5), respectively. This is because of that the former grazing areas (benchmark and enclosure) exercised very light to moderate grazing pressure, while the later ones (communal and riverside grazing areas) are communally owned, and have attracted heavy grazing around them which resulted in the decline of desirable species and encouraged infestation with Pennisetum shimperii and Eluicine flocciofola.. In general, the whole range condition of the area can be classified to be fair (27.5) but with prominent indications that if the trend remains as such, it is likely to worsen. Species of grasses with good palatability such as Cenchrus ciliaris (11.1%), Digitaria milanjiana (10.7%), and Hyparrhenia rufa (12.3%) and Hyparrhenia tuberculata (10.1%) were found in large proprtion of the study area. Out of the total 1289 woody individuals (no/ha), the majority were highly palatable comprising of dominantly Dichrostachys cinerea (16.5%), Acacia tortilis (10.7%) and Terminalia brownii species (10.9%). Structural description also indicates most woody species (71.7%) were in good regeneration and recruitment level. Furthermore, the selected representative palatable grass and woody species for chemical analysis found to be relatively high in average CP content: 8% and 14%, respectively. Based on all the above facts, it can be clearly inferred that the district rangeland has good potential for livestock production. In the contrary, in the study area there exists an intensive cultivated land encroachment and increasing demand to convert grazing lands for crop production. This is associated with that many people consider use (destruction in the author sense) of rangelands as just changing unproductive wastelands into productive farmlands and the communities encouraged in this regard, a practice which leads to an alarming rate of land degradation and destruction of the ecosystem and there by severely affect the livelihood of the community. This is due to the fact that crop production is a risky scheme in most part of the study district. Rainfall is insufficient, erratic and unreliable which is accompanied with high temperature and evapo-transpiration. Therefore, this study suggest that the existing rangelands and pastoral system should not be substituted, but has to be improved through planned and appropriate development interventions for the purpose of community's survival, together with their livestock as well as ecological stability of the district.

29. Vegetation Composition, Biomass Production, and Condition in Bordodde Rangeland, West Hararghe, Oromiya

Zelalem Tesfaye, Lisanework Nigatu and Tamirat Bekele
Year: 2009

Abstract: A study was conducted to assess traditional rangeland use and use practices, as well as vegetation composition, biomass production and condition in the rangeland at Bordode, in Meso district West Hararghe, Oromiya. Data was collected from a total of 44 pastoral household heads from four nearby pastoral villages. They were interviewed by structured questionnaire to collect information on rangeland system; livestock composition; and range resources condition and constraints. A representative area was selected and arranged into a into a different distance group from watering point to help range condition assessment from soil and vegetation parameters. Data on herbaceous (species composition, basal cover, seedling number and age distribution) and woody (tree/shrub umber, tree/shrub composition and percent tree/ canopy cover) vegetation as well as soil (soil erosion, soil compaction and soil bulk density) were collected. Simple descriptive statistics method of data analysis was used for information recorded on traditional rangeland use and use practices. Data collected on soil and vegetation were analyzed using statistical package for social science (SPSS, 1996) was used. Survey results have showed that Farming system in the study area was pastoralism and agro-pastoralism. Livestock production on extensive grazing areas of rangelands was the usual practice and primary livelihood activity. About 29.5% of human population came from the surrounding regions besides the usual increase of the natives in the area. Because of lack of grazing land, lack of livestock, and strategy for the recurrent drought, about 27.3% have started farming. For sustainable rangeland use, improvement of the range condition and avoid excessive degradation, Pastoralists the study areas have adopted method of resting a portion of grazing land for certain seasons and use rotation grazing; use mobility and partition livestock into separate herds depending on their type, productivity, age, sex. But currently, some of these traditional systems of management were also no longer able to cope with reduced size of grazing areas. About 51.85% trees/shrubs and 46.53% grass species were identified to be used as browse and grazing ranging from low to highly palatable for livestock feed. Required qualities and quantities by animals increase with increase distance from watering points. But most important and required species of both woody and herbaceous vegetation by livestock were low in quantity and quality production and cover due to overgrazing. Both quantity and quality in vegetation species investigated to increase as a distance from watering point increase. The ANOVA result of vegetation and soil studies on species composition of trees/shrubs and grasses, basal cover, dry grass biomass production and soil erosion, soil erosion were found significant ($P< 0.05$) for study made among the different distance from watering point groups. There was increased soil erosion in grazing areas nearer to watering point because of the absence quality and quantity cover to prevent soil detachment by raindrops and soil transportation by runoff.

30. Assessment of Rangeland Degradation, Its Effect on Soil Seed Bank Flora and Implications on Carbon Sequestration a Case Study of Allaidege Rangeland, Afar Region, Ethiopia

Kidanie Dessalegn, Abule Ebro and Lisanework Nigatu
Year: 2010

Abstract: A study was conducted at the Allaidege rangeland of zone three of Afar Regional State to assess rangeland degradation, its effect on soil depth on the soil seed bank flora and implication on carbon sequestration. Good, fair, poor and enclosed range sites were selected in order to assess parameters such as range condition scores, species richness, density, composition, diversity and evenness on both standing vegetation and soil seed bank flora (as necessary), while a fifth site (very poor) was latter added to study the effect of degradation on rangeland carbon sequestration as well as soil physical and chemical properties. Three levels of soil depth (0-3 cm, 3-6 cm and 6-9) were also set to examine the vertical distribution of seeds in the soil seed bank; while another three levels of soil depths (0-10 cm, 10-20 cm and 20-30 cm) were established to examine the vertical dynamics of soil physical and chemical properties. The data were analyzed in one-way (extent of degradation) and two-way (degradation and soil depth) ANOVA by using the SAS GLM. Sorensen similarity coefficient and t test were carried out to study the relationship between the two (standing vegetation and soil seed bank flora) communities. GC (Grass species composition), BC (Basal cover) and LC (Litter cover) were significantly higher in the good range site than in the poor one, while SEr (Soil erosion) and SC (Soil compaction) were the opposite. Overall species richness was significantly ($P < 0.01$) different among the range sites. The overall species density also significantly ($P < 0.01$) varied from 6.24 plants m^{-2} in the poor range site, to 20.75 plants m^{-2} in the good range site. Species composition of perennial grass (PG) (5.10%) and desirable forb (DF) (2.02%) were significantly ($p < 0.01$) lower in the poor range site, while that of annual grass (AG) (12.58%), less desirable forb (LDF) (72.76%) and undesirable forb (UDF) (7.14%) were higher. Both Shannon diversity index (H) and evenness (E) were significantly ($P < 0.01$) higher (2.16 and 0.87, respectively) in the poor range site than in the good one (1.59 and 0.70, respectively). The overall species richness of the soil seed bank was significantly ($P < 0.01$) higher (8.46) in the good range site with a non-significant difference among the other three extents of degradation. The overall species density of the seed bank was significantly ($P < 0.001$) higher (859.97 seedling m^{-2}) in the enclosed range site followed by the good one (548.10 seedling m^{-2}); while in the fair and poor range sites, the density was lower and almost similar (277.58 and 325.99 seedling m^{-2}, respectively). The good and enclosed sites had the highest ($P < 0.001$) species density of PG, DF and LDF, while the poor site was highest only in the density of UDF. The good and poor range sites were not significantly ($p > 0.05$) different in all of the species compositions except in UDF. The Shannon diversity index (H) was significantly higher (1.97) in the good range site than in the others. Nevertheless, species evenness (E) was higher (0.93) in the fair range site than in the others. All of the parameters except the species composition were significantly ($P < 0.001$) higher in the shallower (0-3 cm) soil depth than in the others; and these parameters were significantly lower in the deeper (6-9 cm) soil depth than in the others. Apparently, the interaction effects of soil depth and degradation did not show significant ($p > 0.05$) difference on any of the parameters except in the density of desirable forb species. According to the analysis of the relationship between the standing vegetation and the soil seed bank flora, the two communities were also significantly different in most species (PG, AG and DF) composition. Shannon diversity index (H) was not significantly ($P > 0.05$) different between the two communities; however, species evenness was significantly higher in the soil seed bank (0.91 $\pm$0.09) than in the standing vegetation (0.78 $\pm$0.10). There was no significant difference ($P > 0.05$) in soil physical properties among the range sites. A strong significant ($p < 0.001$) difference in pH, EC, N, K and CEC was obtained among the range sites. The interaction effect of degradation and soil depth was not significant for most of the soil parameters. The good and enclosed sites had higher (2.03$\pm$0.26 and 1.93$\pm$0.41%, respectively) OC content in the 10-20 cm soil depth, while the fair, poor and very poor range sites had higher (2.10$\pm$0.22, 1.90$\pm$0.41 and 1.90$\pm$0.45, respectively) OC content in their shallower depth (0-10 cm). The average organic carbon density was about 2.04 g cm^{-3}; and an average of 1.22 Gt carbon was sequestered in the top 30 cm of the rangeland. Generally, this study showed that species richness, density, diversity and evenness of rangeland soil seed bank flora can be altered by degradation, while species composition is more stable until disappearance of most species or colonization of new species occurs. As a result, seeds in the seed bank may assist restoration and rehabilitation of degraded range sites, unless the site is severely degraded. Furthermore, the study also reveals that the contribution of rangelands in carbon sequestration is so immense that they can be considered in climate change mitigation programmes.

31. Characterization, Abundance and Diversity of Invasive Rangeland Weeds in Mieso District, West Hararghe Zone, Ethiopia

Temesgen Terefe, Lisanework Nigatu and J.J. Sharma
Year: 2010

Abstract: A study was conducted in Mieso district of the West Hararghe Zone, Ethiopia, with the objectives of identifying the major problematic invasive and toxic plants, determining the abundance, in terms of biomass/cover and diversity of the identified invasive weeds and assessing type and level of invasion of the rangeland vegetation of the study area. A single visit survey procedure was followed to document the pastoralists' perceptions on changes in the composition of the range vegetation. A total of 160 quadrats in 20 sampling sites, each measuring 20 m x 20 m (400 m^2) were laid out, at an interval of 1.5 km along two parallel transects, each 30 km long and 400 m apart from each other and directed northeast– southwest. Data were collected on broadleaved herbaceous and woody weed vegetation cover, biomass and diversity. A total of 68 plant species belonging to 27 families were identified to be unpalatable by livestock in the area. Of these, 15 were woody and 53 were broadleaved herbaceous species. Ten species were identified to be poisonous or toxic to different species of animals. The data collected on cover abundance indicated that 61.6% of the sampled area was invaded by weeds/unpalatable plants of which broadleaved herbaceous and woody weeds accounted for 30.0 and 31.6%, respectively. The result indicated that Prosopis juliflora, Parthenium hysterophorus and Lantana camara to be the three most invasive weed species and accounted for 64.4% of the total weed invasion of the study area with 38.8, 21.3 and 4.3% cover abundance value, respectively. The other weed species with relatively higher cover abandunce and importance value were Euphorbia hirata and Cissuss rotundiflora. The diversity of woody and broadleaved herbaceous weeds was 3.57 and 2.06, respectively. Parthenium hysterophorus, Euphorbia species and Cissus rotundifolia were highly (0.32, 0.17 and 0.11, respectively) diversified species of broadleaved herbaceous weeds, while Prosopis juliflora (0.36), Lantana camara (0.23) and Senna didymobotrya (0.22) were the highly diversified species of woody weeds of the study area. The ability of invasiveness of the invasive weeds was revealed from the species richness recorded in sample sites. Species richness in the sample sites (1, 6, 14-20) invaded by the highly diversified species was low (2-5), while it ranged from 6-23 at other sites. The mean aboveground dry matter biomass of the total weed collected was found to be high (2.03 ton /ha). The result showed significant ($P < 0.05$) difference between the sample sites for weed biomass and cover abundance value. Southwestern border of the sample sites of transects (border with Afar) was totally invaded by P. juliflora (> 100% canopy cover) pointing out the wide spread of P. juliflora in Afar Region from where it was first introduced to Mieso rangelands. The result also indicated the highest (up to 60% basal cover) invasion of the Northeastern border of the sampled sites of transects (border with west Hararghe highland) with Parthenium hysterophorus that indicated the expansion of this invasive weed from the bordering arable land to the rangelands of the district. Relatively lower weed species cover and aboveground biomass value was recorded in Acacia senegal and Acacia melifera bush encroached sample sites. Taking in to account all the above mentioned variations between sample sites, it may therefore, be suggested that most of the sampled sites have shown the highest level of weed invasion in rangeland. Therefore, necessary interventions such as awareness creation on the effects of invasive plants and their control through utilizations are recommended, in addition to improvement through proper management of the rangeland condition of the study district, in particular, and the Hararghe zone in general.

32. The Impact of Land Use and Land Cover Dynamics on the Vegetation and Soil Characteristics of South Omo Rangelands: The Case of Malle District, Ethiopia

Kinfe Gebre, Abule Ebro and Mohammed Yusuf
Year: 2011

Abstract: The study was undertaken in Malle district of south Omo zone, SNNPR to assess the impact of land use and land cover dynamics on vegetation and soil ecologies of the rangelands in the study district. The perceptions of the community on land use/land cover dynamics was studied through group discussions, semi-structured questionnaire and personal observation to lay foundation for the structured questionnaires. Ninety households were interviewed using the semi- structured questionnaire where each household was taken as a unit of analysis for the type, rate and extent of changes in land use and land covers and the result was determined by interpreting satellite images of the year 1973, 1986 and 2000, and NDVI data of the years 2001-2008 for detecting of the greenness condition of the land use and land cover types. The view of respondents revealed that the deterioration of rangelands of the study district has threaten the living condition of the community as the current status of the rangeland productivity is declining as compared to the past twenty years. Drought, feed shortage due to over grazing, population growth and mismanagement of range resources were perceived to be the probable reasons for the deterioration of the rangelands in the district. As a result of this, the production and the productivity of livestock have been decreased especially at times when the amount and distribution of the rainfall become below the average causing the deficit in livestock feed and water. Sampled household respondents revealed that recurrent drought (45.6%), feed shortage (18.9%), replacement of natural grasses with bushes (15.6%), shortage of water (13.3%), market problem (4.4%) and animal disease are the major constraints for livestock production in the study district. Taking 1973 as a base year in the analysis of the land use and land cover pattern in the study district, six land use and land cover types (i.e. bush land, forest cover, wood land, cultivated land, settlement area and grassland cover) were identified and analyzed using GIS software of ENVI 4.3 and ArcGIS 9.3. As a result, bush land, wood land, cultivated land and settlement areas increased their spatial expansion throughout the study period (from 1973-2000) by 1.2%, 15.6%, 1.7% and 0.6% with a rate of 0.04%, 0.58%, 0.15% and 0.02% per year, respectively. On the other hand, grassland cover and forest cover declined in areas by 16.4% and 5.4% with a rate of 0.59% and 0.2% per year throughout the study period, respectively. A total of 21 grass species, 3 species of legumes and 7 of forbs/herbs were identified in the study district. Basal cover, grass composition, soil erosion, soil compaction and woody vegetation scores of the range condition showed significant differences ($P < 0.05$) between the altitudes and among the three grazing types when interacting each other. Enclosure areas had the highest significance ($P < 0.05$) in their range condition score than communal and riverside grazing areas. Sand, clay, silt, total Nitrogen, available P, organic matter content and CEC (K, Ca, Mg and Na) of the soil parameters exhibited significant difference among the grazing types and altitude categories. In general, man induced factors such as de-vegetation, overgrazing by livestock, natural factors such as recurrent drought occurred at least in a periods between 5-10 years, socio-economic factors such as land right, utilization and management implementation problems, lack of infrastructural and social institutions, and population growth together with the growing needs of the community caused the land use and land cover changes in the study district.

33. The Influence of Resettlement on Pastoral Land Use and Range Vegetation in Bench-Maji Zone, Southwest Ethiopia

Yonas Berhanu, Lisanework Nigatu and Fekadu Beyene
Year: 2011

Abstract: A study with the objectives of exploring the influence of resettlement on pastoral land use pattern, evaluating the emerging challenges to the present pastoral production system, common property rights, and livelihood and resource management and examining local communities' perception in relation to the current resettlement program was conducted in Meinit-Shasha district (wereda) of Bench-Maji zone, SNNPR, Ethiopia. Two purposively selected kebeles were used for this study. The agro-pastoralists perception on rangeland condition and the influence of resettlement were assessed through group discussion and structured questionnaire (94 households), where household heads were taken as unit of analysis. Vegetation and soil condition were investigated in 40 quadrats, in 20 sampling sites, each measuring 20 m x 20 m (400 m^2) that distributed along transects. The investigation included the assessment of grass composition, basal cover, litter cover; number and age distribution of seedlings and soil conditions (erosion and compaction), which were investigated on 1 m x 1 m ($1m^2$) area. Herbaceous species biomass, woody species composition, density, richness and diversity as well as soil chemical properties and texture were also examined. Data from socio-economic survey was analyzed by SPSS while vegetation and soil parameters were subjected to SAS computer software. The main source of income for the households in Eara (resettlement free) was from the sale of live animals (70.2%), while for the Bass (resettlement kebele); it was from livestock products (36.2%) and sale of crops (23.4%). The mean land holding was significantly ($P < 0.05$) higher for the households in Eara (7.38 ± 0.40) than Bass (6.06 ± 0.24). Rangeland degradation, inadequate feed, lack of grazing land and disease were the major livestock production constraints in the study area. Enclosing the land (62.8%), herd movement (20.2%) and burning (17%) were the basic traditional range management practices practiced in the study area. The main causes for the degradation of rangeland were expansion of farm lands, overgrazing, expansion of settlements and, harvesting of wood and NTFP. Large percent (87.2%) of the respondents in resettlement kebele did not agree with the current resettlement program. Alienation and demarcation of land for resettlement resulted in expansion of crop farms (42.6%), conversions of fallow land (27.7%), reduction of grazing lands (19.1%) and conversion of forest lands (10%) in Bass but no change in land use observed in Eara. Conflicts were prevalent in the study area and spontaneous privatization of communal areas, demarcation of communal lands for pasture and farm, water and pasture use, ownership right over rangeland resources, enclosed and settlement area were the major contributing factors for conflict between households. The study revealed that, there were significant differences ($P< 0.05$) in ratings for grass composition, basal cover, seedling number, soil erosion and compaction among the kebeles. The total range condition score showed that the resettlement kebele was towards poor range condition, whereas the resettlement free kebele was under fair condition. Reduction of grazing lands, expansion of crop cultivation, expansion and establishment of permanent settlements following the resettlement were considered to be the main contributing factors to the relatively lower condition scores observed in the resettlement kebele. Woody species composition and density showed significantly ($P < 0.05$) higher score for Eara than Bass. Higher woody species diversity also recorded in Eara.OM, TN, P, and K showed significant ($P < 0.05$) variation between the kebeles. However, pH and soil texture showed non-significant differences ($P > 0.05$).The study showed that higher level of degradation in resettlement kebele which needs further improvement intervention while the resettlement free kebele needs maintenance of the existing condition. Generally, this study indicated the current resettlement program has a negative influence on the inhabitants' livelihood, resources utilization and management and rangeland vegetation. Considering all the above mentioned variations between the kebeles, it may therefore, be suggested that the resettlement of farmers who had different culture in dealing with land and rangeland resources was more of a top-down exercise and had multiple negative influence on hosts, host-resettler relations, and the environment because it did not pay due attention to the very people who are the victims of rangeland degradation and the consequences of the program on both the environment and the host population. Therefore, proper host consultation, planning and preparation, recognition of differences in land use and economic activity of both communities, consolidating concerns of the host, minimizing conflict and securing inhabitants land tenure are recommended to sustain the socioeconomic condition of the inhabitants in particular and total population in general, to improve and prevent rangeland from further degradation.

34. Diversity, Composition and Biomass of Grassland Vegetation in Danno District, Western Shewa Zone of Oromia, Ethiopia

Alemayehu Kumsa, Abule Ebro and Lisanework Nigatu
Year: 2012

Abstract: The study was conducted in Danno district with objectives of investigating the species diversity, botanical composition and biomass production of the grassland vegetations. The district was stratified into three altitudinal locations (sites) at an interval of 300- 400: Low (1400-1750 masl.), medium (>1750-2100 masl.) and high (>2100-2400 masl.) by using GARMIN GPS v.6.0. From these locations protected (benchmark) and unprotected (communal) grasslands with similar age and management were chosen. From both communal as well as the bench mark grasslands, an area of 1 km x 0.05 km was selected twice from each of the altitudinal locations. Each of these sample sites were further sub-divided into five plots of 250 m X 50 m and in each sub-divided plots, a belt transect of 20 m X 10 m was randomly laid out across the plots Then, five square shaped quadrates of 1 m^2 were randomly established at each corner and center of the belt transects. The species diversity was done by using the Shannon-Wiener index formula $Hi' = (-) \sum (P_i.\ln P_i)$. The species composition of the herbaceous layer was determined by using a wheel point apparatus. For the determination of biomass production, the herbaceous vegetation were clipped at ground level by using hand shears. Then, the clipped herbaceous species were air dried first and then oven dried at 70 C^o for 48 hours. Finally, the samples were weighed using sensitive balance. Descriptive statistics was used to analyze species diversity and species composition and the mean biomass production was done by using SAS v.6.0. The results of species diversity (H') indicated that the benchmark grassland vegetation had higher diversity index values than the communal grassland vegetation across the three locations. The highest species diversity (H'=2.857) was obtained in the benchmark grassland vegetation at high altitude. The Medium species diversity values were determined in communal (H'=2.172) and benchmark grassland (H'=2.701) vegetation at mid altitude. The lowest species diversity (H'=1.725) was recorded in the communal grassland vegetation at low altitude locations of the district. The similarity study showed that there was variability among the grassland types and locations. In this study, the Importance Value Index (IVI) showed different figures among the grassland types as well as different locations. Similarly, the study of composition and biomass production of the grassland vegetation showed differences among the grassland types as well as different locations. Hence, an immediate and relevant restoration and protection measure is very important to save the grassland ecosystem, and the productivity of livestock and hence the livelihoods of the community would be affected.

35. Pastoralists' Perception, Vegetation Diversity and Condition Assessment in Rangelands of Kafta-Humera Woreda, Tigray Regional State, Ethiopia

Gebrehaweria Kidane, Lisanework Nigatu and Abule Ebro
Year: 2012

Abstract: The study was conducted in Kafta-Humera Wereda of western zone of Tigray Regional State, with the objectives of assessing the pastoralist perceptions on rangeland resources and utilization, investigating the vegetation composition, rangeland diversity, herbaceous and browse plants biomass production of the rangelands and evaluating the conditions of rangeland based on vegetation and soil physical characteristics. The pastoralists' perceptions were studied through group discussions, personal observation, and using semi-structured questionnaires where 90 households were interviewed. The study woreda was stratified in-to three altitude ranges of 600-1000, >1000-1400 and >1400-1800 masl. and further in-to different grazing types; communal, enclosures and riversides, to study the condition of the rangelands. Basal cover, number of grass seedlings, age distribution of grasses, soil erosion, soil compaction, grass species composition and woody density were measured for range condition scores. The dominant type of production system was mixed farming system (84.4%), where crop like sesame and sorghum, and livestock rearing (mainly cattle) are mainly practiced. As the respondents (58%) replied, livestock number per unit area has increased in time. The major feed resources in the study area were natural pasture followed by crop residue. Feed shortage, cultivation of rangeland, recurrent drought and disease were identified as the major livestock production constraints. Mobility, use of collected feed, sale of animals and use of fodder trees were some of the copping strategies to the observed constraints. Over grazing, human population pressure, crop expansion, increase in livestock density and recurrent drought were the factors contributing to poor rangeland condition. Herd mobility, enclosing grazing land, herd splitting and livestock diversification were some of the traditional rangeland managements. A total of 23 species of grasses, 36 species of non-grasses and 31 species of woody vegetation were identified. In the lower altitude, communal (26.96 ± 0.81) and enclosure (25.17 ± 0.54) areas were floristically richer ($P < 0.05$) in taxa than that of riverside grazing (22.44 ± 0.57) sites. In the middle altitude, communal and riverside grazing areas had significantly ($P < 0.05$) higher species richness and diversity than enclosure grazing area. In the upper altitude, all the diversity indices in communal rangelands were found to be significantly higher. The larger proportion of the woody plants was found in the lower and middle height classes (0-2 m = 25.32% and >2-5% = 38.6%). The study also showed that total dry matter biomass (DM) and DM biomass of grasses were significantly ($P < 0.05$) higher in enclosures of all altitude zones. The communally grazed land in the upper altitude showed significantly higher total DM (3.28 ± 0.18) and DM biomass of grasses (2.78 ± 0.18) than in the other altitudes. Generally, there was no sound difference in browse biomass production among the grazing types. The communal grazing land in the mid altitude had significantly ($P < 0.05$) higher browse biomass than the other altitudinal ranges due to the dominance of the Dovyalis abyssinica. Regarding the range condition, enclosure areas were found in a good condition while communal and riversides were in fair and poor condition classes, respectively. Therefore, appropriate interventions should be planned to improve the rangeland condition. The community should be aware of proper rangeland management and improvement measures such as proper grazing management, establishing dry season grazing reserves and collecting feed reserves.

36. Livestock Production Status, Traditional Utilization and Chemical Composition of Major Browse Species in Range Lands of Mieso, Ethiopia

Kiros Welay, Lisanework Nigatu and Getachew Animut
Year: 2012

Abstract: This study was conducted in Mieso district, Ethiopia with the objective of assessing livestock production, possible constraints and traditional utilization, determine the nutritive value and potential yield of major browse species. Data on traditional utilization and livestock production constraints were collected by group discussion with elders and questioners. Six major browse species were selected based on traditional uses, fair accessibility, palatability and preference by animals and ability to maintain greenness for long dry season with the help of skilled field assistant and elders. Nine circumference measurements for each browse species were taken to estimate the potential dry biomass. The foliage (leaves) of major browse species were collected in the field for nutritive quality, in sacco and in vitro evaluations. The main livelihood base in the study area was livestock production. Milk is the main food for Mieso pastoralist and in general dominated by cow's milk (42.7%) followed by camel and goat milk (32%) in male headed households and 50% of cow milk supplemented by 27.8% of goat and camel milk in female headed households. Trends in livestock population, grazers in particular, were decreased, but browsers replaced grazers and increased per household over the period of last 30 years. Recurrent drought (86 %) is a primary constraint in the district followed by feed and water scarcity (64.5%) for livestock production. Leaves, pods, twigs and fruits were the plant parts utilized by livestock. Browse species also had many uses like as a source of fire wood, medicinal values and the majority of fruits were consumed by both human and livestock. Significant difference ($P < 0.05$) in potential biomass yield was observed between browse species. There is also Significant difference ($P < 0.05$) in CP, NDF, ADF contents among browse. The highest CP was observed in Grewia ferruginea (19±0.12%) and Grewia tenax (18.7±0.57). The lowest ($P < 0.05$) CP was noted for Rhus natalensis (15.5±0.19%). In vitro dry matter digestibility (IVDMD) of browse species was lowest (42.08 %) in Rhus natalensis and highest (63.55 %) in Acacia mellifera. In sacco degradability of the browse species were ranked as Acacia mellifera > Ziziphus mauritiana > Grewia ferruginea > Grewia tenax > Grewia tembensis > Rhus natalensis. The present result suggest that livestock to be the main stay of people in the study area, and browse species to have a valuable role in feeding of animals and other worthy traditional uses. Therefore, in-depth studies on the nutritional and medicinal and /or other traditional values of major browse species used in this study and others should be conducted. Long term development strategies should also target in creating awareness and developing means to combat the constraints of livestock production noted in the area, to enhance the role of livestock and the livelihood of pastoralists.

37. Composition and Diversity of Invasive Plant Species and Their Socio Economic Impacts on Livelihoods of Pastoralists in the Rangeland of Telalak District, Afar Regional State, Ethiopia

Natnael Demelash, Lisanework_Nigatu and J.J. Sharma
Year: 2012

Abstract: The study was conducted in the Telalak district of Afar Regional State of Ethiopia during Aug. to Nov. 2010 with the objectives of investigating the composition and diversity of the invasive plant species, their effects on native rangeland vegetation and assess the socio economic impacts on the livelihoods of the local people. Forty quadrats were laid out in two parallel transects, each 20 km length and 1 km apart from each other, to investigate the composition, diversity, abundance and cover of woody invasive plant species. Five sub quadrats in each quadrat were laid out and a total of 200 sub quadrats (1 m^2) were used to assess the dry matter biomass production, abundance, cover, composition and diversity of the herbaceous invasive plants. Data were collected through semi structured questionnaires, group discussion and visual observations to assess the socio economic impacts as well as the local people's perception towards the invasive plant species. Thirty two invasive plant species classified under 18 families were identified and recorded. Of these 11 were trees/ shrubs invasive and 21 non grass herbaceous invasive species. The result of cover-abundance values estimated indicates that 80% of the sampled areas were invaded by rangeland invasive species. There was a significant difference between infestation levels in coverage with in the same site. The overall diversity index (H) and evenness (E) of the rangeland invasive plants in the study area were 3.64 and 1.04, respectively. The result revealed that, there was a significant difference ($p < 0.05$) in dry matter biomass production within and among the sites at different infestation levels. The total dry matter biomass production in the 2nd site was 316 and 798 kg per sample site (4000 m^2) in higher and moderate infestation level, respectively. The total dry matter biomass production in the 1st site was 265 and 684 kg per sampled area (4000 m^2) in highly and moderately infested levels respectively. Acacia mellifera, A. senegal, A. nubica, and Grewia villosa were the most dominant woody invasive species in the study area. It was found that draught, overgrazing and encroachment by invasive plants were the major rangeland constraints in the area. Invasive plant species had an adverse effect on animal production and productivity, crop production, human health and livelihoods of the local people. It may therefore, be suggested that most of the sampled sites had shown the highest level of invasion in the rangeland. Therefore, necessary interventions like prevention, mechanical and biological controlling mechanisms are recommended, in addition to general improvement of the rangelands in the sample sites of the study area. Governmental and NGOs should exert the maximum possible effort to control these destructive and noxious invasive plants so that animals, human beings and the environment could have a better future.

38. Study of Smallholder Farms Livestock Feed Sourcing and Feeding strategies and Their Implication on Livestock Water Productivity in Mixed Crop-Livestock Systems in the Highlands of the Blue Nile Basin, Ethiopia

Bedasa Eba, Amare Haileslassie and Getachew Animut
Year: 2013

Abstract: This study was conducted to assess livestock feed sourcing and feeding strategies and their implications on livestock water productivity (LWP) in mixed crop-livestock production systems of the Blue Nile Basin (BNB) in Ethiopian Highlands. Three Woredas (Diga, Jeldu and Fogera) representing diverse agricultural farming systems were considered. One watershed in each Woreda, which is Dapo from Diga, Meja from Jeldu and Mizuwa from Fogera were selected. Each watershed further stratified to different farming systems depending on cropping pattern and landscape positions. Accordingly seven farming system has been identified. Diga has *teff*-millet and maize-sorghum farming systems; Jeldu has barley-potato*, teff*-wheat and *teff*-sorghum farming systems; and Fogera has *teff*-millet/maize and rice-pulses farming systems. A multi-stage stratified random sampling technique was employed to select farm households. A total of 220 household were selected: where 67 household from Diga, 91 household from Jeldu and 62 household from Fogera Woreda. A structured questionnaire, group discussions, plant biomass sampling, literature and survey were done to generate data on farmers feed sourcing and feeding strategies. To estimate livestock water productivity, water depleted (evapotranspired) for livestock feed was estimated using reference evapotranspiration and crop coefficient and then LWP was estimated as a ratio of livestock's beneficial outputs and services to depleted water. The results indicated that the major feed sources in the BNB were mainly from natural pasture and crop residues. Improved feed sources including those with denser metabolisable energy were not reported. The share of crop residues on dry matter basis was highest in all study sites. In the study farming system the contribution of crop residues to livestock feed sourcing varied among farming systems and it ranged from 58.5% to 78.2%. Generally access to crop residues by the households is a function of crop composition and productivity at farm scale and thus varies across study systems. For example in Diga and Fogera, the dry matter of crop residues per household were greater for maize-sorghum and rice-pulses systems, respectively at $P < 0.05$. Similarly dry matter from private grazing land showed significant differences among the farming systems in Jeldu and Fogera at $P < 0.05$. The feed storage, feeding strategies and utilization techniques were relatively similar among the study farming systems but the magnitude varies in Woredas. In response to low biomass yield feed deficit in terms of metabolisable energy predominated in all farming systems, except maize-sorghum system of Diga. The water depleted for feed production (m^3ha^{-1}) and feed water productivity (FWP) (kg m^{-3}) were greater for maize-sorghum and rice-pulses systems of Diga and Fogera Woreda, respectively at $P<0.05$. FWP for Jeldu systems was also differed ($P < 0.05$). The productivity of livestock per TLU (US$ TLU^{-1}) was greater only for maize-sorghum system in Diga at $P < 0.05$. There was no significance difference ($P > 0.05$) observed in LWP within all Woreda between the farming systems, and the value falls between 0.15-0.19 US$ m^{-3}. However, when farm households clustered into wealth status difference of LWP was observed within all farming systems (ranges 0.08-0.24US$ m^{-3}) and lower value of LWP general observed for the poor farm households. Such big gap of LWP for farm households operating in the same farming system suggests a potential for improvements. Such big differences of LWP values among farm household can be accounted for by the strategies farm households are following in feed sourcing and how water productive those feed sources are. Although divergences in feeding strategies and livestock beneficial outputs were not vivid, among the systems, empirical evidences suggests that these are also a good entry points to improve LWP. Hence, in the context of this work, options to improve LWP mainly involve sourcing water productive and higher quality feed.

39. Regeneration of Natural Pasture in the Rangelands of Jigjiga District, Somali Regional State, Ethiopia

Hassan Ali, Lisanework Nigatu and Alemayehu Mengistu
Year: 2013

Abstract: A study was conducted in Jig-jiga district of the Jigjiga Zone, Somali Regional State of Ethiopia, with the objectives of investigating species composition and diversity of the vegetation cover, the composition and density of plant species in the soil seed bank and assess the regeneration capacity of the vegetation. A single visit survey was conducted in the study area to document the pastoralists & agro-pastoralists' perceptions on overall livestock and rangeland management practices through visual observations, group discussions and structured questionnaire. A total of 45 quadrats each measuring 20 m × 20 m (400 m^2) were laid out randomly in 9 sample sites from three corresponding land use types (i.e. twenty years enclosure, five years enclosure and communal grazing land). From each land use type three sites having 5 quadrats were investigated. Each quadrat was laid out at an interval of 400 m in five parallel transects each 200 m apart from the other, in order to collect data on the herbaceous and woody vegetation cover, soil condition and soil seed bank. There was significant ($P < 0.05$) difference for soil erosion and compaction between the land use types & high degree of soil erosion and compaction exhibited in the open gazing land use. The study also revealed that significant ($P < 0.05$) variation occurred between land use types in grass species composition, basal cover, age category, and herbaceous species richness. Relatively higher mean values were recorded for all these parameters in the five year enclosure land use type and intermediate value scored in twenty year enclosure followed by those in the open grazing land use type. The total herbaceous species recorded in the study district were 39. These were 14(35.89%) species of grasses and 25(64.10%) non-grass species. The non-grass comprises 1 species of legume, and 24 species of other herbaceous plants. Whereas in the two enclosure land use types abundant grass species such as Chrysopogon aucheri, Cenchurs ciliaris, Cynodon dactylon, Aristida mutabilis, Digitaria abyssinicum, Digitaria spp. Hyparrhenia hirta and Tragus heptahuron all occurred frequently forming the major constituents of the sites . There was significant ($P < 0.05$) variation in woody species composition. The highest woody species richness was scored in sites from the twenty year enclosure and five year enclosure land use types, whereas, the least woody richness was scored in the open grazing land use type. Whereas relatively adequate proportion of important woody species such as Acacia ethbaica, A. nilotca, A. nubica, A. bussei, A. tortilis, A. brevespica and Balanites glabra were recorded in twenty yeasr enclosure land use type followed by the five years enclosure land use type. The soil seed bank study revealed that a total of 38 species representing 15 families of flowering plants germinated in the green house experiment. The forbs comprised 63.15%, grass 31.57% & legumes 5.26%, of the total germinated plant species. There was significant ($P < 0.05$) difference in seedling density and species composition along land use type and layers. There was lower similarity between species composition in soil seed bank flora and standing vegetation (Jaccards similarity index=16%).The present study revealed that, the two enclosures land use type in the Jig-jiga rangeland have shown relatively higher level of soil and vegetation cover, woody species regeneration potential and soil seed bank flora. Therefore, expansions of enclosure with proper grazing management and planting of native flora seedling are recommended for improvement of the Jig-jiga rangeland.

40. Effect of Human Settlement on Rangeland Productivity and Biodiversity in Kafta-Humera Woreda, Tigray, Ethiopia

Teame Gebrehiwot, Tessema Zewdu and Emiru Brhane
Year: 2013

Abstract: This research was conducted in Kafta-Humera Wereda of western zone of Tigray Regional State, to determine the effect of human settlement on rangeland productivity and biodiversity. Plots were laid under three altitudinal ranges (600-1000, >1000-1400 and >1400-1800 masl.) along three distance intervals near (0-2 km), middle (2-4 km) and far (4-6 km) from settlement. The Statistical Package for Social Sciences (SPSS, version 16.0, 2013) was used to analyze the vegetation and soil data. In the study districts, a total of 39, 30, 15 and 46 species of grasses, forbs, herbaceous legumes and woody species were identified, respectively. There was an increase in grass abundance and decrease in non-grass species with increasing distance from settlement. Species diversity and species richness were lower in the middle and lower altitudes than higher altitudes. Species diversity and species richness were lower near to settlement than far distance from settlement. Total grass biomass increased both with increasing distance from settlement and increasing altitudinal ranges. The mean grass biomass of near, middle and far distance from settlement were 113.59, 622 and 1102.56 kg ha^{-1} respectively. Similarly, the mean grass biomasses of the low, middle and upper altitude were 349.8, 542.7 and 945.7 kg ha^{-1}, respectively. Woody species diversity and plant abundance increased with increasing altitude and were significantly lower near to settlement than middle and far distance. Woody biomass production in lower altitude was significantly lower than middle and upper altitudes. The far distance interval from settlement had significantly higher organic carbon, organic matter, available phosphorus and available potassium than middle and near distance interval from settlement. The upper altitudinal range had significantly higher organic carbon, organic matter, available phosphorus and available potassium than the lower and middle altitudinal ranges. Generally, the study area was highly dominated by the annual herbaceous and thorny woody species. This implies that there is undergoing reduction in soil quality, biodiversity and productivity degradation. Therefore, appropriate plan of soil and biodiversity conservation such as establishing, designing and implementations of watershed management for physical and biological conservation should be planned to minimize loss of biodiversity.

41. Socio-Economic Value Assessment and Nutritional Qualities of Indigenous Multi-Purpose Fodder Trees in Three Districts of Wolayta Zone, Southern Ethiopia

Takele Geta, Lisanework Nigatu and Getachew Animut
Year: 2013

Abstract: The objectives of this study were to characterize and assess socio-economic values of the indigenous multipurpose fodder tree (MPFT) species, and evaluate the chemical composition, in-vitro and in-sacco DM degradability of selected indigenous MPFTs. The study was conducted in 3 districts of Wolayta Zone of Southern Nations Nationalities and Peoples Regional State. From each districts 3 Kebeles were taken and a total of 270 households were used for interview using structured questionnaires, from the survey 28 indigenous MPFT species were identified, that can increase feed resource base in the area. Respondents noted that MPFTs provide food and feed, shade, traditional medicinal value, to improve shelf life and flavor of milk, social values, and as source of household income. The feeding system of most indigenous MPFTs to livestock in the area is by cut and carry, pitting, browsing, looping leaves, young tips and twigs, and pods of fruit. Respondents believe that MPFTs can serve to provide nutrients for maintenance, milk production and growth of animals. But about 70% of the respondents appeared to have a knowledge gap about the feeding value of MPFTs. The five MPFT species identified as important in this study for biomass estimation and laboratory analysis were E. brucei, V. amygalina, E. cymosa, C. africana and D. abyssinica. About 98% of the respondents in the study districts own E. brucei, 87% own V. amygalina, 90% have E. cymosa, 74% own C. africana and 82% own D. abyssinica. Biomass yield of the selected MPFTs ranges from 25 kg for D. abssinica in Humbo district to 959 kg for E. brucei in Sodo Zuria district, and vary significantly ($P < 0.05$) among the selected MPFTs and among the districts. The five selected indigenous MPFT species had chemical composition ranges of 11–21% CP, 8-14% ash, 38-56% NDF, 33-51% ADF and 9-17% lignin, indicating their wide variability among species ($P < 0.05$). The IVDMD of the five selected MPFT species is generally high and ranges 37-54%, and was lower ($P < 0.05$) for C. africana than other species. Potential and effective in sacco degradability ranged 40-83% and 24-63, respectively, and were in the order of D. abssinica > E. cymosa > V. amygdalina > E. brucei > C. Africana. In conclusion, the indigenous MPFT species can be considered to be a potential source of CP to supplement poor quality roughages to fill the gap especially in dry season.

IV. Animal Nutrition

1. Effects of Feed Restriction on the Subsequent Performance of Rhode Island Red Chicken

Etalem Tesfaye, Berhan Tamir and Tadelle Dessie
Year: 2006

Abstract: The performance of Rhode Island Red (RIR) chicken subjected to feed restriction by skip-a-day method during starter and grower periods was evaluated at Haramaya University Poultry Farm. The objectives of the study were: (1) to evaluate the effect of feed restriction in relation to age, body weight and egg weight at the onset of egg laying; (2) to assess the effect of feed restriction on carcass yield characteristics; and (3) to evaluate the economic benefits of skip-a-day feeding system. Two-hundred forty chicks day-old with similar body weight of 48.92±1.53 g were randomly distributed using CRD into 12 pens each with 20 chicks, representing four feeding regimen each with three replications. The four feeding regimen consisted of T_1 (Unrestricted, Control), T_2 (Restricted at 7, 14, 21 and 28 days of age), T_3 (Restricted at 35, 42, 49 and 56 days of age) and T_4 (Restricted at 63, 70, 77 and 84 days of age). Feed restriction was based on skipping-a-day and the next day's feed offer was based on the previous day's feed intake. The experiment lasted for 22 weeks, during which dry matter intake (DMI) and body weight change were measured. At the end of the experimental period, 6 pullets from each treatment were randomly selected and sacrificed to evaluate the effect of feed restriction on carcass yield, fat percentage and weights and lengths of different parts of gastrointestinal tract and reproductive tract. Data were subjected to analysis of variance for all parameters considered. The daily DM, CP and ME intake as well as body weight changes of birds subjected to feed restriction at different ages were similar ($P > 0.05$) with the unrestricted groups. The DM efficiency ratio also did not varied ($P > 0.05$). The average days to lay first egg was significantly different ($P < 0.05$) between treated and the control groups, with 140.8±0.8, 140.17±2.5, 147±2.2 and 143.83±2.3 days for the respective treatments. There was also a difference ($P < 0.01$) in body weight and egg weight at the onset of egg lay. Except for yolk diameter and shell thickness ($P < 0.05$), the egg quality parameters considered were not significantly ($P > 0.05$) different. The absolute and relative weights of different parts of oviduct were significantly ($P < 0.01$) different among treatments and the control. The length of oviduct was different ($P < 0.01$), but percentage was similar ($P > 0.05$) between the groups. Besides the weight of ovary and number and diameter of yellow follicles were not significantly ($P > 0.05$) different but not the weight of white follicles ($P < 0.05$). It was lower for T_3. The weight and percentage of GIT and total giblet and parts of giblets were not ($P > 0.05$) affected by feed restriction except liver weight which was higher ($P < 0.05$) for T_3. From the carcass yield parameters, dressed weight, abdominal fat free carcass, carcass with abdominal fat and breast meat weights were significantly ($P < 0.05$) different. Abdominal fat weight and percent weight were also different ($P < 0.01$) between treatments and the control. The weight of drumstick-thigh showed significant ($P < 0.01$) difference between the groups. The relative weight of abdominal fat free carcass, carcass with abdominal fat, breast meat and drumstick-thigh carcass cuts did not vary ($P > 0.05$). Results on mortality during the experimental period indicated insignificant ($P > 0.05$) difference between treatments and the control. Cost of feed consumed per kilogram live weight gain (with 14.96, 13.40, 13.97 and 12.51 Birr) for respective treatments was lower for the feed restricted birds than the control and it was the least for T_4. Besides, the labor cost was lower for the feed restricted group than the unrestricted group. Bird sale to feed cost showed also an increasing trend for the treated birds. The results of this study suggested that the feed restriction at T_4 (feed restriction at later days of age) might be economically considered as beneficial as compared to the control and feed skipping at T_2 (early age feed restriction) stages of growth.

2. Replacement of Formulated Concentrate Mix with Vetch (*Vicia dasycarpa*) Hay to Lactating Crossbred Dairy Cows Fed on Urea Treated Wheat Straw

Getu Kitaw, Solomon Melaku and Eyasu Seifu
Year: 2006

Abstract: The experiment was conducted at Holetta Agricultural Research Center with an objective to see whether vetch legume hay can partially replace a formulated concentrate mix in the daily ration of lactating crossbred cows fed urea treated wheat straw. Eight crossbred cows of same current milk yield (8-10 kg d^{-1}), body weight (360± 40 kg) age of lactation (early lactation), but differing parities were arranged in 4 x 4 double latin square design to receive treated wheat straw based diet ad libitum and supplemented with concentrate mix (T1), 25%(T_2), 50%(T_3) and 75% (T_4) replacement of the concentrate mix with vetch (*Vicia dasycarpa*) hay.The concentrate mix consisted of 74% wheat bran, 25% noug (*Guizotia abysinica*) cake and 1% salt. Laboratory analysis and degradability studies showed that both supplements were very similar except that a relatively faster rate of degradation constants have been noticed for vetch hay implying, the necessity of supplying escape nitrogen and energy sources. Dry matter intake was significantly different ($P < 0.05$) for total DM intake, where those cows on T_3 consumed the highest DM ($P < 0.05$) compared to cows on the remaining treatments. Differences among dietary treatments for milk yield and milk composition parameters were non- significant except that cows on $T_{1\ produced}$ significantly ($P < 0.05$) higher milk yield than cows on T_4. Live weight changes of experimental cows showed no significant difference ($P > 0.05$). Similarly, in an experiment conducted to see DM and nutrient intakes and whole tract apparent nutrient digestibility, non-significant differences ($P > 0.05$) were observed both among and between the vetch supplemented and T_1 except that NDF and ADF intakes of cows on T_3 were significantly higher ($P < 0.05$) over those cows maintained on T_1 and T_2. Energy digestibility of dietary treatments were significantly different ($P < 0.05$), with higher digestibility recorded for T_3 over T_1. CP and ME intakes were sufficient to meet daily requirements for the observed mean daily milk yield (6.5 kg). In general, economic analysis showed that vetch replacement of concentrate mix at the rate of 50% replacement was economically feasible than the control group and the remaining dietary treatments. Therefore, from the present study, it can be concluded that vetch can optimize both biological and economic response of dairy cows when supplemented at the rate of 50% replacement of formulated concentrate mix.

3. Livestock Production Systems and Available Feed Resources in Different Agro-Ecologies of North Gonder Zone, Ethiopia

Sisay Amare, Solomon Melaku and Zeleke Mekuriaw
Year: 2006

Abstract: The study was conducted in North Gonder Zone of the Amhara Regional State of three woredas, which represent all agro-ecology of the zone. In title of qualitative and quantitative aspects of animal feed in different agro-ecological areas of North Gonder, with the objectives of: generating base line information about livestock feed production system, and to identify the quality and quantity of available feed resources in the study area. The major livestock feed available in the study areas was crop residues, natural pasture, hay, crop aftermath and some indigenous fodder trees. In the study area, the mean utilizable DM yield of crop residues in the study areas was 2.39, 2.46 and 3.68 tones per household in Debark, Layarmachiho and Metema woredas, respectively. Moreover, the contribution of crop residues to the total feed DM was 46.4%. There is significantly higher ($P < 0.01$) crop residues were produced in Metema woreda than Debark and Layarmachiho woredas. The DM yield of natural pasture from Metema is higher ($P < 0.01$) than from Debark and Layarmachiho woredas. Whereas, hay from Layarmachiho and Metema was higher ($P < 0.01$) than that of Debark. The mean contribution of DM from fodder trees was only 0.3% of the total DM available. In cases of the quality of available feeds, the total ME supplied by the types of feed per household per annum amounts 43,726.9MJ, whereas the DCP obtained from available feeds was 373 kg per annum per household at Debark woreda. Moreover, for Layarmachiho and Metema woredas the total ME, and DCP produced were 47,263.9MJ and 415.6 kg of DCP for Layarmachiho and 76,636.81 MJof ME, and 736.75 kg of DCP was supplied for Metema woreda. The nutrient requirement of livestock for maintenance was estimated based on the recommendations of Kearl (1982) and McCarthy (1986) for tropical livestock. The annual ME and DCP requirement is therefore, 46,524.1 MJ of ME and 506.4 kg of DCP for Debark, 47,395.7MJ of ME, and 508.4 kg of DCP for Layarmachiho and 69.773.3 Mjof ME, and 691.2 kg of DCP for Metema was required by the livestock per annum. Generally, the nutrient balance obtained from this study indicates that energy and protein was deficient by 6.1% and 26.3%, respectively, for Debark and 0.3% of energy 18.3% of DCP was deficient for Layarmachiho for the maintenance requirement of livestock per annum. But for Metema woreda the energy and the digestible protein was 9.8% and 6.5% of ME and DCP, respectively was produced annually above the maintenance requirement. Finally, the study indicates that an integrated effort of different stakeholders was required in improving the quality and the quantity of feed resources to exploit the potential of the livestock resources per unit of time and money.

4. Identification and Nutritional Characterization of Major Browse Species As Livestock Feed In Abergelle Woreda of Tigray, Ethiopia

Teferi Aregawi, Solomon Melaku and Lisanewerk Nigatu
Year: 2006

Abstract: The research took place in 8 representative PAs in Abergelle woreda of Tigray, Ethiopia with the objective of identifying the major browse species and manners of utilization by livestock, to evaluate the potential biomass yield, chemical composition, in vitro dry matter digestibility and in sacco degradability characteristics of the browse species. A list of twenty browse species were identified, out of which twelve were selected based on their abundance in the woreda, preference by livestock, ease of browsing and additional uses other than livestock feed. According to the respondents, nearly all the domesticated ruminants in the survey area consumed browse species. Browses were utilized in both wet and dry seasons. Certain browse species shed leaves early, while others retained leaves late into the dry season. Leaves, pods, twigs and flowers were the plant parts utilized by livestock. However, leaves were the most preferred part. The browse species were found on grazing land, crop land, in home compounds or grown as boundary plant species between farm lands. The farmers did not attach great importance to the fodder value of the browse species and so do not manage them as such. Significant difference ($P < 0.05$) in potential biomass yield was observed between browse species. There is a wide variation in CP, NDF, ADF, ADL, ash and tannin contents within a season for both wet and dry seasons. The CP, NDF, ADF, and tannin contents of the browse species during the wet season were relatively higher than in the dry season. The mean values for IVDMD of the browse species during the wet season (67.6%) were relatively lower than in the dry season (71.74%). The browse species differed ($P < 0.05$) in DM and N in sacco degradation constants. Correlations between the IVDMD and the cell wall constituents in both seasons were negative and significant ($P < 0.05$) indicating the probable limiting effects of the cell wall components on the digestibility of the browse species considered in this study. During the wet season, NDF content was negatively correlated with potential DM and N degradability ($P < 0.01$), effective N degradability ($P < 0.01$) and effective DM degradability ($P < 0.05$). Moreover, ADF content was negatively correlated with potential degradability of N ($P < 0.05$) and effective N degradability ($P < 0.01$) while ADL was also negatively correlated with potential ($P < 0.01$) and effective degradability ($P < 0.05$) of N. In the browse species harvested during the dry season, ADF was negatively ($P < 0.05$) correlated with the effective DM degradability. Moreover, ADL was negatively correlated ($P < 0.01$) with the slowly degradable DM fraction, potential DM degradability ($P < 0.01$), effective DM degradability ($P < 0.05$) and the slowly degradable N fraction ($P < 0.05$). Based on the potential DM and N degradation, of the browse species in the wet and dry seasons, Acacia oerfota, A. tortilis, Balanites aegyptiaca, Boswellia papyrifera, Sterculia africana, Terminalia brownii and Ziziphus spina-christi were superior in quality as animal feed. As a result these browse species can easily be fitted into smallholder animal agroforestry systems. It is recommended that further studies be considered in assessing the nutritive value of the other browse components such as pods, and other components consumed by animals and not considered in this study. Moreover, it is also recommended to conduct agronomic studies on the most promising browse species. To also verify the result of this study, it is recommended to conduct animal feeding and digestibility trials by supplementing with the promising species to animals fed on poor quality roughages.

5. Feed Utilization, Body Weight Change and Carcass Characteristics of Intact and Castrated Afar Sheep Fed Urea Treated *Teff* Straw Supplemented With Graded Levels of Wheat Bran

Awet Estifanos and Solomon Melaku
Year: 2007

Abstract: The study was conducted to evaluate the effect of graded levels of wheat bran supplementation in urea treated teff straw (UTTS) based feeding on feed utilization, feedlot growing performance and carcass characteristics of intact and castrated Afar sheep as well as to evaluate the appropriate economical levels to achieve optimum production in feedlot growing. Thirty-two intact (16) and castrated (16) Afar sheep with average initial weight of 15.75 ± 1.57 kg (mean ± SD) were divided into four blocks based on initial live weight. The treatment diets, namely, 0, 150, 250 and 350 g DM/day wheat bran were assigned randomly to both the intact and castrated sheep in each block. The basal feed was treated with urea at the rate of 4 kg urea dissolved in 80 l of water for 100 kg DM of teff straw. Common salt blocks and water were given ad libitum. At the beginning and end of the 90 days of feeding trial, the digestibility trial and carcass parameters evaluation were carried out, respectively. Daily UTTS, dry matter intake (DMI), the total DMI per kg $W^{0.75}$ and as percent of body weight was significantly higher ($P < 0.05$) for the castrated than the intact sheep. However, there were similarities in all nutrient intake parameters between "sex" groups. The supplemented sheep had also significantly higher ($P < 0.001$) total DMI. On the basis of the DMI per kg $W^{0.75}$ and DMI as percent of body weight, the medium and high level of wheat bran supplementation resulted in higher ($P < 0.05$) DMI than the low level of supplementation. Similarly, organic matter (OM) intake was significantly lower ($P < 0.01$) in the control than the supplemented sheep, and CP intake was significantly higher ($P < 0.001$) for the high and medium level of supplementation compared to the low level of supplementation and the control treatment, which also had significantly lower ($P < 0.001$) CP intake than the medium and high level of supplementation. Significantly higher ($P < 0.05$) ADF intake was observed for the control and low level of supplementation than the high level of supplementation. The daily live weight gain was significantly higher ($P < 0.001$) in the order of high>medium>low level of supplementation, which was also higher ($P < 0.001$) than the control treatment. Final body weight was significantly higher ($P < 0.001$) for the high compared to the low level of supplementation and the control treatment. Sheep on the medium level of supplementation also achieved higher ($P < 0.001$) final body weight than those on the control treatment. The feed conversion ratio and efficiency were better ($P < 0.001$) for the supplemented compared to the control sheep. The differences in feed conversion efficiency between the different treatments were similar in trend to the differences observed between treatments in final body weight. Apparent digestibility was significantly higher in high and medium supplemented compared to control for DM ($P < 0.05$), in high supplemented compared to low supplemented and control, and in low supplemented compared to control for CP ($P < 0.001$). There was no significant difference ($P > 0.05$) in slaughter weight between supplemented and non-supplemented sheep, but there was significant difference in rib-eye muscle area ($P < 0.001$), dressing percentage ($P < 0.01$) based on slaughter weight and for hot carcass weight ($P < 0.001$) between the supplemented and non-supplemented sheep as well as within supplemented ones. Considering the economic return (MRR), intact medium level wheat bran supplemented sheep could be recommended as the optimum level for feedlot growing. However, intact high level wheat bran supplemented sheep had better growing performance and carcass and non-carcass characteristics, but partial budget analysis indicated its less profitability than intact medium level wheat bran supplemented sheep.

6. Effects of Feeding Peanut Seed Cake and Brewery Dried Yeast on Egg Production, Fertility and Hatchability of Rhode Island Red Chicken

Meseret Girma, Berhan Tamir and Tadelle Dessie
Year: 2007

Abstract: This study was conducted to evaluate the effects of feeding different proportions of peanut seed cake (PSC) and brewery dried yeast (BDY) on egg production, fertility and hatchability of Rhode Island Red chicken at Poultry Farm of Haramaya University. The objective of the study was to assess the effect of replacement of PSC with BDY on egg production, fertility and hatchability and egg quality parameters of RIR pullets. One hundred eighty RIR chicken with similar body weight of 1554.67 $\pm$ 1.01 g and aging 26 weeks (one and half month in lay) were randomly distributed to 12 pens each with 15 birds for feeding trial and kept in a deep litter system representing six treatments each with two replications in CRD. The treatment rations were formulated on an isonitrogenous (16% CP) and isocaloric (2800 kcal/kg DM) basis. The treatments were T1 (20% PSC + 0% BDY), T2 (15% PSC + 5% BDY), T3 (10% PSC + 10% BDY), T4 (5% PSC + 15% BDY), T5 (0% PSC + 20% BDY) and T6 as control (commercial layer's ration). The experiment lasted for 12 weeks during which dry matter intake (DMI), laying performance and egg quality parameters were measured. Partial budget analysis was undertaken to evaluate the economic benefits of the different proportions of brewery dried yeast and peanut seed cake. Data were subjected to analysis of variance for all parameters considered. The chemical analysis showed that BDY contained 41.2% CP and 2982.04 kcal ME/kg DM and PSC 42.2% CP and 2842.5 kcal ME/kg DM, indicating their potential to be used as sources of both protein and energy in poultry feeding. The results of the experiment showed that there were significant differences ($P < 0.01$) among treatments in dry matter intake, final body weight, body weight gain, hen-day egg production, egg weight and egg mass, fertility and hatchability, yolk color in terms of Roche fan measurement and feed cost per dozen of eggs. The dry matter intake of birds on T_3 (133.7 g) and T_4 (133.8 g) was similar with that of the birds on the control diet (133.1 g), but diet T_5 (135.9 g) resulted in significantly increased dry matter intake than the control diet. Diets T_1 (131.7 g) and T_2 (132.1 g) resulted in a significantly ($P < 0.01$) decreased dry matter intake than the control diet. The final body weight and body weight gain of birds was significantly lower ($P < 0.01$) for T_1 (1570.5 and 12 g) and T_2 (1572.5 and 15 g) than that of the birds on T_4 (1578.5 and 28 g). Birds on T_3 had higher hen-day egg production (87.92%) compared to birds on the control ration (81.84%). The diets containing T_4 (57.02 g) resulted in a significant increase ($P < 0.01$) in egg weight than that of the birds on T_2 (55.02 g) and the control diet (55.42 g) but the diets containing T_1 (54.80 g) resulted in a significantly decreased ($P < 0.01$) egg weight than the control diet and other treatment groups. Birds on T_1 (40640 g) had significantly lower ($P < 0.01$) egg mass than birds that were receiving T_2 (42400), T_3 (43600), T_4 (45560), T_5 (43080) and the control diet (44060 g). Birds on T_4 (88.70), T_5 (88.06), T_3 (86.66) and T_2 (86.30%) showed better results in fertility than control (79.11) and T_1 (79.44%). Similarly birds in T_2 (66.31), T_3 (68.43), T_4 (66.65) and T_5 (68.79%) were better in hatchability than the birds in the control (59.46) and T_1 (59.87%). Eggs of birds on T_3 (5.33), T_4 (5.27) and T_5 (5.28) showed higher yolk color value than the birds on control diet (4.22). Brewery dried yeast could be included in Rhode Island Red chicken feed in order to increase fertility and hatchability of fertile eggs and it also increase egg weight and mass. Brewery dried yeast could be also included in RIR chicken feed in order to increase yolk color. Birds of treatment T_3 (3.43 Birr) had lower feed cost per dozen of egg than control, indicating the importance of this form of combination for feeding layers as least cost ration than that of the birds on control. The results also showed that initial body weight, feed conversion ratio (feed per egg mass), embryonic mortality, albumen height in terms of Haugh unit, shell thickness, albumen diameter, yolk diameter, shell weight, albumen weight, yolk weight, feed cost per egg mass and egg sale to feed cost ratio did not vary ($P>0.05$) among dietary treatments. Based on the results of this study, T3 (10% BDY + 10% PSC) or 50% BDY 50% PSC appeared to be a diet of good feeding value, more economical or reasonably cheaper ration which can be used as protein supplement in formulation of layers ration without adverse effects on egg laying performance of pullets between 26-38 weeks of age.

7. Supplementation of Dried Atella, Noug Seed (*Guizotia sbyssinica*) Cake and Their Mixtures on Feed Intake, Digestibility and Live Weight Change of Local Sheep Fed Finger Millet (*Eleusine coracana*) Straw Basal Diet

Almaz Ayenew, Berhan Tamir and Solomon Melaku
Year: 2008

Abstract: This study was carried out to investigate the effect of supplementation of atella, noug seed (*Guizotia abyssinica*) cake and their mixtures at different proportions on feed intake, digestibility, daily body weight change and feed conversion efficiency in local sheep fed finger millet (*Eleusine coracana*) straw basal diet. Twenty five yearling male sheep with average initial BW of 16.4 ±1.1 kg were used. The experimental animals were grouped into five blocks of five animals based on their initial BW, and the five treatment feeds were randomly assigned to each animal in a block. Dietary treatments comprised of finger millet straw alone (T1), finger millet straw + atella (T2), finger millet straw + mixture of 70% atella and 30% NSC (T3), finger millet straw + mixture of 30% atella and 70% NSC (T4) and finger millet straw +NSC (T5). Common salt and water were made available at all times. The supplements were offered at the rate of 300 g/d, which were offered twice per day at 0800 and 1600 hours in equal portions. The experimental sheep were kept in individual pens. The digestibility trial was carried out for 7 days after 15 days of adaptation period to the experimental feeds and conditions, which was then followed by feeding trial of 90 days. Supplementation of atella, NSC and their mixtures significantly increased ($P < 0.001$) the intakes of total dry matter (DM) and crude protein (CP). Unsupplemented sheep consumed significantly higher ($P < 0.001$) finger millet straw (393 g) DM as compared to the supplemented sheep in T4 (353.5 g) and T5 (337.8 g). There was significant difference ($P < 0.001$) in CP intake among all treatments T2 (73.3 g), T3 (84.3 g) and T4 (90.7 g) with the highest value (100.6) observed for noug seed cake supplemented group (T5). The digestibility of DM, CP and OM was significantly higher ($P < 0.001$) in the supplemented than in the control treatment. Similarly, there was significantly higher ($P < 0.001$) daily BW gain in the supplemented sheep than in the control ones. There was BW loss of -23.3 g/d for the control, but positive BW gain was observed in all supplemented treatments 51.1, 56.7, 63.3 and 60 g/d for T2, T3, T4 and T5, respectively. Atella (T2) supplemented treatment had significantly lower ($P < 0.001$) daily BW gain (51.1 g), and final BW (20.9 kg) as compared to T4 (63.3 g and 22.1 kg) and T5 (60 g and 21.8 kg). In general, supplementation of finger millet straw with mixtures of atella and noug seed cake had a positive effect on intake, digestibility and body weight change in local sheep fed millet straw basal diet. Therefore, to attain higher BW gain within short period of growing program, sheep producers can use NSC and the two mixtures of the supplement types depending upon their local availability, but in the order of priority T4, T5, and T3, respectively. However, based on partial budget analysis atella supplementation resulted in a higher profit margin than the other supplements and the control treatment. It is concluded that supplementation of finger millet straw with atella at 300 g/d/head used in this study was potentially more profitable and economically recommended to growing local sheep.

8. Supplementation of Concentrate Mix to Hararghe Highland Sheep Fed a Basal Diet of Urea-Treated Maize Stover: Effect on Feed Utilization, Live Weight Change and Carcass Characteristics

Hirut Yirga, Solomon Melaku and Mengistu Urge
Year: 2008

Abstract: The effects of feeding different levels of concentrate mixture to sheep fed urea treated maize stover basal diet on feed utilization; body weight changes, carcass parameters as well as economic feasibility were evaluated. The experiment was conducted in a randomized complete block design using twenty male Hararghe Highland sheep with a mean initial body weight of 17.2 + 1.74 (mean + SD). The animals were grouped into five blocks based on their initial BW and randomly assigned to four treatments within the block. The levels of supplementation were 0 g (control, T1), 150 g (low, T2), 250 g (medium, T3) and 350 g (high, T4) of the concentrate mix prepared from brewers dried grain, peanut cake and wheat bran at a ratio of 1:1:3, respectively. The basal diet was urea treated maize stover (UTMS) (4 kg of urea dissolve in 100 liters of water for treating 100 kg DM of maize stover). The basal diet, water and mineral block were offered ad libitum. Digestibility trial and evaluation of carcass parameters were carried out at the beginning and end of feeding trial, respectively. Urea treatment improved the crude protein (CP) content of maize stover by about 33% (from 5.8 to 7.7%). The UTMS intake was lower ($P < 0.05$) for the sheep in T4 (665±16 g DM/day) than in T1 (768±16 g DM/day) and T3 (754±16 g DM/day). Daily total DM intake per kg W0.75 was higher ($P < 0.01$) for T3 (105.7±1.7 g/day) and T4 (104.1±1.7 g/day) than T1 (91.9±1.7 g/day). Total CP intake increased as the level of supplementation increased ($P < 0.01$). Crude protein digestibility was lower ($P < 0.05$) in non-supplemented sheep (0.42±0.04) than the supplemented sheep (0.65±0.04, 0.71±0.04 and 0.70±0.04 in T2, T3 and T4, respectively). Nitrogen intake increased with increasing levels of supplementation ($P < 0.001$) (6.4±0.3, 11.2±0.3, 14.4±0.3 and 17.5±0.3 g/day for T1, T2, T3 and T4, respectively). Nitrogen balance was higher ($P < 0.01$) in T4 (8.2±0.6 g/day) than in T1 (0.02±0.6 g/day) and in T2 (4.4±0.6 g/day). The supplemented sheep achieved higher ($P < 0.05$) average daily gain (ADG) (32.2±5, 54.4±5 and 63.3±5 g/day in T2, T3 and T4, respectively) than the non- supplemented sheep (-14.4±5 g/day). The mean slaughter weight and hot carcass weight were higher ($P < 0.001$) for T3 (21.5±0.4 and 8.1±0.3 kg, respectively) and T4 (22.3±0.4 and 9.1±0.3 kg, respectively) than T1 (16.1±0.4 and 5.2±0.3 kg, respectively). Higher empty BW ($P<0.001$) and dressing percentage on slaughter weight basis ($P < 0.05$) was observed in T4 (17.1±0.3 kg and 40.8±1.5, respectively) than T1 (9.6±0.3 kg and 32.6±1.5, respectively). The sheep in T1 had lower ($P < 0.001$) rib eye area (3.7 ±0. 4 cm^2) than in T2, T3 and T4 (7.0±0.4, 8.4±0.4 and 7.1±0.4 cm^2 , respectively). Total edible offal component was higher ($P < 0.001$) in T4 (4.2±0.1 kg) than in T2 (3.2 ±0.1 kg) and T1 (2.2 ±0.1 kg). Sheep in T1 resulted in a negative return (-47.3 ETB) and T4 resulted in the best return (45.7ETB). The result of the present experiment revealed that UTMS alone cannot maintain BW of Hararghe Highland sheep. In general, supplementation had a positive effect on feed utilization, body weight change and carcass parameters. Therefore, it is concluded that supplementation of Hararghe Highland sheep with 350 g of concentrate mix in UTMS based feeding resulted in better biologic and economic performance.

9. Effects of Supplementation of Napier Grass with Greenleaf Desmodium or Lablab on Feed Intake, Digestibility and Live Weight Change of Washera Sheep

Negussie Mohammed, Tessema Zewdu and Solomon Melaku
Year: 2008

Abstract: The study was conducted with the objectives of determining feed intake, digestibility, and live weight change of Washera sheep fed Napier grass sole and Napier grass supplemented with greenleaf desmodium or Lablab. Thirty-five intact Washera sheep with initial weight of 18.3 + 0.2 kg (mean + SD) were used for the study. The sheep were blocked into five groups on the basis of their initial body weight (BW), and allocated to one of the seven dietary treatments randomly: T1 (Napier grass sole), T2 (Napier grass + greenleaf desmodium at a ratio of 1:1), T3 (Napier grass + greenleaf desmodium at a ratio of 2:1), T4 (Napier grass + greenleaf desmodium at a ratio of 3:1), T5 (Napier grass + lablab at a ratio of 1:1), T6 (Napier grass + lablab at a ratio of 2:1) and T7 (Napier grass + lablab at a ratio of 3:1). The study included a feed intake and BW change and a digestibility trial conducted for 90 and 7 days, respectively. Samples of feed and faeces were analyzed for dry matter (DM), crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF), ash and acid detergent lignin (ADL). Results of the study indicated significant difference ($P < 0.01$) in dry matter intake (DMI),organic matter intake (OMI), crude protein intake (CPI), neutral detergent fiber intake (NDFI) and acid detergent fiber intake (ADFI) between the treatment diets. The highest($P < 0.01$) daily DMI, OMI, CPI and the lowest ($P < 0.01$) NDFI of 729 g, 640 g, 96.7 g, 484 g, respectively, were recorded for sheep fed T5, the lowest ($P < 0.01$) DMI (643.3 g), OMI (560.6 g) and CPI (51 g) were observed in T1. Corresponding to the DMI, OMI and CPI, there were significant ($P<0.01$) differences in ADG between the diets whereby the highest ($P < 0.01$) ADG (39.7 g) was obtained by sheep fed T5 and the lowest ($P < 0.01$ by sheep fed T1 (6.2 g). Similarly, the highest ($P < 0.01$) digestibility of CP (88.8%) and FCE (0.05) were observed in T5, while the lowest ($P < 0.01$) digestibility of CP (56.5%) and FCE (0.01) were observed in T1. Moreover, the results proved the advantages of supplementation of legumes in improving total DMI, OMI, CPI, digestibility, ADG and FCE than Napier grass sole. The study also demonstrated the advantage of utilizing lablab as a supplement to Napier grass over greenleaf desmodium.

10. Characterization of Goat Production Systems and On- Farm Evaluation of the Growth Performance of Grazing Goats Supplemented With Different Protein Sources in Metema Woreda, Amhara Region, Ethiopia

Tesfaye Tsegaye, Brehan Tamir and Mengisitu Urge
Year: 2009

Abstract: The study was carried out in Metema Woreda of Amhara National Regional State. The objectives of the study were to describe the goat production systems in the study area and to identify major constraints and opportunities of goat productivity; to evaluate the effect of supplementation with different protein sources on live weight gain of grazing goats under farmers management and to evaluate the economic feasibility of the feeding system under farmers condition. The results on production and marketing systems of this study were based on survey of 135 sample households and rapid appraisal of major goat markets respectively. Following the survey work, on-farm monitoring and feeding trial were carried out. Records on birth weight, weaning weight, preweaning average daily gain and mature body weight were recorded from monitored flocks. Twenty intact male local goats owned by farmers were used for on- farm feeding trial experiment to evaluate the growth performance of grazing goats supplemented with different protein sources. The survey results revealed that goats were the most widely reared livestock species in the study area and the overall mean holding of goats per households was 19.7 ± 6.60. The purposes of keeping goat in Metema Woreda was to generate income followed by meat production, savings and as means of ceremony, in that order. In Metema, the genotype of goat was entirely indigenous goat types. According to the respondents, the indigenous goat type dominantly (76.3%) found is locally known as "Habesha", and small proportions of "Rutana (5.2%)" and "Gumuz(5.9%)" goat types are also present. The major feed resource was natural pasture and source of water were from rivers, wells, natural ponds and springs. Enclosures near the fence or a separate hut for goats with a suspended wooden floor,(about 0.5- 1 m above the ground), shelter were the two main methods of housing. The result revealed that uncontrolled mating within the household's flock was predominant. In both cotton and sesame based farming systems, disease, theft an, labour were the most important goat production constraints in that order. There was neither regular market in formations on prices and supplies nor grades and standards. Animals are sold on a per head basis. The present pricing system in which agreement on price is reached by a long bargaining between sellers and buyers leaves the greater opportunities for benefiting the middlemen. The primary reason for selling of goat for the Metema goat owners was to generate money for labour wage payment followed by food crop purchase, input purchase, school fee and as means of tax pay in that order. Buying for consumption purpose in all market places showed a higher proportion followed by buying for profit /resale, reproduction and fattening. Regarding market composition, goats less than or equal to one year were the largest proportion in all markets and the percentage of goat sold decreased as the age increase. According to respondents' report, the overall average age at puberty in males was 7.4 ± 1.95 and 8.2 ± 1.64 months in females. Age at first kidding and kidding interval were 13.6± 2.44 months and 8.4± 1.37 months, respectively. The overall average birth weight, weaning weight three months and pre-weaning growth rate were 2.28 ± 0.04 kg, 12.73 ± 0.13 kg and 115.74 ± 1.55 g/day, respectively. Kids born single, male and kids from later parity were heavier ($P < 0.01$) than twins, females, kids born from first parity. Kids born from does for the first time grew slowly and had significantly lower ($P < 0.01$) weaning body weight and pre weaning average daily gain. Type of birth had also significant effect ($P < 0.01$) on weaning weight but not on pre weaning average daily gain ($P > 0.005$). The overall body weight of goats from above dentition class 1 pair of permanent incisor (PPI) was 32.96 ± 0.61 kg. Sex and age group had significant effect ($P < 0.05$ and $P < 0.01$, respectively) on live weight. Live weight significantly (at least $P < 0.05$) increased from goat having 1PPI to 3 PPI and then showed a decreasing trend though not significant. In the feeding trial, twenty intact male Hebesha or Dega type yearling goats with average initial live weight of 22.35± 0.12 kg were used. The experimental goats were blocked into five groups of four animals each based on their initial body weight. Dietary treatments were randomly assigned to each animal in the group. Animals which

were assigned randomly in each block were given to one farmer. Each farmer possessed all treatments. The treatments comprised of grazing alone (T1), grazing + mixture of 47% noug seed cake and 53% wheat bran (T2), grazing + mixture of 31% cotton seed cake and 69% wheat bran (T3) and grazing + mixture of 40% sesame seedcake and 60% wheat bran (T4). Supplemented goats attained better BW gain which were 52.9,68 and 55.1 gm/day in T2, T3 and T4, respectively than nonsupplemented ones 34.4 gm/day. All the supplement feeds significantly ($P < 0.01$) improved final weight and average daily gain of goats. The partial budget analysis showed that supplementation with noug cake; cotton seed cake and sesame seed cake with wheat bran mixtures for Metema goat under grazing condition was not potentially profitable compared with no supplementation (grazing only). Therefore, from this finding it is concluded that, even though supplementation favor better growth rate and improved body condition, it was not economically beneficial compared to unsupplemented groups.

11. Supplementation of Raw, Malted and Heat Treated Grass Pea (*Lathyrus sativus*) Grain on Feed Intake, Digestibility, Body Weight Gain and Carcass Characteristics of Farta Sheep Fed Grass Hay

Aschalew Assefa, Getachew Animut and Mohammed Yusuf
Year: 2010

Abstract: This experiment was conducted to study effects of supplementation with raw, malted and heat treated grass pea on feed intake, live weight change, digestibility and carcass characteristics of Farta sheep fed on natural pasture grass hay basal diet. Twenty intact male yearling Farta sheep with an average initial weight of 17.68±1.45 kg (Mean ± SD) were arranged in a randomized complete block design. Animals were blocked in to 5 blocks based on their initial body weight and randomly assigned to treatments. Treatments were grass hay alone fed ad libitum (T1), or with 300 g raw grass pea (T2), 300 g malted grass pea (T3) and 300 g heat treated grass pea (T4) on dry matter (DM) basis. The study consisted 12 weeks feeding trial and 7 days digestibility trial followed by carcass evaluation. Sheep fed on the supplemented diet consume greater total DM (707-720 g/d) and CP (106-125 g/d) than sheep fed on the unsupplemented diet (550 g/d) and (37 g/d), respectively. Among the supplemented treatments, T2 consumed greater ($P < 0.05$) DM, CP, ADF and NDF than T3 and T4. On the other hand hay DM intake was higher ($P < 0.05$) for T1 than the supplemented ones. Supplementation significantly ($P < 0.05$) improved DM and CP digestibility (DM digestibility: 52.7, 60.4, 62.6 and 65.3%; CP digestibility: 76.1, 82.8, 88.9 and 88.4% for T1, T2, T3 and T4, respectively). Digestibility of CP was similar among the supplemented groups but DM digestibility was in the order of T4 > T3 > T2 ($P < 0.05$). Average daily gain (-11, 50, 48 and 66 g/d) and hot carcass yield (6.4, 9.3, 9.4 and 10.1 kg for T1, T2, T3 and T4, respectively) were different among treatments ($P<0.05$) and were in the order of T4 > T3 = T2 > T1. Partial budget analysis also showed that net return was in the order of T4 > T2 > T3 and the unsupplemented group resulted to a negative value. Therefore, from biological point of view as well as based on partial budget analysis, T4 was found to be recommendable and as such heat treatment of grass pea may bring better results in animal performance and economic gains.

12. Assessment of Small Ruminant Production Systems and On-Farm Evaluation of Urea Treated Wheat Straw and Concentrate Feeding On Sheep Body Weight Change in Burie Woreda, West Gojjam

Yenesew Abebe, Solomon Melaku and Azage Tegegne
Year: 2010

Abstract: Assessment of the small ruminants production systems was conducted in four selected representative rural kebeles, namely, Woheni Durebetie, Woyenema Ambaye, Denbun and Boko Tabo in Burie Woreda to assess the farmers' traditional small ruminants management practices, to identify and prioritize the constraints of the small ruminants production systems. The study was carried out through informal and formal surveys in the selected kebeles. The farmers interviewed in the informal survey were selected purposively and for the formal survey, by systematic random sampling method. In addition, sheep/ goat flocks in the grazing fields were selected randomly and body weight (BW) (using hanging scale), sex and age (by dentition) of the animals were measured and recorded. Farmers in the study area rear sheep for two main purposes, for cash income and home slaughter on festivals. On average, one household had 3.7±2.46 heads of sheep (n = 127). There were two sheep breeds in the study kebeles, Washera and Horro. The mean body weight of sheep in the flock was 21.6±9.34 kg (n = 1211). From the current survey result, it was evident that there were more Washera sheep (98%) in Woheni Durebetie Kebele and more Horro sheep (92%) in Boko Tabo Kebele in Burie Woreda. As farmers in the study area sell, castrate and slaughter males at a very young age, there is a possibility of inbreeding in the sheep flocks. The main feed resources for sheep in the area are natural pasture and stubble grazing. In addition, most farmers supplement salt and atella (a local beer (tela) residue) to their animals. There is feed shortage problem both during the dry and rainy seasons in the highland kebeles. Based on calculation of feed requirement for the existing livestock per household, there is a deficit of 0.7 ton DM feed per household per year in the highland kebeles. One household in the area sold on average 1.1±1.40 heads of sheep (n = 127) per year. Farmers mainly sell sheep during Easter, New Year and Christmas. Sheep from the woreda and neighboring woredas and even neighboring region enters into the woreda for marketing. Among the constraints identified in sheep production, sheep diseases, lack of adequate veterinary service and feed and nutrient shortage are the main ones. To bring improvements in sheep production in Burie Woreda, these constraints should be given more emphasis in research and development activities that are going to be undertaken in the area. The goat production system in the study area is similar in several respects to the sheep production system. Two on-farm feeding trials were conducted in Arebesi, Tiya Tiya and Sertekez kebeles in Burie Woreda. The objectives of the trials were to evaluate the weight change performance of the lambs when they were fed urea treated wheat straw and concentrates, to estimate the economic feasibility and to assess farmers evaluation of these feeding practices. The lambs used in the trial were all local breeds (Washera, Horro and crossbreds) and of male sex. The animals used in the grazing and wheat straw feeding trial had an initial body weight of 20.8±3.88 kg (n = 18)and 23.3±4.37 kg (n = 32) and an initial age of 8.7±1.68 months (n = 18) and 10.2±1. 84 months (n = 32), respectively. The wheat straw that was used for the trial was treated with 5% urea. The following treatments were used in the trials. In the grazing trial, farmers' traditional fattening practices and grazing plus 200 g concentrate mix supplement. In the wheat straw feeding trial, untreated wheat straw plus 200 g concentrate mix and urea treated wheat straw plus 200 g concentrate mix supplement. The concentrate mix consisted of 75% groundnut cake (150 g) and 25% wheat bran (50 g). A completely randomized design was employed for the on-farm feeding trials. At the end of the feeding trials, farmers' were interviewed individually and in a group to evaluate the results of the feeding trials. Economic analysis was done using partial budget analysis. The trials were conducted for 86 days. The experimental animals consumed almost all the concentrate feed mix offered to them during the trials. The animals' consumption of urea treated and untreated wheat straw was very low, 52.8 g and 7.4 g per day, respectively. There was no difference ($P>0.05$) on final BW and daily BW gain between the treatments in the wheat straw feeding trial. But, in the grazing trial, there was a difference ($P<0.05$) on final BW and daily BW gain between the treatments. The animals in the concentrate supplemented treatment and the control group had a mean final BW of 24.6 kg and 21.9 kg and a mean daily BW gain of 43.6 g and 12.9 g per day, respectively. Supplementation of groundnut cake and wheat bran mix to grazing sheep was feasible based on partial budget analysis also. Furthermore, this treatment was selected to be the best by farmers' evaluation and has a potential for adoption by farmers. Hence, this feeding practice can be scaled up to be widely used in the study area.

13. Effect of Substitution of Concentrate Mix with *Sesbania sesban* on Feed Intake, Digestibility, Body Weight Change and Carcass Parameters of Arsi-Bale Sheep Fed Grass Hay

Wondewsen Bekele, Solomon Melaku and Yoseph Mekasha
Year: 2010

Abstract: The study was conducted at Dilla ATVET College with the objectives of assessing the effect of substitution of concentrate mix with Sesbania sesban on feed intake, digestibility, body weight (BW) change and carcass parameters of Arsi Bale sheep fed a basal diet of grass hay, and to evaluate the economic benefit of supplementation. The experiment was conducted using 25 intact male Arsi-Bale sheep with average initial BW of 19.13 ±1.60 kg (mean ± SD). Experimental sheep were acclimatized to the experimental diets for two weeks. The experiment consisted of 7 days of digestibility trial and 90 days of feeding trial followed by evaluation of carcass components at the end of the feeding trial. The experiment employed a randomized complete block design with five blocks consisting of five animals per block based on the initial BW. Experimental sheep were kept in individual pens. Five dietary treatments were used in the experiment, which comprised grass hay fed ad libitum (T1), grass hay ad libitum + 100% concentrate mix (CM) consisting of wheat bran (WB) and noug seed cake (NSC) at a ratio of 2:1(T2), grass hay ad libitum + (67% CM+ 33% S. sesban) (T3), grass hay ad libitum + (33% CM+ 67% S. sesban) (T4) and grass hay ad libitum +100 % S. sesban (T5). The amount of supplement on DM bases was 298, 270, 265, 261 gDM/d forT2, T3, T4 and T5, respectively. Animals had free access to salt block and water and grass hay was offered ad libitum. The supplements were offered twice daily at 0800 and 1600 hours. The CP content of grass hay, NSC, WB, and S. sesban in the current study were 9.3, 37.4, 16.6, and 26.86%, respectively. The daily basal dry matter (DM) intake (611.4, 503.0, 545.9 and 557.3 g/d for T1, T2, T3, T4 and T5, respectively) was higher ($P < 0.05$) in control treatments compared to supplemented groups. Digestibility of DM and organic matter (OM) was higher ($P < 0.01$) in supplemented as compared to control treatment. Crud protein (CP) digestibility was higher ($P < 0.001$) for supplemented treatments compared to the control. The final body weight were higher ($P < 0.01$) in supplemented treatments. Moreover feed conversion efficiency and average daily BW gain which was (38, 100, 96, 84 and 74 g/head/day for T1, T2, T3, T4 and T5, respectively) were higher ($P < 0.001$) in supplemented than the control treatments. The present result indicated that supplementations improved feed intake, digestibility of nutrients, some carcass parameters, BW gain and FCE. The net return from the supplemented treatments was 47.2, 80.5, 101.2 and 138 ETB for T2, T3, T4 and T5 respectively, and the corresponding marginal rate of return was 62, 131, 200, 479% for T2, T3, T4 and T5, respectively. Body weight gain and carcass weight were higher in the groups supplemented with sole concentrate mix (T2) and the groups supplemented with high proportion of concentrate to S. sesban ratio as compared to those supplemented with only S.sesban. The results of this study suggested that T2, T3 and T4 resulted in better BW and hot carcass yield and can be recommended to be biologically efficient. Even though treatment four (T4) did not differ both from T2 and T3 in ADG and hot carcass weight it could be recommended since it resulted in higher net return than T2 and T3. However, if economic returns are considered as the only criterion for recommendation, T5 is the treatment of choice.

14. Effect of Supplementing Erythrina Brucei Leaf as a Replacement for Cotton Seed Meal on Performance of Sidama Goat Fed Natural Pasture Hay Basal Diet

Asmamaw Yinnesu, Solomon Melaku and Ajebu Nurfeta
Year: 2011

Abstract: This experiment was conducted at Dilla Agricultural, Technical, Vocational, Education and Training College (ATVETC). Twenty five male yearling Sidama goats with an average live weight of 15.13 kg ± 1.4 (mean ± SD) were used to investigate the effect of supplementing Erythrina brucei (E.brucei) leaves as a replacement for cotton seed meal on feed intake, digestibility, live weight change and carcass parameters in a study comprising of seven days digestibility trial followed by 80 days feeding trial and carcass evaluation at the end of the experiment. The treatments consisted of grass hay alone (T1) or supplemented with 300 g DM/goat/day of 100% Cotton seed meal (CSM) (T2), 67% CSM + 33% E.brucei leaf (T3), 33% CSM + 67% E. brucei leaf (T4) and 100% E. brucei leaf (T5). A randomized complete block design was used to conduct the experiment. The experimental goats were categorized into five blocks of five animals based on their initial body weight and the five feed treatments were randomly assigned to each goat in a block. The CP content of grass hay, E. brucei leaf and CSM were 91.9, 257.7 and 453.3 g/kg DM, respectively. Supplemented goats consumed more ($P < 0.001$) total DM and organic matter (OM) than the non-supplemented group but total DM and OM were not influenced ($P > 0.05$) by the proportion of the supplements. The highest ($P < 0.001$) crude protein (CP) intake (165.6 g/day) was observed in goats supplemented with cotton seed meal alone, whereas the lowest intake (43.1 g/day) was observed in the non-supplemented group. Total CP intake decreased ($P < 0.001$) with decreasing levels of CSM in the supplement mixture. Apparent DM and OM digestibility were higher ($P < 0.001$) in supplemented goats compared to the non-supplemented ones but similar ($P > 0.05$) among the supplemented groups. Apparent digestibility coefficient of CP was higher ($P < 0.001$) for supplemented goats and lower ($P < 0.001$) for sole E. brucei supplemented goats (0.72) among the supplemented groups. The NDF digestibility coefficient (0.66) for sole CSM supplemented goats was higher ($P < 0.001$) and for sole E. brucei supplemented (0.54) and control group (0.57) were lower. The supplemented goats gained more ($P < 0.001$) weight than the control group (0.9 kg). Slaughter weight, hot carcass weight, dressing percentage on empty body weight base and total main carcass weight were higher ($P < 0.001$) for supplemented goats than for non-supplemented ones. Dressing percentage on slaughter weight base was higher ($P < 0.001$) for T2 (43.9) and T3 (43.8). Rib-eye muscle area was lower ($P < 0.001$) for the control (6.4 cm^2) and sole E. brucei (7.00 cm^2) fed goats. Goats supplemented with sole CSM showed superior weight ($P < 0.01$) for total main carcass and main carcass components than sole E. brucei diet except hind leg, ribs and pelvic region. Weight of non-carcass components such as heart, blood, tongue, genital fat, total edible offal and testicles were higher ($P < 0.05$) for supplemented goats. Supplementation didn't affect the weight of digestive tracts, lungs and trachea, skin and feet, pancreas and gallbladder among treatments. Goats fed sole CSM had higher ($P < 0.05$) weight of total edible offal, total non-edible offal, blood, omatal fat, genital fat, head without tongue and spleen compared to sole E.brucei fed goats. The result of this study revealed that E. brucei could be used as a suitable protein supplement for growing goats since sole E. brucei leaf or its mixture with CSM had similar effect to sole CSM diet on DM intake and digestibility, growth and FCR of Sidama goats. Therefore, it can be concluded that E. brucei could be used as a substitute to cotton seed meal under smallholder production systems.

15. Effect of Supplementation of Different Levels of Dried 'Girawa' (*Vernonia amygdalina*) Foliage and Crushed Maize Grain Mixtures on Feed Intake, Digestibility and Body Weight Change of Horro Sheep Fed Natural Pasture Hay

Amensissa Eresso, Solomon Melaku and Mengistu Urge
Year: 2011

Abstract: An experiment was conducted at Nedjo town, using twenty growing male Horro Sheep with a mean body weight (BW) of 16.4 ± 0.9 Kg (mean ± SD) to investigate the effect of supplementation of dried 'girawa' (*Vernonia amygdalina*) foliage and crushed maize grain mixtures on feed intake, digestibility and body weight change of Horro Sheep fed hay, and to assess economic benefit of the feeding regime. The experiment consisted of seven days of digestibility trial and ninety days of feeding trial. The experimental design used for the study was randomized complete block design. The experimental sheep were blocked into five blocks of four animals based on their initial BW and randomly assigned to one of the four treatment diets within a block. The treatments included ad libitum feeding of hay (control, T_1) and supplementation with mixtures of dried girawa foliage and crushed maize grain at a ratio of 70%: 30% which were offered at 350 g (T_2), 450 g (T_3) and 550 g (T_4) /head /day (as fed base). Water and mineral salt were offered freely at all times and natural pasture hay diet was given ad libitum. The CP content of the hay in the current study was 7.9% on DM basis. The daily DM intake of hay was higher ($P < 0.001$) for T_1 (560.1 g) compared to T_2 (465.1 g), T_3 (416.9 g) and T_4 (408.7 g). Total DM intake was higher ($P < 0.001$) for supplemented treatments T_4 (858.8 g), T_3 (782.9 g) and T_2 (760.5 g) compared to T_1 (560.1 g). Supplementation improved ($P < 0.001$) digestibility of DM, OM, CP, NDF, and ADF. Supplementation increased ($P < 0.001$) final BW as compared to the control. The group supplemented with 550 g/d concentrate mixture (T_4) and 450 g/d (T_3) gained (53.3 and 54.4 g/d) compared to those supplemented with 350 g/d that gained 31.1 g/d. Feed conversion efficiency follows the same trend as daily body weight gain. The highest total return and net income were observed in higher level supplemented sheep than the control and the other supplemented groups. Therefore, T_4 improved animal performance and net return than the other treatments and could be used as an alternative feed supplement in hay based feeding of Horro sheep.

16. Effect of Urea Treatment and Chopping of Wheat Straw (*Triticum aestivum)* On Digestibility, Body Weight Gain and Carcass Characteristics of Adilo Sheep

Belete Balla and Getachew Animut
Year: 2011

Abstract: The experiment was conducted to evaluate effects of urea treatment (urea treated (T) and untreated (U)) and chopping (chopped (Ch) and unchopped (UCh)) of wheat straw on feed intake, digestibility, weight gain and carcass characteristics. Twenty-four yearling male Adilo sheep with a live weight of 17.25 ± 0.49 kg (mean ± SD) were used in an experiment with a 2× 2 factorial arrangement of treatments in randomized complete block design (RCBD). The experiment consisted of 7 days digestibility and 90 days feeding trial followed by carcass evaluation. Treatments were: urea treated and chopped (T-Ch), urea treated and unchopped (T-UCh), untreated and chopped (U-Ch) and untreated and unchopped (U-UCh) wheat straw. Urea treatment increased straw crude protein (CP) content from 3.94 to 6.87% and decreased contents of neutral detergent fiber (NDF) from 84.61 to 78.21%. There was urea treatment by chopping interaction for the total DM and CP intakes. DM intake of T-Ch (460 g/d) > T-UCh (444 g/d) > U-Ch (443 g/d) > U-UCh (436 g/d) and that of CP intake was T-Ch > T-UCh > U-Ch > U-UCh with values of 81, 76, 69 and 68 g/d, respectively. Urea treatment increased ($P<0.05$) apparent digestibility of DM, OM and CP from 39 to 53, 40 to 55 and 48 to 67%, respectively. Chopping also had similar impact on digestibility of DM and nutrients, although the magnitude of effect was slightly lower than urea treatment. Average daily weight gain (ADG), hot carcass weight (HCW) and dressing percentage on the basis of slaughter weight (DP) was greater for T vs. U (ADG: 34 vs. 17 g/d; HCW: 8 vs. 6 kg; DP: 38 vs. 30) and for Ch vs. UCh (ADG: 30 vs. 22 g/d; HCW: 7.2 vs. 6 kg; DP: 36 vs. 32). The results of this study highlighted the positive effect of urea treatment and chopping of wheat straw on intake, digestibility and animal performance, with possible additive effect of the two treatments when used in conjunction. However, the magnitude of effect on measured parameters appeared to be greater for urea treatment than chopping. Thus, urea treatment and chopping can be considered as cheap and effective technologies to improve feeding value of straws where commercial supplements are scarce.

17. Effect of Feeding Concentrate, Dried Khat (*Catha edulis*) Leftover or Their Mixtures on Feed Intake, Digestibility, Growth Performances and Carcass Characteristics of Hararghe Highland Goats

Getinet Yadeta, Yoseph Mekasha and Solomon Melaku
Year: 2011

Abstract: The experiment was conducted at Kobmolcha Agricultural Technical and Vocational Educational and Training College, using twenty five yearling intact male Hararghe Highland goats with mean (±SD) initial body weight of 17.8 ± 1.30 kg. The study was carried out to assess the effect of supplementation with concentrate, dried khat leftover or their mixtures on feed intake, digestibility, growth performance, carcass characteristics and economic return of Hararghe Highland goats fed native hay. Goats were quarantined for 15 days, vaccinated against common ruminant disease pasteurellosis, de-wormed against endo-parasites and sprayed against ecto-parasites before commencing the study. A completely randomized block design consisting of five treatments and five blocks was used. Goats were blocked based on their initial body weight and were randomly assigned to one of the five treatment feeds within a block. The goats were adapted to experimental feeds for 15 days followed by seven days of digestibility trial. The feeding trial was conducted for ninety days following digestibility trial, and carcass parameters were determined at the end of the study period. Concentrate mix, 300 g dry matter (DM) consisting of 55 g CP (crud protein), was prepared from wheat bran and brewer's dried grain at ratio of 2:1 respectively. Dietary treatments were prepared in such a way that CP from concentrate mix was substituted with CP from dried khat leftover at a ratio of 0, 33, 67 and 100% on DM basis. Treatments consisted of ad libitum feeding of native hay alone (T1) or native hay supplemented with either 100% CP from concentrate alone (T2) or a mixture of 33% CP from dried khat leftover and 67% CP from concentrate (T3) or a mixture of 67% CP from dried khat leftover and 33% CP from concentrate (T4) or 100% CP from dried khat leftover (T5) on DM basis. Supplement used as isonitrogenous to achieve an estimated body weight gain of 50 g per day**.** However, goats supplemented with T4 and T5 had consumed only 37.1 and 23.3 g CP/h/d, respectively, from the supplementary diet. The native hay was offered at 35% refusal. Clean water and common salt lick were available to the animals all the time. Supplemented treatments (T2-T5) had higher ($P<0.001$) total dry matter intake (630-747.4 g/d), total organic matter intake (527.6-644.9 g/d), total crud protein intakes (43.1- 80.5 g/d) and metabolisable energy (6.1- 7.5 g/kg) than the control (505.2, 458.7 and 28.7 g and 4.0 g/kg for dry matter [DM], organic matter [OM], crud protein[CP] and metabolisable energy [ME], respectively). Digestibility of dry matter (64-65%), organic matter (66- 67%) and crud protein (57-76%) were higher ($P < 0.001$) for supplemented treatments than the control (52, 54 and 53% for DM, OM and CP, respectively). Final body weight and average daily body weight gains were higher ($P < 0.001$) for supplemented compared to the control treatments. Supplemented goats had better hot carcass weight (8.6- 10.2 kg), empty body weight (16.5- 18.8 kg), dressing percentage based on slaughter weight (41.4-44.4 %), and rib-eye muscle area (7.8-8.7 cm^2**)** than the control (6.1, 12.6 and 37 kg and 5.3 cm^2 for hot carcass, empty body weight, dressing percentage based on slaughter weight and rib-eye muscle area, respectively). Goats fed native hay alone (control) had lowest net return (-24.13ETB).TDM, nutrient intakes (except TCP intake) and digestibility, BWG, feed conversion efficiency, carcass parameters, non-carcass parameters, total non-edible offals and total edible offals were comparable between T2 and T3. Goats supplemented with T_3 had higher ($P < 0.001$**)** TDM and nutrient intakes and CP digestibility, daily BWG, HCW,EBW, dressing percentage based on slaughter weight, REMA, hear weight, kidney fat, abdominal fat, kidney weight, blood, the highest net return (64.72 ETB), change in net return (88.85) and marginal rate of return (2.5) compared to goats in T4 and T5. Thus, it is recommended that supplementation with T3 is biologically and economically optimum combination that could be used to enhance production of goats under small-scale farming system. Further, since supplementation with higher level of khat leftover (T4 and T5) resulted in higher DM, OM CP intakes, digestibility, growth performance, most carcass parameters and better economic return compared to unsupplemented goats, these treatments could also be considered as an alternative feeding strategies under smallholder farming systems.

18. Growth Performance and Carcass Characteristics of Horro Lambs Fed Vetch (*Lathyrus sativus*) Haulm Supplemented with Acacia Albida Leaf Meal, Wheat Bran and Their Mixtures

Takele Feyera, Solomon Melaku and Getachew Animut
Year: 2011

Abstract: Twenty five yearling male Horro lambs with initial body weights (IBW) of 23.14±2.45 kg (mean±SD) were used to determine effect of supplementation of wheat bran (WB), Acacia albida leaf meal (AA) or their mixture on nutrient digestibility, feed intake, growth performance and carcass characteristics of yearling Horro lambs fed a basal diet of vetch (Lathyrus sativus) haulm (VH). Animals were blocked into 5 groups of 5 animals each based on IBW and were randomly assigned to treatments. Treatments were ad libitum feeding of VH either without supplement (T1) or with daily supplement of 300 g DM of sole WB (T2), sole AA (T5), or mixture of the two at 2:1 (T3) or 1:2 (T4) ratios of WB:AA. The study had 7 days digestibility and 84 days feeding trial period followed by carcass evaluation. The VH, WB and AA had crude protein (CP) contents of 6.5, 16.0 and 19.5%, respectively. Supplementation did not impact ($P > 0.05$) dry matter (DM), neutral detergent fiber and acid detergent fiber digestibility but significantly increased ($P < 0.05$) organic matter and CP digestibility. Intake of the basal diet DM was not affected by supplementation. Intake of total DM and nutrients increased by supplementation. Supplementation also increased average daily gain (ADG), and animals on sole VH diet lost weights of 40.95 g daily while gains of 39.52, 52.86, 42.38 and 28.09 g/day were recorded for T2, T3, T4 and T5, respectively. Among the supplemented treatments, T3 showed higher final weight, total gain and ADG ($P < 0.05$) than T5, but means for other supplemented groups were similar ($P > 0.05$). Positive and significant ($r=0.82$, $P < 0.05$) correlation was observed between ADG and CP digestibility. This relationship might have caused growth performance differences among treatments. Differences in carcass characteristics followed the trend observed for growth performance. Supplementation improved hot carcass weight and dressing percentage ($P < 0.05$) compared to the non-supplemented group. Among the supplemented groups T3 had greater hot carcass weight ($P < 0.05$) than T5. In conclusion, supplementation of WB, AA and their mixture to VH basal diet can be employed to enhance performance of growing lambs, and based on the feeding regimen employed in this study, the 2:1 ratio of WB:AA supplement of T3 would be recommended due to its relatively better impact on nutrient utilization, animal performance and carcass yield.

19. Effect of Feeding Neem (*Azadirachta indica*) And Acacia (Acacia Senegal) Trees Foliage on Nutritional and Carcass Parameters; and Gastrointestinal Nematode Parasites in Short-Eared Somali Goats

Samson Hailemariam, Solomon Melaku and Sissay Menkir
Year: 2011

Abstract: The study was conducted at Haramya University using 20 intact male yearling Short-Eared Somali goats with average initial BW of 16.2 ±1.08 kg (mean ± SD) and 8 intact male Short-Eared Somali goats used as tracers. The objectives of the experiment were to evaluate the effects of Acacia senegal and Neem (*Azadirachta indica*) tree foliage supplementations on intake, apparent digestibility, carcass characteristics and live weight gain of Short-Eared Somali goats; and to determine the effects of the supplementary feeding on gastrointestinal nematode parasite infections. The experiment consisted of ninety days of feeding trial and seven days of digestibility trial followed by evaluation of carcass components at the end of the feeding trial with gastrointestinal parasite worm count carried out throughout the experiments. The experiment employed a randomized complete block design. The experimental animals were blocked in to five blocks of four animals based on the initial body weight and randomly assigned to one of the four treatment diets. Experimental goats were kept in individual pens. Four dietary treatments were used in the experiment, which comprised grass hay fed ad libitum (T_1), grass hay ad libitum + 1.2% LBW of Neem tree foliage (T_2), grass hay ad libitum + 1.2% LBW of Acacia senegal (T_3) and grass hay ad libitum + 1.2% LBW of the mixture of Neem tree and Acacia senegal (1:1 ratio) (T_4). Animals had free access to mineral lick and water. Grass hay was offered ad libitum. The supplements were offered twice daily at 0800 and 1600 hours. The CP content of grass hay, Neem tree foliage, Acacia senegal, and their mixture in the current study were 9.04, 16.92, 17.5, and 17.01% of DM, respectively. The daily basal diet dry matter (DM) intake was not statistically significant ($P > 0.05$) among the treatment including the supplemented groups. However, total dry matter intake (TDMI) was significantly ($P < 0.001$) higher for the supplemented group as compared to the control one. The maximum TDMI was recorded in goats supplemented with Acacia senegal which was 770.4 g/day while the control group consumed 597.4 g/day. Digestibility of DM and organic matter (OM) was significantly higher ($P < 0.001$) in supplemented goats as compared to the control. Crud protein (CP) digestibility was significantly higher ($P < 0.01$) for goats supplemented with Neem tree (72%) and Acacia senegal (67%) compared to the rest supplemented and control groups. The final body weight were higher ($P < 0.05$) for the goats supplemented with Acacia senegal (T_3). Average daily BW gains recorded were 20, 35.55, 45.55 and 43.33 g/head/day for T_1, T_2, T_3 and T_4, respectively and it was higher ($P < 0.01$) in supplemented than the control treatments. The hot carcass weight was higher in the group supplemented with Acacia senegal (8.3 kg) among the supplemented groups, all of which are higher than the control (4.9 kg). The mean egg per gram (EPG) of the supplemented group were significantly ($P < 0.001$) lower than the control and the minimum EPG was recorded for the goats supplemented with Acacia senegal (1637). Based on the results of the present study, it can be concluded that supplementation of Acacia senegal foliage on hay could be used as one strategy for better feed intake, digestibility, live weight gain, carcass weight and further work is needed to assess whether this would improve growth and decrease the parasitic load of the goats.

20. Effects Of Supplementing *Euphorbia tirucalli*, *Acacia albida* Pods and Their Mixtures on Feed Intake, Body Weight Gain, Digestibility and Carcass Characteristics of Abergelle Goats Fed on Native Hay Basal Diet

Niguse Gebru, Getachew Animut and Solomon Melaku
Year: 2011

Abstract: The experiment was conducted to evaluate supplemental value of mixtures of different levels of Acacia albida pods (AAp) and Euphorbia tirucalli (EUt) on digestibility, feed intake, body weight change and carcass characteristics using twenty-five intact Abergelle goats with initial body weight (IBW) of 13.9 ± 1.15 (mean ± SD). Randomized complete block design with 5 blocks were employed for the study and animals were blocked based on their initial BW. Treatments were native hay fed ad libtum alone (T_1) or with 210 g/day AAp (T_2), 210 g/day EUt (T_5) or 140 AAp + 70 EUt g/day (T_3) and 70 AAp +140 EUt g/day (T_4). All animals were offered 52 g dry matter (DM)/day sesame cake. Water and mineralized salt block were available free choice. The experiment had 90 days feeding and 7 days digestibility trial followed by carcass evaluation at the end. The CP content of AAp, EUt and hay was 17.8%, 7.4% and 7.3% respectively. Goats consumed higher ($P < 0.05$) native hay (433.7 g/day) compared to the supplemented groups (321.7, 319, 315.5 and 315.9 g /day) for T_2, T_3, T_4 and T_5, respectively. Higher ($P < 0.05$) total DM intake of 561.4, 565.4, 540.9 and 531 g/day for T_2, T_3, T_4 and T_5, respectively were recorded than T_1 (486.5 g/day). CP intake was lowest for T_1 and increased with increasing level of AAp in diet of supplemented goats (52, 77, 71, 62 and 56 g/day). Digestibility of DM, OM and CP was improved ($P < 0.05$) by supplementation but CP digestibility was similar for T_1 and T_5. Average daily gain (ADG; 3, 44, 34, 31, 22 g/day) and feed conversion efficiency (FCE; 0.007, 0.079, 0.060, 0.057 and 0.042 g gain/g DM for T_1, T_2, T_3, T_4 and T_5, respectively) were greater for supplemented than unsupplemented goats and was the highest for T_2. Hot carcass yield and dressing percentage were higher for T_2 than T_1. Partial budget analysis also showed T_2 to be the most profitable. Therefore, it is concluded that AAp supplementation has better impact both biologically and economically. However, the slight improvement in animal performance with EUt supplementation also suggested the potential of the supplement especially in the absence of better option.

21. Effect of Supplementing Different Levels of Dried Cactus (*Opuntia Ficus* Indica) Peel on Feed Intake, Digestibility, Body Weight Change and Carcass Characteristics of Tigray Highland Sheep Fed Grass Hay

Lidetu Gebreselassie and Getachew Animut
Year: 2011

Abstract: Twenty male yearling Tigray Highland sheep with an average body weight (BW) of 17.0 ± 0.46 kg (mean ± SD) were used to invstigate the effect of supplementing different levels of dried cactus (*Opuntia ficus*-indica) peel to grass hay on feed intake, digestibility, daily BW gain (ADG) and carcass characteristics in a study comprising 90 days feeding trial, followed by 7 days of digestibility trial and evaluation of carcass characteristics at the end. Treatments were ad libitum feeding of grass hay plus 60 g dry matter (DM) of noug seed cake (T_1) and diet similar to T_1 supplemented with 125 g (T_2), 250 g (T_3) and 375 g (T_4) DM cactus fruit peel (CFP) per head per day. The experimental sheep were categorized in to five blocks of four animals based on their initial weight and the four feed treatments were randomly assigned to each animal in a block. Grass hay intake decreased ($P < 0.05$) with increasing level CFP supplementation. Total DM, OM and CP intakes significantly increased ($P < 0.05$) by CFP supplementation. Total DM intake as g/day or on metabolic body weight basis, OM and CP intakes were low for T_1 as compared to T_3 and T_4 and T_4 had the highest total DM intake. But, T_1 and T_2 had similar DM, OM and CP intakes. Apparent digestibility of DM also showed increasing trend with increasing level of CFP, but CP digestibility was not affected ($P > 0.05$) by treatment. ADG was 14.4, 28.9, 37.8 and 42.2 g/day for T_1, T_2, T_3 and T_4, respectively (SEM = 2.49) and was in the order of $T_4 > T_3 > T_2 > T_1$ ($P<0.05$). Empty BW, hot carcass weight, dressing percentage on slaughter weight basis and rib eye muscle area also followed similar trend like that of ADG. Net return was greatest for T_4 and marginal rate of return **(**MRR**)** was highest for T_3. In conclusion, T_4 can be recommended based on the result of biological performance and net return. But, if capital is a limitation T_3 with highest MRR and with similar carcass yield and dressing percentage to T_4 would be recommended as an economic optimum for fattening of Tigray Highland sheep.

22 Different Proportion of Ground Green *Prosopis juliflora* Pods and Noug Seed (*Guizotia abissynic*a) Cake Supplementing on Digestibility and Performance of Black Head Ogaden Sheep Fed Hay as a Basal Diet

Birhanu Tesema, Getachew Animut and Mengistu Urge
Year: 2012

Abstract: This study was conducted to evaluate the effect of supplementation of ground immature *Prosopis juliflora* pods (PJP), noug seed cake (NSC) and their mixtures at different proportions on feed intake, digestibility, and average daily body weight gain (ADG), feed conversion efficiency (FCE), carcass parameters and economic feasibility of Blackhead Ogaden sheep fed hay as a basal diet. Twenty five intact yearling male sheep with initial BW of 13.82 ± 0.52 kg (mean ± SD) were blocked in to five blocks based on initial BW and animals within a block were randomly assigned to treatments. Treatments were supplementation of 300 g DM /day of PJP and NSC at proportions of 100, 75, 50, 25, 0% PJP and 0, 25, 50, 75, 100% NSC for T1, T2, T3, T4 and T5, respectively. All sheep had ad libitum access to hay, water and mineralized salt block. The digestibility and feeding trials lasted for 7 and 80 days, respectively followed by carcass evaluation. The crude protein (CP) content was 6.2%, 15.5%, and 29.1% and NDF content was 80.9%, 46.7% and 41.3% for hay, P. juliflora pod and NSC, respectively. Hay and total DM intakes were higher ($P < 0.05$) in T4 (475.98 ± 2.49 and 758.03 ± 2.49) and T5 (457.36 ± 3.74 and 757.37 ± 3.74) than in T1 (430.63 ± 3.50 and 738.77 ± 3.55) which was similar to T3 (439.04 ± 5.62 and 729.04 ± 5.62) and T2 (439.52 ± 3.73 and 739.55 ± 3.73). Intake of CP increased with increasing level of supplemental NSC. Treatment did not impact ($P > 0.05$) DM, OM, NDF and ADF digestibility, but CP digestibility coefficient (0.620, 0.663, 0.669, 0.631, 0.664 (SEM = 0.09)) for T1, T2, T3, T4 and T5, respectively was low for T1 than T2, T3 and T5 ($P < 0.05$) and T4 had similar ($P > 0.05$) CP digestibility as compared to the other treatments. Animal on T2 (20.64 ± 1.14) and T3 (20.76 ± 1.00) had greater ($P < 0.05$) ADG than T1 (17.35± 0.69), and T4 (19.50 ± 0.47) and T5 (19.24 ± 0.51) were similar in ADG. FCE was in the order of T3 = T2 > T1 = T4 = T5 ($P < 0.05$. Hot carcass weight (HCW) and rib- eye muscle area (REA) were greater for T2 than T1, and the rest treatments were similar to each other. Dressing percentage both on slaughter and empty BW basis was not affected by treatment ($P > 0.05$). The highest total income, net income and change in net income were gained in T3. Marginal rate of return (MRR) in the present study was positive for all treatments and was highest for T2 followed by T3. Based on the biological performance and most of the parameters(net income, rate of returns and marginal rate of return) considered in partial budget analysis, combination of the two supplements in equal proportions as in T3 was recommended in this study.

23. Effects of Different Levels of Dried *Vernonia amygdalina* Leaf Supplementation on Feed Intake, Digestibility, Weight Gain and Carcass Parameters of Somali Goats Fed Catha Edulis Leftover

Kedir Adem, Mohammed Yusuf and Getachew Animut
Year: 2012

Abstract: The experiment was conducted to determine feed intake, digestibility, average daily body weight gain (ADG), carcass parameters and partial budget analysis of feeding Somali goats with Catha edulis leftover and supplemented with graded levels of dried *Vernonia amygdalina* leaf (DVAL).Twenty four yearling male Somali goats with a mean initial body weight of 12.57± 0.59 kg (means ± SD) were used for the experiment. The experimental goats were blocked into six blocks of four animals each based on their initial body weight and the four treatments were assigned randomly to each goat within a block. The treatments were Catha edulis leftover ad libitum supplemented with 100,200, 300 and 400 g DM/day V. amygdalina leaf for T_1, T_2, T_3, and T_4, respectively. The experiment was conducted for 90 and 7 days of feeding and digestibility trial, respectively followed by carcass evaluation at the end. The CP contents of the Catha edulis leftover and V. amygdalina leaf were 11 and 22.3 g /kg DM, respectively. Catha edulis leftover DM intake (407, 357. 8, 2951.1 and 236. 6 ± 3.7 g/d) for T_1, T_2, T_3 and T_4 respectively was higher ($P<0.05$) for lower and medium level of supplementation and total DM intake (507, 557. 8, 595.1 and 636. 6 ± 2.6 g/d) was lower in low level supplemented goats than the higher and medium supplemented ones. Intake of total crude protein (CP) and organic matter (OM) followed similar trends with that of total DM intake. The apparent CP digestibility was higher ($P < 0.05$) for T_4 (78%) compared to T_1 (56 %), T_2 (62 %) and T_3 (66%). The results of the study indicates that level of supplementation significantly ($P < 0.05$) improved average daily weight gain (ADG) (21.7,36.8,46.2 and 58.5 ± 0.3 g/d) and had better feed conversion efficiency as well as carcass characteristics. Hot carcass weight (HCW ; 5.8,6.8,7.2 and 9.2 ± 2.1 kg and dressing percentage on empty body weight basis (49. 8,50.0,53.4 and 61.8 ± 1.6) for T1, T2, T3, and T4 respectively was higher ($P < 0.05$) for T_4 as compared to T_1,T_2 and T_3. Goats supplemented with 400 g (T_4) had the highest net income whereas goats with lower level of supplementation showed loss of 3.4 ETB/goat.

24. Evaluation of Sugar Syrup as a Partial Substitute for Maize in Broilers' Ration

Kiros abebe, Getachew Animut and Mengistu Urge
Year: 2012

Abstract: This study was conducted to evaluate sugar syrup as a partial substitute for maize on feed consumption, growth rate, feed conversion ratio, carcass yield and economic importance of using sugar syrup in the ration of broilers. Three hundred day old Hubbard chicks with similar initial weight of 55.2 ± 0.52 gram (mean ± SEM) were randomly distributed to five treatments each with three replications in CRD. The treatment rations were formulated to contain approximately 22% and 20% CP and 3100 kcal/kg and 3200 kcal/kg ME for the starter (1-28 days) and finisher (29-49 days) phases. Treatments were 0, 7, 14, 21, and 28% of maize substituted by sugar syrup for T_1, T_2, T_3, T_4, and T_5, respectively. During the study feed intake, growth rate, feed conversion ratio and mortality percentage were determined. At the end of the trail 6 broilers (3 males and 3 females) were randomly picked and slaughtered for carcass evaluation. The results obtained indicated that there was no significant difference ($P > 0.05$) in DM intake, body weight gain and mortality during the entire growth period. The daily DM intake of broilers fed different substitution levels of sugar syrup for maize during the entire growth period was 75.5, 87.8, 80.9, 81.2 and 67.5 gram per bird (SEM = 6.08) for T_1, T_2, T_3, T_4 and T_5, respectively. There was significant difference ($P<0.05$) in feed as well as protein and energy conversion ratio among the treatment groups during the whole growth period. Feed conversion ratio of broilers in T_2 (3.2 ± 0.0) was significantly higher than T_5 (2.5 ± 0.1), T_1 (2.6 ± 0.2) and T_4 (2.7 ± 0.1) but was similar with T_3 (2.8 ± 0.1). Slaughter weight, eviscerated weight, drumstick-thigh weight and percent as well as breast weight and percent showed non-significant difference ($P > 0.05$) among treatments. But significant difference ($P < 0.05$) was observed in eviscerated percentage, which was greater for T2 (67.1 ± 0.51) and T3 (66.6 ± 0.45) than T5 (64.4 ± 0.64). Abdominal fat weight and percent was greater for T_1 and T_2 as compared to T_4 and T_5. Partial budget analysis indicated that among the treatments T_2 was more profitable when net return is considered. But when marginal rate of return is considered T_4 was more profitable than others. On the other hand T_4 and T_5 score higher chicks' sale to feed cost than T_2, T_1 and T_3. In summary by controlling other factors that affect broiler performance increasing the substitution level of sugar syrup increases profit. This study highlighted that sugar syrup could substitute maize up to 28% in formulating broilers' ration without adverse effect on growth performance.

25. Effects of Inclusion of Ground *Prosopis juliflora* Pod on Growth, Egg Production, Quality, Fertility and Hatchability of White Leghorn Hens

Lemma Gulilat, Mengstu urge and Getachew Animut
Year: 2012

Abstract: A study was conducted to evaluate the effect of inclusion of ground *Prosopis juliflora* pod on egg production, quality, fertility, hatchability, chick quality, embryo mortality, body weight gain (BWG), feed intake and feed conversion efficiency of point of lay white leghorn layers in Haramaya University poultry farm. One hundred sixty eight white leghorn hens with similar initial body weight of 1077± 6 g and 27 weeks of ages were randomly distributed to 12 pens each with 14 hens and 2 cocks. Hens were kept in full litter house system. The ingredient used for formulate layer ration were maize grain, noug seed cake, soybean meal, wheat short, ground P. juliflora pod, vitamin premix, lime stone and salt. The four treatment rations used in this study were 0% GPJP inclusion (T1) control group, 10% GPJP (T2), 20% GPJP (T3), and 30% GPJP (T4). The experiment lasted for 12 weeks. Dry matter intake, BWG, HDEP, HHEP, egg mass, eggs quality and fertility eggs were measured during the experiment. The chemical analysis showed that ground P. juliflora pod contained 16.04% CP and 2461.6 ME kcal/kg DM. The daily BWG of hens fed with T4 (0.02±0.003 g) was significantly ($P < 0.05$) lower than those on T1 (0.04±0.003 g) and T2 (0.04±0.003 g). Hens fed T4 has significantly ($P < 0.05$) lower egg mass (19.6±1.04 g) than hens fed T1 (27.14±1.04 g). Roche color reading revealed that eggs from hens fed T4 is yellowish (3.2±0.19) than T2 (2.6±0.19) and control diet (1.7±0.19; $P < 0.001$). Eggs laid by hens fed with T3 and T4 had thinner and T4 lighter egg shell ($P < 0.05$) as compared to the control. Levels of GPJP did not negatively affected hen day egg production, DMI, fertility, hatchability and chick quality. The result of the present study showed that GPJP can be used in formulation of layers ration up to 20%.

26. Effects of Substituting Maize with Sundried and Ground Cassava Tuber on Egg Production, Quality, Fertility and Hatchability of White Leghorn Hens

Mihret Aregay, Mengistu Urge and Getachew Animut
Year: 2012

Abstract: Twelve weeks feeding trial was conducted to evaluate the effect of substitution of maize with peeled sun dried cassava tuber meal as energy source on egg production, fertility, hatchability, egg and chick quality, embryonic mortality, body weight gain and feed conversion ratio of white leghorn layers at Haramaya University poultry farm. One hundred and ninety five points of lay pullets and thirty cockerels at 32 weeks of age with average initial body weight of 940.04±32.2 g (mean ± S.D) were randomly distributed to five treatments replicated three times with thirteen layer hens and two cockerels per replicate in CRD and kept on a deep litter system. The ingredients used for the study were maize grain, PSDCTM, noug seed cake, soybean meal, wheat short, lime stone, vitamin premix and salt. The treatments were replacing peeled sun dried cassava tuber meal (PSDCTM) for maize grain at a percentage of 0 (T_1, control), 25 (T_2), 50 (T_3), 75 (T_4) and 100 (T5) in layers ration. Dry matter intake (80.7, 87.5, 80.8, 83.4 and 83.0 (SEM=1.02), for T1, T2, T3, T4 and T5, respectively) was not statistically different among the treatments. Average daily body weight gain (g/bird) (0.2, 0.27, 0.2, 0.21 and 0.2 (SEM=0.012), for T1, T2, T3, T4 and T5, respectively) was significantly ($P < 0.05$) higher in T2 as compared to the other treatment group. Feed conversion ratio (3.2, 3.8, 2.9, 3.5, and 3.5 (SEM=0.11), for T1, T2, T3, T4 and T5, respectively) was significantly ($P < 0.05$) higher in T3 than T1, T4 and T5 but low in T2. Percentage of hen- day egg production (57.6, 52.3, 64.1, 53.9 &53.8) (SEM=1.4) and egg mass (g/hen day) (28.9, 26.1, 32.3, 27.1 & 26.9 (SEM= 0.076), for T1, T2, T3, T4 and T5, respectively) were significantly higher in T3 followed by T1 than T2, T4 and T5. There was no significant difference ($P > 0.05$) among treatments on egg weight, albumen quality, yolk diameter, yolk weight, yolk index, shell weight, egg shell thickness, albumen height, Haugh unit, fertility, hatchability, embryonic mortality, chick weight and chick visual score and all values of these parameters are within the standard established and/or values recorded for the present strain of layers. Chick length was significantly shorter in T2 than T1, T3 and T5 groups. Yolk color score (2.0, 2.6, 2.6, 2.8 and 3.2 (SEM=0.14) for T1, T2, T3, T4 and T5, respectively) was significantly ($P < 0.05$) higher in T5 and T4, followed by T3 and T2 but low for T1 (control diet) indicating that cassava increased the intensity of yellow color. PSDCTM could be economical substitute for maize in layer ration preferably at a ratio of 50:50. We conclude that peeled sun dried cassava tuber meal can replace maize without adversely affecting laying performance of chicken and can be an alternative ingredient for preparing poultry ration for semi-intensive as well as intensive poultry production.

27. Effect of Supplementation of Hay with Graded Level of Rapeseed Cake and Rice Bran Mixture on Feed Intake, Digestibility, Body Weight Change and Carcass Characteristics of Farta Sheep

Melese Dejen and Getachew Animut
Year: 2012

Abstract: A study was conducted to assess the effect of supplementation of hay with graded levels of rapeseed cake (RSC) and rice bran (RB) mixture on feed intake, digestibility, and daily body weight (BW) gain (ADG,) carcass parameters and, to evaluate profitable level of the supplement of Farta sheep fed hay basal diet. 24 yearling male sheep with initial BW of 16.53 ±1.53 kg (Mean ± SD) was used, in a randomized complete block design with four treatments. Treatments were hay fed ad libitum alone (T1) or supplemented with 140 (T2), 280 (T3) and 420 g DM/day concentrate mixture (21.7% RSC + 78.3% RB). The study consisted of 7 days digestibility and 90 days feeding trials with carcass evaluation at the end. The CP content of was 9.89, 32.1 and 7.6% and the NDF content was 75.7, 28.5 and 64.9% for hay, RSC and RB, respectively. The hay DM intake (563, 532, 468, 410 g/day (SEM = 19.9) for T1, T2, T3 and T4, respectively) was higher ($P < 0.05$) in T1 and T2 than T4, but the value for T3 was similar ($P > 0.05$) with all treatments. Total DM intake was lowest ($P < 0.05$) for T1 as compared to the supplemented group, and total DM intake was greater for T4 than T2 and the value for T3 was similar with T2 and T4. The total CP intake (58, 75, 91 and 102 g/day) was in the order of T4 > T3 > T2 > T1. Digestibility coefficient for DM was greater ($P < 0.05$) for T3 and T4 as compared to T1 and T2. The digestibility coefficient for CP (0.36, 0.58, 0.68 and 0.73 (SEM = 0.037) for T1, T2, T3 and T4, respectively) was lowest ($P < 0.05$) for T1 as compared to the supplemented treatments, and among the supplemented treatments the value for T4 > T2, and that of T3 was similar with T2 and T4. ADG (1.9, 25.6, 30.9 and 35.7 g/day (SEM = 4.24) for T1, T2, T3 and T4, respectively) was lower ($P < 0.05$) for T1 than the supplemented sheep. Differences among the supplemented treatments in ADG were not significant ($P > 0.05$). Hot carcass weight (5.53, 7.01, 7.14 and 7.64 kg for T1, T2, T3 and T4, respectively) was lowest ($P < 0.05$) for T1, and among the supplemented sheep hot carcass weight was in the order of T4 > T3 = T2 ($P < 0.05$). Dressing percentage on slaughter BW basis was greater ($P < 0.05$) for the supplemented than the non-supplemented sheep, and was similar among the supplemented treatments. Partial budget analysis revealed that as the level of concentrate inclusion in the diet increased net return, change in net income as well as marginal rate of return (MRR) increased. The results of this study indicated that the practice of supplementation of poor quality diets like hay with agro-industrial by-product concentrates would result to not only improvement in animal performance biologically but also offer a positive and higher net income. Thus, from the overall results of this study, it would appear that a 420 g/day inclusion level of concentrate mixture of rapeseed cake and rice bran could be used for growing Farta sheep with better results.

28. Replacement of Cottonseed Meal with Ground *Prosopis juliflora* Pods on Feed Intake, Digestibility, Body Weight Gain and Carcass Parameters of Afar Sheep Fed Cultivated Pasture Hay Basal Diet

Mohammed Yasin and Getachew Animut
Year: 2012

Abstract: The experiment was conducted to determine the comparative supplementary feeding value of ground *Prosopis juliflora* pod (PjP) and cottonseed meal (CSM) and their mixtures on feed intake, body weight gain, digestibility and carcass parameters of Afar sheep fed a basal diet of cultivated pasture hay. Twenty-five yearling intact fat-tailed Afar rams with mean initial live weight of 17.24±1.76 kg (mean ± SD) were used for the experiment in a randomized complete block design. Animals were blocked on their initial body weight. The experiment consisted of 12 weeks feeding trial and 7 days of digestibility trial followed by carcass evaluation at the end. Treatments were alone ad libitum (T_1) or with 300 g CSM (T_2), 300 g PjP (T_5), 2:1 ratio (T_3) and 1:2 ratio of CSM : PjP (T_4). The CP content of the hay, CSM and PjP were 10.5, 44.5 and 16.7%, respectively. Hay DM intake (587, 491, 451, 437 and 402 g/d) was higher in non-supplemented ($P < 0.05$) and total DM intake (587, 783, 748, 731 and 684 g/d for T_1, T_2, T_3, T_4 and T_5, respectively) was lower in non-supplemented sheep than the supplemented ones. No significant difference was seen in DM and OM digestibility ($P > 0.05$) among treatments, whereas supplementation increased ($P < 0.05$) CP digestibility coefficient (0.63, 0.76, 0.73, 0.72, and 0.71 for T_1, T_2, T_3, T_4 and T_5 respectively). Daily weight gain (ADG; 6.8, 77.1, 72.4, 56.9 and 33.8 g for T_1, T_2, T_3, T_4 and T_5, respectively) was lower ($P < 0.05$) for T_1 compared to all supplemented treatments except T_5. Hot carcass weight and rib-eye muscle area also followed the same trend like that of ADG. From the present study, it can be conclude that supplementation of sole CSM or mixture of CSM and ground PjP appeared to be of biologically better supplementation strategy for Afar sheep under the current feeding regime. Depending on the economics and/or objective supplementation, however, one of the supplementation strategies (sole CSM or one of the mixtures of CSM and ground PjP) can be recommended for Afar sheep.

29. The Effect of Feeding Different Levels of Soybean Meal on Egg Production, Quality, Fertility and Hatchability of White Leghorn Layers

Senayt Abraha, Mengstu Urge and Getachew Animut
Year: 2012

Abstract: A 12 week study was conducted to evaluate the effect of feeding different levels of SBM inclusion on dry matter (DM intake), egg production, quality, fertility, hatchability, and profitability of white leghorn layers. A total of 204 (180 layers and 24 cocks) with uniform body weight (BW) and age were randomly distributed in to 12 pens and assigned to 4 treatments. Treatments were ration containing 0, 13, 26, 39% SBM for T1, T2, T3 and T4, respectively. All diets contained crude protein (CP) and metabolizable energy (ME) within the recommended level for layers. The CP and ME content of treatment rations were 16.5-17.7% and 3083-3305 kcal/kg DM, respectively. The DM intake of layers was 91.7, 94. 7, 98.3 and 94.6 g/bird/day (SEM = 0.70) for T1, T2, T3 and T4, respectively and was highest for T3, intermediate for T2 and T4 and lowest for T1 ($P < 0.05$). Hen-day egg production (53.0, 58.8, 63.9, and 58.3% (SEM = 1.22)), hen –housed egg production (52.7, 58.0, 63.6 and 57.7 (SEM = 1.21)) and total egg produced per hen (48, 53, 58 and 53 (SEM =1.21) for T1, T2, T3 and T4, respectively) were highest for T3, intermediate for T2 and T4 and lowest for T1 ($P < 0.05$). Egg weight and egg mass was greater for SBM containing diets, but was similar among the SBM containing diets. Shell weight, yolk weight and shell thickness were not impacted ($P > 0.05$) by treatment. Albumen weight and yolk color score were greater for SBM containing diets, while the reverse was apparent for yolk height and yolk index ($P < 0.05$). Albumen height was greater for T3 than T1 and Haugh unit was greater for T3 than other treatments ($P < 0.05$). Fertility ranged 87-97% and was lower for T1 than other treatments, whereas hatchability tended to decreases with increasing level of SBM in the rations. T1 (87.9 $\pm$6.7) scored the highest ($P < 0.05$) chick quality as assessed by visual observation, and T4 (9.6$\pm$0.8) scored the highest ($P < 0.5$) embryonic mortality. The economic return (profitability) was in the order of T3 > T2 > T1 > T4. In conclusion, 26% SBM inclusion in the diet of layers is recommended due to its positive impact on egg production and profitability without any detrimental effect on egg quality. However, high level of SBM meal should be used cautiously if the egg is to be used for hatching.

30. Inclusion of Silkworm Pupa as Protein Supplement in Broilers Ration

Tekalegn Yirgu, Mengistu Urge and Tadelle Dessie
Year: 2012

Abstract: Inclusion of silkworm pupa (SWP) and noug seed cake for soybean meal (SBM) at various levels in broiler starter and finisher rations as protein supplement was evaluated at Debre-Zeit Agricultural Research Center. The objectives of the study were to assess the performance of broilers on the basis of dry matter and nutrient intake, growth, feed conversion efficiency, survivability, carcass characteristics, as well as economics of production. Two hundred twenty five day-old Hubbard Classic unsexed chicks with uniform average group weight (42.32±0.297 g (±SEM)) were randomly allotted to five dietary treatment groups in a completely randomized design (CRD) each with three replicates of fifteen chicks per replicate. The treatments were T1 that contains no SWP (0% SWP+30% SBM (the recommended level of SBM)), T2 (1.25% SWP+22.5% SBM), T3 (2.5% SWP+15% SBM), T4 (3.75% SWP+7.5% SBM) and T5 (5% SWP (the recommended level of SWP) +0% SBM) of the total rations. As the level of SWP inclusion increased the noug seed cake was also increased. During the 49 days of the experiment, dry matter and nutrient intake, body weight change, dry matter and nutrient conversion ratio and efficiency, mortality, carcass characteristics, organ weight and percent, and economic responses were assessed. The results revealed that daily DM (59.2-63.9 g/bird/day (SEM=±1.65)), CP (12.4-13.4 g/bird/day (SEM=±0.37)) and ME (404.8-430.2 Kcal/bird/day (SEM=±10.8)) intake, and body weight gain (19.4-23.1 g/bird/day (SEM=±0.87)) during the entire experimental period were not significantly ($P > 0.05$) different between the dietary treatments. Dry matter conversion ratio (DMCR) (g/g) was higher ($P < 0.05$) for birds fed the control diet (3.07±0.07 (±SEM)) compared to those fed with T4 ration (2.73±0.07 (±SEM)). Significantly ($P < 0.01$) higher CP (0.67, 0.61, 0.58 (SEM=±0.01)) and ME (9.82, 8.82, 8.72 (SEM=±0.2)) conversion ratios were found in T1 than T3 and T4. Birds fed ration containing SWP were utilized feed efficiently than the control. This indicates that the different levels of SWP and noug seed cake inclusion for SBM did not affect feed intake, but improved nutrient utilizations. No significant difference ($P > 0.05$) in livability was found between treatments. The mean slaughtered weight (1207.8 g-1488.2 g (SEM=±60.21)), dressed weight (977.6 g - 1218.5 g (SEM=±53.5)), eviscerated weight (825.3 g - 963.1 g (SEM=±62.86)) and drumstick-thigh weight (222.5 g - 284.1 g (SEM=±15.91)) were not significant ($P > 0.05$) between the treatment means. Cost of feed declined significantly ($P < 0.001$) with increasing level of SWP (26.1-14.3 birr (SEM=±0.59)) indicating higher economic benefits than the control diet and the result was even more promising for T4 ration. It can be concluded that SWP and noug seed cake can fully replace SBM without any adverse effect on the performance and carcass characteristics of broilers and it is more profitable.

31. Effect of Supplementation with Different Proportions of Breweries Dried Grain and Maize Bran Mixtures on Feed Intake and Digestibility in Crossbred Dairy Cows Fed Natural Pasture Hay Basal Diet

Tesfaye Feyisa, Getnet Asefa and Mengistu Urge
Year: 2012

Abstract: Effect of supplementation with different proportions of breweries dried grain and Maize bran mixtures on feed intake and digestibility in crossbred dairy cows were assessed at Holetta Agricultural Research Center by using five crossbred cows of similar milk yield (8-10 kg/d), body weight (355±47), age of lactation (early lactation), but differ in parities arranged in 5*5 single latin square design; being started at December/2010 and finished at March/2011. Experimental animals were fed ad libitum natural pasture hay basal diet and supplemented with different treatments; T1 = Concentrate mix that consisted 65% wheat bran, 33% noug (Guizotia abysinica) seed cake and 2 % salt, T2 = 20% breweries dried grain (BDG) + 78% maize bran (MB) + 2% Salt ; T3 = 38% BDG + 60% MB + 2% Salt ; T4 = 58% BDG + 40% MB + 2% Salt and T5 = 78% BDG + 20% MB + 2% Salt. Laboratory analysis of experimental feeds showed that all ingredient feeds, except maize bran and all treatment diets had adequate CP content required for moderate level of ruminant production, which is greater than 15%, a level that is usually required to support lactation and growth, except that of T2 and T3. Dry matter (DM) and metabolisable energy (ME) intakes were the same in all groups while basal diet and crude protein intakes were significantly different where by cows maintained on T1 ration consumed high basal intake with the average daily intake of 8.04 kg/d. In addition, significantly higher ($P < 0.001$) CP intakes were recorded for T1 and T5 groups with the average value of 1.56 and 1.54 kg/d, respectively. Although it failed to reach significance difference, high total daily DM intake with the average value of 12.80 kg/d was consumed by animals in T1 while low total DM intake was recorded by T2 (11.13 kg/d). Similarly, treatment effects were also non-significant ($P > 0.05$) for apparent dry matter digestibility (ADMD) and apparent acid detergent fiber digestibility (AADFD), but significance difference ($P < 0.05$) existed for apparent crude protein digestibility (ACPD), apparent metabolisable energy digestibility (AMED) and apparent neutral detergent fiber digestibility (ANDFD) whereby animals consumed T5 concentrate diet digest significantly higher ($P < 0.01$) CP than those on T2, T3 and T4, while cows on T3 was able to digest significantly higher ($P < 0.05$) ME than those on T1 and T4. In addition to this, animals that received T3 and T5 concentrate diet digested significantly higher ($P < 0.05$) NDF than those consumed T1 concentrate diet. Thus, it can be judged from the present study that the different proportion of concentrate mixture used in the current study contained sufficient amount of energy and protein feeds above the level recommended in ARC (1990), and sufficient enough to support the projected milk yield (8-10 kg/d). Therefore, it can be concluded that supplementing low quality basal diets with breweries dried grain and maize bran mixture could be alternative sources of dairy feed supplements to provide adequate and required amount of protein and ME for dairy animals.

32. Effect of Supplementation of Noug Seed (*Guizotia abyssinica*) Cake, Locally Processed Oat (*Avena sativa*) Bran and Their Mixtures on Performance of Hararghe Highland Sheep Fed a Basal Diet of Natural Pasture Hay

Taye Demissie, Mengistu Urge and Getachew Animut
Year: 2012

Abstract: The study was conducted using twenty five yearling intact male Hararghe highland sheep with a mean initial live weight of 15.36±1.81 kg (mean ±SD), with the objective of evaluating the effect of supplementation with noug seed cake (NSC), oat bran (OB) and their mixtures on performance and economics of sheep fed a natural pasture hay based diet. The experiment consisted of 90 days of feeding trial and 7 days of digestibility trial followed by evaluation of carcass parameters at the end. The experimental sheep were blocked into five blocks of five animals based on their initial body weight and randomly assigned to one of the five treatment diets within a block. The treatments included ad libitum feeding of hay + 45 g NSC (control, T1), hay ad libitum + 350 g NSC (T2), hay ad libitum + 350 g OB (T3), hay ad libitum + mixture OB with NSC at 67%:33% (T4), and hay ad libitum + mixture of OB with NSC at 33%:67% (T5), which was offered at a level of 350 g DM/head/day. Water and mineral block were available to the animals at all time. The CP content of hay and OB was 4.2 and 8.3%, respectively. The intake of hay DM (562.9,429.8, 302.8, 433.6 and 430.4 g/day (SEM = 3.93) for T1, T2, T3, T4 and T5, respectively) was higher (P<0.001) for the control sheep compared with the supplemented ones, but total DM intake (604,751,616,753 and 750 g/day (SEM = 3.93) and CP intake (37.7, 117.1, 40.11, 85.3 and 107.6 g/day (SEM = 0.27)) for T1, T2, T3, T4 and T5, respectively) were higher (P < 0.001) for T2, T4 and T5 than T3 and T1. Treatment did not impact (P > 0.05) DM, OM, NDF and ADF digestibility, but CP digestibility (51.4, 80, 53.7, 73.3 and 77.9% (SEM = 2.16) for T1, T2, T3, T4 and T5, respectively) (P < 0.001), was lower for T1 and T3 than T2, T4 and T5, but T5 had similar (P > 0.001), CP digestibility percentage with T2 and T4. Average daily gain (ADG) (15.6, 17.8, 54.4, 72.2 and 75.6 g/day (SEM = 3.23)) and feed conversion efficiency (FCE) (0.03, 0.03, 0.07, 0.1 and 0.1 (SEM = 0.005)) were significantly different in the order of T3 = T1 < T2= T5 = T4 (P<0.001). Hot carcass weight (HCW) (5.4, 8.6, 5.5, 11.1 and 10.3 kg (SEM = 0.45) for T1, T2, T3, T4 and T5, respectively) was higher in T2, T4 and T5 compared with T3 and T1. In general, supplementation improved the performance of animal and its effect was higher in sheep supplemented with mixtures of OB and NSC (T4 and T5). The result of partial budget analysis also indicated that T4 to be a more profitable supplementation. Therefore, T4 diet is recommended as being biologically and economically efficient level of supplementation for sheep feeding in areas where oat bran and NSC is available.

33. Effects of Feeding Different Levels of Detoxified Ethiopian Mustard (*Brassica carinata*) Seed Cake on Live Weight Gain and Carcass Parameters of Afar Sheep Fed Native Hay Basal Diet

Wondimagegne Bekele, Getnet Assefa and Mengstu Urgie
Year: 2012

Abstract: The experiment was carried out at Debrezeite agricultural research center, south east of Addis Ababa, using thirty yearling Afar male sheep with an average initial body weight of 17.07 ± 0.58 (mean ± SD) kg, to investigate the effect of including detoxified Ethiopian mustard seed (*Brassica carinata*) cake as protein source of the concentrate supplement on feed intake, digestibility, live weight gain and carcass parameter. The experiment consisted of ninety days of feeding trial and seven days of digestibility trial followed by evaluation of carcass components at the end of the trial. During quarantined period all sheep were ear-tagged for identification, vaccinated against anthrax, sheep pox and pasteurellosis. The sheep were also injected ivermectin drug against both internal and external parasites. The experimental design used for the study was randomized complete block design. The experimental sheep were blocked into six blocks of five animals based on their initial body weight and randomly assigned to one of the five treatment diets within a block. The experimental diets included ad libitum feeding of natural pasture hay and concentrate mix supplementation of 300 g/head/day dry matter (DM), each treatment feed consisting 67% (200 g) Wheat Bran (WB) as energy source and 33 % protein source. The treatments were replacing the common feed noug seed cake (NSC) with Ethiopian mustard seed cake. Therefore, T1consistes 100 g NSC and 200 g wheat bran (WB), T2 (67 g NSC+33 g detoxified mustard seed cake(DMSC)), T3 (33 g NSC+ 67 g DMSC), T4 (100 g DMSC) and T5 (33 g NSC + 67g unditoxified mustard seed cake (UMSC) that were indeed with 200 g WB. All animals were fed and managed in individual pens. Water was available all the time and salt were added at 1% of the daily supplement. All animals for digestibility trial and three animals for carcass analysis were used from each treatment group. The experimental feeds were analyzed for DM, crude protein (CP), and fiber contents. During the trial period, feeds offered, refusals, faeces and body weight change were recorded. The supplement was offered twice daily at 0800 and 1600 hours. The CP content of natural pasture was 6.5% and considered average under the Ethiopian condition. The CP content of WB, NSC, DMSC and UMSC were 15.4, 28.2, 39.7, and 35.1% as percent DM. The daily DM basal diet intake ranged 530.1 g to 543.4 g per head were not significant ($P > 0.05$) difference among the treatment group whereas there was significant ($P < 0.01$) difference in concentrate intake T5 consume significantly ($P < 0.01$) lower (281.1 g/h/d) supplement intake than T1 (284.6 g/h/d), T2 (284.5 g/h/d), and T3 (285.6 g/h/d). No significant ($P > 0.05$) difference were observed in DM, OM, CP, NDF, and ADF digestibility. Similarly No significant ($P > 0.05$) difference were observed for slaughter weight, dressing percentage, hot carcass weight (9.6, 9.0, 9.3, 9.1 and 8.5; (± 0.11 SEM) and rib eye area (8.1, 8.1, 8.0, 7.8 and 7.8 (± 0.18 SEM) for T1, T2, T3, T4 and T5 respectively). The average daily live weight gain was ranged between 62.1 g to 77.8 g Moreover, veterinarian visual assessment of liver revealed that no toxic remnants was observed. The result of the experiment indicates that detoxified mustard seed cake can fully replace noug seed cake, and therefore be used as protein supplement in the diets of growing Afar sheep. It is also noted that UMSC could replace up to 67 % of the NSC. However, as the effect of anti-nutritional qualities vary over the length of feeding period, type of animal and the level of feeding, future studies should focus on long term feeding effect of high level inclusion of mustard seed cake on different species and classes of animals to see the overall animal performance and its effect on product quality.

34. Effects of Levels of Inclusion of Locally Processed Fish Waste Meal in the Diets of White Leghorn Layers On Egg Production and Quality

Yared Alemayehu, Mengistu Urge and Kefelegn Kebede
Year: 2012

Abstract: A study was conducted to evaluate the effects of inclusion of locally processed fish waste meal in white leghorn layers diet on performance and egg quality, sensory flavor, and profitability of the ration at Haramaya University poultry farm. One hundred eighty WL chickens weighing 1039.31±28.14 g and 5 months of age were randomly distributed to 12 pens each with 15 layers on a deep litter system. The pens were randomly assigned to one of the four experimental rations, each treatment consisting three replications. The treatments were T_1 (conventional layers ration with no FWM), T_2 (5% FWM + 10% SBM + 16% WS + 17% NSC), T_3 (10% FWM + 5% SBM + 8% WS + 16.8 % NSC), T_4 (15% FWM + 0% SBM + 6% WH + 16.7% NSC). The experiment lasted for 90 days during which dry matter intake, laying performance, egg quality parameters including flavor, fertility and hatchability, as well as profitability of egg production were evaluated. The chemical analysis showed that FWM contained 41.2% CP and 2982.04 kcal ME/kg DM. Dry matter intake (88.6, 90.1, 89.1, and 89.2 (SEM=2.81, for T1, T2, T3, and T4, respectively) was not statistically different between the treatments. Average daily gain (0.12, 0.07, 0.23 and 0.19 (SEM=0.02), for T1, T2, T3 and T4, respectively) was significantly lower in T2 and T4 as compared to T3. Hen day egg production (47.8, 54.9, 58.1, and 53.8 (SEM=1.32), egg mass (23.0, 28.8, 27.1, and 26.8 (SEM=0.73), for T1, T2, T3 and T4, respectively) were significantly higher in diets fed with ration containing FWM as compared to the control group. Feed efficiency ratio (0.26, 0.3, 0.3, and 0.3 (SEM=0.007), for T1, T2, T3, and T4, respectively is significantly higher for groups consumed FWM diet than the control. Differences between treatments in egg quality parameters did not revealed any trend that is related to treatment effect. Also yolk quality parameters of all treatments fall within the accepted standards and yolk color values as measured by Roche color fan are within 1 and 4. Thus, as such inclusion of FWM did not seem to affect internal and external quality parameters measured in the present experiment. Eggs from hens fed with ration containing 10 and 15% FWM have moderate fishy flavor ($P< 0.05$) as compared to those consumed the control and T2. Early and mid-embryonic mortality, visual scoring of chicks, fertility and hatchability were not significant between the treatments. The result obtained from partial budget analysis indicated that inclusion of fish waste meal improved economics of egg production as compared to the control, which is attributed to the high cost of soybean meal as compared to FWM and the better efficiency of feed utilization by FWM groups. Thus, FWM inclusion improved egg laying performance and profitability, but imparted moderate fishy flavor beyond 5% inclusion. However, when considering egg production, feed efficiency ratio, net return and egg sale to feed cost ratio inclusion of FWM in White Leghorn diets up to 10% is recommended, besides consumer preference to consumption of cooked eggs was excellent even if moderate fishy flavor was detected in T_3

35. Supplementation of Different Level of Corn Silage with Linseed Meal on Performance of Black Head Ogaden Sheep Fed Grass Hay

Yohannes Urgesa, Getachew Animut and Mohammed Yusuf
Year: 2012

Abstract: The experiment was conducted at Haramaya University Sheep farm to evaluate the supplementation effect of different level of corn silage (CS) with linseed meal (LSM) on performance of black head ogaden sheep fed grass hay basal diet. Twenty five yearling male sheep with a mean initial BW of 14.85±0.31 kg (means ± SD) were assigned into five treatments in a randomized complete block design. Treatments were grass hay ad libitum + 60 g DM/day LSM alone (T_1) or supplemented with 100 (T_2), 200 (T_3), 300 (T_4) and 400 g DM/day CS (T_5). The experiment contained 90 days feeding and 7 days digestibility trials and carcass evaluation at the end. The CP content was 10.0, 8.6, and 30.4% and the NDF content was 76.8, 59.6 and 37.0% DM for grass hay, CS and LSM, respectively. Hay dry matter (DM) intake was significantly higher ($P < 0.05$) in CS non-supplemented sheep than the supplemented ones. Total DM intake was 575, 637, 695, 765 and 844 g/head/day and was in the order of $T_5 > T_4 > T_3 > T_2 > T_1$ at ($P < 0.05$). Intake of total crude protein (CP) and metabolizable energy (ME) followed a similar trend to that of total DM intake. The apparent digestibility of DM and NDF follow the same trend ($P < 0.05$) like that of total DM and CP intakes. The apparent digestibility of CP (55.3, 63.3, 66.9, 68.4 and 72.4% for T_1, T_2, T_3, T_4 and T_5, respectively) was greater ($P < 0.05$) for T_5 as compared to T_1 and T_2, and values for T_1 was less than that of T_3 and T_4 as well. ADG was 50, 65, 70, 80 and 80 g/day (SEM = 5.5) for T_1, T_2, T_3, T_4 and T_5, respectively and was greater ($P < 0.05$) for CS supplemented group than the non-supplemented ones. Among the corn silage supplemented group ADG was lower ($P < 0.05$) for T_2 than T_4 and T_5, and values for T_3 was similar ($P > 0.05$) with other CS supplemented groups. FCE on the other hand was greater ($P < 0.05$) for T_4 than T_1, but differences among other treatments were not significant. Hot carcass weight for T_1, T_2, T_3, T_4 and T_5, was 6.03, 7.00, 7.35, 7.97, 8.00 kg respectively (SEM = 0.42) and dressing percentage on slaughter BW basis was lower ($P < 0.05$) for T_1 as compared to T_3, T_4 and T_5, and the rest treatments were similar ($P > 0.05$) among each other. DM and CP intake was positively and significantly ($P < 0.05$) correlated with ADG and hot carcass weight. Sheep in T_4 had higher net return (33.37 ETB/head) and the least was for CS non supplemented sheep. Marginal rate of return (MRR) was lowest for T_5 (3.64%) and highest was for T_2 (22.32%). So considering capital, T_2 with the highest MRR would be recommended as being economical. However, if capital is not the limiting factor, T_4 would be selected since it fetches better net return and is good in inducing better biological performance of animals in terms of ADG and carcass output.

36. Feeding Value of Ground *Prosopis juliflora* Pods in Layers and Broiler Rations

Meseret Girma, Mengistu Urge and Getachew Animut
Year: 2013

Abstract: This study was conducted to evaluate feeding value of graded levels of ground Prosopis juliflora pods (GPJP) in layers and broiler rations. One hundred eighty 26-weeks old Bovans Brown commercial layers (experiment one) and three hundred ninety six Hubbard Classic commercial day old broiler chicks (experiment two) were used. The treatment rations contained GPJP at inclusion levels of 0 (T_1), 10 (T_2), 20 (T_3) and 30% (T_4) of the total ration. Both experiments were arranged in a completely randomized design and each treatment was replicated three times. The replicates consisted 15 layers and 33 broiler chicks. The rations were formulated to be isocaloric and isonitrogenous with 2800 kcal ME/kg DM and 16.0% crude protein (CP) to meet requirements of layers and 3060 kcal ME/kg DM and 22% CP; 3100 kcal ME/kg DM and 18% CP to meet the nutrient requirements of broilers during the starter and finisher phases, respectively. Experiment one lasted for 12 weeks. Dry matter intake (DMI), body weight, egg production and quality parameters, and feed conversion ratio were measured. Broilers experiment lasted for 45 days (1-21 starter and 22-45 finisher phase) during which feed and nutrient intakes, live body weight, feed conversion ratio, mortality, carcass yield characteristics, gastro intestinal tract weight and length were recorded. Fatty acids composition, sensory characteristics, and chemical composition of breast and thigh muscles and blood hemathology were also assessed. Data were subjected to analysis of variance. Chemical composition of GPJP used for layer rations was 12.1% CP, 7.3% ether extract (EE), 14.4% DM crude fiber (CF) and 82.3 μg/100 g β-carotene. Values for GPJP used for broiler ration was 15.43, 6.01, and 14.6% DM for CP, EE and CF, respectively. The results showed that DMI and hen day egg production (HDEP) was lower ($P < 0.05$) for T_4 than T_1 and T_2 and that of egg mass was significantly ($P < 0.05$) lower for T_4 than T_1 (DMI: 111.4, 111.8, 110.5 and 105.4 g/day (SEM = 1.92); HDEP: 67.2, 67.7, 62.7 and 60.0% (SEM = 0.02); egg mass: 44.0, 43.8, 41.3 and 39.6 g/day (SEM = 1.49) for T_1, T_2, T_3 and T_4, respectively). Except for egg yolk color, which was greater ($P < 0.05$) for T4 than other treatments, all egg quality parameters were similar among treatments. Therefore, the overall layers performance revealed that up to 20% GPJP inclusion in layers ration is recommendable, and treatment with 10% GPJP in the ration appeared to be more economical. Higher level of GPJP inclusion in broilers ration also impacted some performance parameter. Feed intake during finisher phase (3387, 3340, 3337 and 3280 g (SEM = 29.54)) and the entire experiment period (4369, 4321, 4313 and 4248 g (SEM = 27.41)), final live weight, finisher and live weight change at the entire experiment (1837.6, 1854.1, 1798.2 and 1639.5 g (SEM = 63.55)) period, average daily gain (ADG) (40.8, 41.2, 39.9 and 36.4 g/d (SEM = 1.41)) at entire experimental period and feed conversion ratio (2.3, 2.3, 2.4, and 2.5 (SEM = 0.070)) during the entire experiment period, for T_1, T_2, T_3 and T_4, respectively), were significantly lower ($P < 0.05$) in T_4 than T_1. Among carcass yield parameter, drum stick weight was significantly lower ($P < 0.05$) in T_4 than T_1 and T_2, but esophagus and crop weight were higher ($P < 0.05$) in T4 than other treatments. There was no adverse effect of GPJP inclusion in broiler ration on fatty acid composition, sensory evaluation and chemical composition of breast and thigh meat. Hematological responses of broilers was similar between the treatments, except monocyte percentage, which was significantly ($P < 0.05$) higher in T_4 as compared to the other treatments, and more lesions were observed on the intestine of birds at the highest level of GPJP inclusion (30%). Overall, the result showed that broilers performance, product quality, and health were not hampered by the inclusion of GPJP up to 20% of the total ration. Therefore, we conclude that inclusion of GPJP in poultry ration at lower level (maximum of 20%) reduces feed cost per egg produced and weight gain without affecting performance of layers and broilers.

37. Effect of Faba Bean (*Vicia faba* L.) Hull Substitution to Wheat Bran on Feed Intake, Digestibility, Body Weight Change and Carcass Characteristics of Afar Sheep a Basal Diet of Hay

Abadi Nigus, Mohammed Yusuf and Getachew Animut
Year: 2013

Abstract: The study was conducted in Alamata woreda, and carried out with the objective of studying the response of Afar sheep in feed intake, live weight change and carcass parameters when substituted with different proportions of wheat bran (WB) and faba bean hull (FBH) on hay and 45 g noug seed cake(NSC). The digestibility trial of 7 days and 90 days of feeding trial was conducted using the same 25 Afar sheep with a mean initial live weight of 19.98±0.12. The experimental animals were arranged randomly in to five blocks based on the initial weight variation and the five treatments were assigned randomly to the individual animal in the block. Five dietary treatments used in the experiment comprises grass hay as ad libitum plus 45 g NSC (T_1), T_1 plus 300 g WB (T_2), T_1 plus 200 g WB plus 100 g FBH (T_3) T_1 plus 100 g WB plus 200 g FBH (T_4), T_1 plus 300 g FBH (T_5). Common salt, basal diet and water were given as ad libitum for all animals, while the supplements offered individually two times a day at 0800 and 1600 hrs dividing in to two equal quantities. Un-supplemented sheep consume significantly higher ($P < 0.05$) amount of grass hay as compared to Substituted group. Substitution at different proportions of WB and FBH significantly ($P < 0.05$) increase the total DM and CP intake compared to control group, but among Substituted group there was no significant ($P > 0.05$) difference in CP intake. Substitution significantly improved ($P < 0.05$) the digestibility of CP, but there was no significant effect ($P > 0.05$) on DM, OM, NDF, and ADF digestibility among treatments. Very low CP digestibility observed in control indicated that feeding grass hay plus 45 g NSC could not provide nutrient for maintenance requirement of growing sheep. Significant ($P < 0.05$) difference in final and daily live weight gain in the range of 60.42-64.67 g/d was observed in Substituted Afar sheep, but control group was gain by 11 g/d. Numerically among Substituted group sheep Substituting with different level of FBH gained more weight than the rest group, but statistically both had similar gain. The absence of statistical difference in daily body weight gain between all Substituted groups indicated that the Substitution at different proportions of WB and FBH had similar potential to provide nutrients to improve weight gains of the sheep. The result of this study suggested that Substituting at different proportions of WB and FBH comparably improve CP intake, CP digestibility, feed conversion efficiency and ADG and generally enhanced final body weight of Afar sheep. But regarding to the production profitability for producers T_5 which has high net return with less feed cost was recommended, and is advisable to smallholder in use.

38. Effect of Supplementing Lentil (*Lenis culinaris*) Screening as a Replacement of Concentrate on Performance of Hararghe Highland Goats Fed Hay as Basal Diet

Bazezew Gizie, Getachew Animt and Mengistu Urge
Year: 2013

Abstract: This study was conducted by using twenty five Hararghe highland goats with initial body weight (IBW) of 10.84 ± 0.28 kg (mean± SD), with the objectives to determine the response in fed intake, digestibility, body weight change and carcass characteristics as well as to assess economical profitability when fed hay as basal diet and supplemented with lentil screening (LS) as replacement of concentrate mix (CM). A 90 days feeding and 7 days digestibility trials with carcass parameters evaluation at the end were carried out. The experimental goats were blocked into five blocks of five animals based on their IBW and animals within a block were randomly assigned to the five treatments. Treatments were ad libitum feeding of hay and supplementation with 300 g DM/head/day of different proportions of CM (33% noug seed cake (NSC) +67% wheat bran (WB)) and LS. Thus, the treatments were LS at levels of 0% (T1), 25% (T2), 50% (T3), 75% (T4) and 100% (T5). The CP content of hay, LS, NSC and WB were 7.8, 25.0, 30.7, and 17.3%, respectively. Total DM intake were 513, 517, 524, 522 and 515 g/day (SEM =0.95) for T1, T2, T3, T4, and T5, respectively, and was higher for T3 and T4, values for T2 was greater than T1 while values for T5 were similar with T1 and T2. CP intake were 86, 87, 90, 92, and 95 g/day (SEM=0.66) for T1, T2, T3, T4, and T5, respectively, and increased with increasing level of LS. Apparent digestibility percentage of DM in T3 (74.37%) and T4 (74.28%) was similar ($P > 0.05$), but significantly ($P < 0.001$) higher than T1 (73.13%) and T2 (73.14%), while values for T5 (73.91%) was similar with other treatments. Digestibility of CP for T2 (82.5%) was lower than other treatments (82.5, 81.5, 83.1, 82.5 and 82.6% (SEM=0.16) for T1, T2, T3, T4 and T5, respectively). Average Daily body weight gain (ADG) was 18, 35, 48, 30 and 22 g/day (SEM=2.21) for T1, T2, T3, T4 and T5, respectively, and values for T3 was the highest while T1 was the lowest ($P < 0.05$). Hot carcass weight (HCW) was greater for T3 (5.74 kg) and lowest for T1 (4.70 kg), while values for T5 (4.88 kg) was less than T2 (5.18 kg) and T4 (5.20 kg). In most carcass parameters, T3 showed better result than other treatments. Net return and marginal rate of return was higher for T3 as compared to other treatments and as such T3 showed better result in this study and is thus recommended.

39. Effect of Supplementation with Different Levels of Wheat Bran and Noug Seed (*Guizotia abissynica*) Cake Mixtures on Nutrient Utilization and Carcass Parameters of Hararghe Highland Sheep Fed a Basal Diet of Maize Stover

Merhun Lamaro, Mengistu Urge and Yoseph Mekasha
Year: 2013

Abstract: The study was conducted at Haramaya University Sheep farm with the objective to determine feed intake, digestibility, body weight gain and carcass characteristics and to evaluate the economic benefits of the feeding regime in Hararghe Highland Sheep fed untreated maize stover (MS) and supplemented with different levels of wheat bran (WB) and noug seed cake (NSC) mixtures in 2:1 ratio, and its comparison with sole urea treated MS. Twenty five intact uniform male Hararghe Highland sheep with average body weight of 17.1±1.2 kg (mean±SD) were- purchased from the surrounding market and used in both the 90 days of feeding trial and 10 days of digestibility trial. The experimental animals were arranged randomly in to five blocks of five animals based on their initial body weight and five treatments were randomly assigned to each animal in a block. The dietary treatments were untreated maize stover ad libitum + 60 g NSC (T1), urea treated maize stover ad libitum (T2), untreated maize stover ad libitum +150 g concentrate mix (T3), untreated maize stover ad libitum +250g concentrate mix (T4), and untreated maize stover adlibitum +350 g concentrate mix (T5). Urea treatment increased crude protein content of maize stover from 4.6 to 7.9%). Supplementation with concentrate mix increased ($P < 0.001$) total DM intake (g/h/day. Among the supplemented groups, T5 had significantly higher ($P < 0.001$) CP intake (88.85 g/h/day) than T3 (55.7 g/h/day) and T4 (71.27 g/h/day). Average daily body weight gains of 50.2, 49.8 and 60 g/h/day was recorded for T3, T4 and T5, respectively, whereas T1 and T2 lost weight at a rate of -18.8, and -26.9 g/h/day, respectively. The final body weight, daily body weight gain and feed conversion efficiency were higher ($P < 0.001$) for the supplemented groups compared to the control treatments. The SW, EBW, HCW and REA were significantly higher ($P < 0.001$) in the supplemented sheep than non-supplemented. Dressing percentage on slaughter body weight base was significantly higher ($P < 0.05$) in the supplemented sheep than the control groups. The total edible offal component showed no significant difference among the supplemented groups and between the controls but it showed significant difference ($P < 0.001$) between the supplemented and non-supplemented sheep. The total non-edible offal component and non- edible offal components showed no significant difference among all treatments. The current study revealed that ad libitum feeding of untreated MS with small amount of protein feed supplementation, and sole urea treated MS resulted in loss of body weight. However, supplementation of untreated maize stover with concentrate improved ram performance. The partial budget analysis showed that sheep offered with the highest level of concentrate mix (350 g/h/day, T5) returned a higher net income (38.1 ETB) as compared to the lower levels of supplementation, T3 (16.4 ETB) and T4 (28.6 ETB). However, the MRR decreased as the level of supplementation increased. The animals in the control treatments, T1 and T2, lost net return of 44 and 93.8 ETB, respectively, indicating that feeding urea treated maize stover incur higher loss than small amount of supplementation of untreated maize stover based diet with protein concentrate. Based on the results of the present experiment, we conclude that supplementation of Hararghe Highland Sheep fed untreated maize stover basal diet with 150 g DM /h/day concentrate mix (T3) resulted in better biological performance.

40. Effect of Supplementation of Different Proportions of Ameja (*Hypericum quartinanum*) Leaf and Noug (*Guizotia abyssinica*) Seed Cake on Digestibility and Performance of Highland Male Sheep Fed Natural Pasture Hay

Tefera Mekonen, Getachew Animut and Mengistu Urge
Year: 2013

Abstract: This experiment was conducted to evaluate the effect of supplementation of different proportion of Ameja (*Hypericum quartinanum*) leaf (AL) and Noug (*Guizotia abyssinica*) seed cake (NSC) on digestibility, feed intake, growth and carcass characteristics of Menz sheep fed natural pasture hay (NPH) as a basal diet. Twenty five 10-11 month old male Menz lambs were blocked based on their initial body weight (BW) and randomly assigned to treatments. Treatments were NPH ad libitum + 150 g/day oats grain alone (T1) or with 344 g/day AL (T2), 230 g/day AL + 50 g/day NSC (T3), 112 g/day AL + 100 g/day NSC (T4) and 150 g/day NSC (T5). The supplements from AL and NSC were on iso-nitrogenous basis. The crude protein (CP) content of NPH, NSC, AL and oat grain was 6.5, 35.6, 15.1 and 9.8%, respectively. Total dry matter (DM) intake was greater for T3, T4, and T5 as compared to T1 (608, 692, 735, 836 and 796 g/day (SEM = 94.0) for T1, T2, T3, T4 and T5, respectively). Intake of crud protein CP was 51, 70, 82, 97 and 99 g/day (SEM = 7.2) for T1, T2, T3, T4 and T5, respectively, and ranked T5 = T4 > T3 > T2 > T1. Digestibility of DM, organic matter (OM), nutrient detergent fiber (NDF) and acid detergent fiber (ADF) was similar. However, CP digestibility differed ($P < 0.001$) among the treatments, the value being lowest for T1 (0.48) and highest in T5 (0.72). Daily BW gain (ADG) differed ($P < 0.001$) among treatments, being lowest for T1, similar among T_3, T_4, and T_5. Hot carcass weight was 7.1, 8.4, 8.7, 10.0 and 9.7 kg (SEM = 0.79) for T1, T2, T3, T4 and T5, respectively, and it is the lowest ($P < 0.001$) for T1, and among the supplemented groups T4 and T5 had greater hot carcass weight than T2, while the value for T3 was similar with T5, but less than that of T4. Dressing percentage on slaughter and empty body weight basis did not differ ($P > 0.05$) among treatments. In most of the performance parameters measured, T3 was not different from T4 and T5, indicating the potential of AL to replace up to 67% of NSC with similar effect on performance of sheep.

41. Effect of Graded Levels of Onion Leaves as a Substitute for Wheat Bran in Concentrate Mixture on Performance and Carcass Characteristics of Hararghe Highland Sheep

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Year: 2013

Abstract: A study was conducted using twenty four 10 to 11 month male Hararghe highland sheep with a mean initial live body weight of 11.14 ± 0.22 kg (mean ± SD), with the objective to evaluate the response of sheep in feed intake, digestibility and body weight gain, as well as to assess carcass parameters and sensory characteristics of the meat sample when fed onion leaves as a replacement for wheat bran (WB) at different ratio in a concentrate mixture. The experiment consisted of 90 days of feeding trial and 7 days of digestibility trial followed by evaluation of carcass parameters at the end. The experimental sheep were blocked in to six blocks of four animals based on their initial body weight and randomly assigned to one of the four treatment diets within a block. The treatments included ad libitum feeding of hay + 139.2 g noug seed cake (NSC) + 208.7 g (WB) (T_1), hay + 165.7 g WB + 139.2 g NSC + 41.5 g onion leaves (OL) (T_2), hay ad libitum + 123.1 g WB +139.2 g NSC + 82.1 g OL (T_3), hay ad libitum + 81.3 g WB + 139.2 g NSC + 122 g OL (T_4), which was offered at a level of about 350 g/head/day on dry matter basis. Water and mineral block were available to the animal at all time. The CP content of hay and OL was 7.9 and 16.5%, respectively. The intake of hay DM (333.6, 399.1, 347.6 and 437.1 g/day (SEM = 1.83) for T_1, T_2, T_3 and T_4, respectively) was higher ($P < 0.001$) for the treatments supplemented with concentrate containing OL as a substitute for WB compared with hose consumed ration with no OL. The total DM intake (681.5, 745.6, 691.9 and 779.6 g/day (SEM = 2.22) and CP intake (103.8, 109.4, 104.8 and 110.9 g/day (SEM = 0.137)) for T_1, T_2, T_3 and T_4, respectively) were higher ($P < 0.001$) for T_4, T_2 and T_3 than T_1. Treatment did not impact ($P > 0.05$) DM, OM, CP and NDF digestibility. Average daily gain (ADG) (67.8, 75.6, 72.0 and 82.9 g/day (SEM= 1.03)) and feed conversion efficiency (FCE) (0.099, 0.101, 0.104 and 0.107 (SEM = 0.0016)) were significantly different among treatments in the order of $T_4 > T_3 > T_2 = T_1$ ($P < 0.01$). Hot carcass weight (HCW) (7.1, 7.7, 7.7 and 7.9 kg (SEM = 0.10) for T_1, T_2, T_3 and T_4, respectively) was higher in T_4, T_2 and T_3 compared with T_1. Dressing % per slaughter weight (40.9, 42.1, 42.9 and 42.8% (SEM = 0.59)) for T_1, T_2, T_3 and T_4, respectively) was higher in T_2 than the other treatment. Rib eye area (cm^2) (3.83, 5.36, 4.44 and 6.7(SEM =0.09)) were significantly different among treatments in the order of $T_4 > T_2 > T_3 > T_1$ ($P < 0.01$). Sensory evaluation of flavor (27, 43, 61 and 71) was significantly ($P < 0.05$) higher for T_4 than the other treatments. Therefore, T_4 diet is recommended as being biologically efficient level of replacement of onion leaves (OL) for wheat bran (WB) in a concentrate mixture for higher performance of animals and meat with good flavor and no side effect on animals.

42. Effects of Supplementation with Different Forms of Barley (*Hordeum vulgare* L.) Grain on Feed Intake, Digestibility, Live Weight Change and Carcass Characteristics of Hararghe Highland Sheep Fed Natural Pasture Hay

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Year: 2013

Abstract: This study was conducted using 24 yearling intact male Hararghe highland sheep with initial body weight (BW) of 15.7 ± 2.3 kg (Mean ± SD), to determine effects of supplementing different forms of barley grain to natural pasture hay basal diet on feed intake, digestibility, average daily BW gain (ADG), carcass parameters and economic feasibility. Animals were grouped into 6 blocks of 4 animals based on initial BW and were randomly assigned to the four treatments. Treatments were feeding hay ad libitum alone (T1) or supplemented with 300 g dry matter (DM) of raw barley (RB, T2), malted barley (MB, T3) or cracked barley (CB, T4). All animals received 50 g DM supplemental noug seed cake (NSC) and had a free access to water and mineral block. The experiment consisted 90 days of feeding and 7 days digestibility trials and carcass evaluation at the end. The crude protein (CP) content of hay, NSC, RB, MB and CB were 6.6, 35.7, 11.7, 12.5 and 11.6%, respectively. Hay DM intake was higher for T1 (523 g/day) than other treatments (360-425 g/day). Total DM intake (573, 710, 723 and 775 g/day (SEM = 29.5)) and CP intake (52, 77, 77 and 83 g/day (SEM = 2.0) for T1, T2, T3 and T4, respectively) was lower for T1 than supplemented groups, with no difference ($P > 0.05$) among the supplemented treatments. Digestibility of CP (55.8, 71.1, 69.0 and 70.0% for T1, T2, T3 and T4, respectively (SEM = 1.93)) were higher ($P < 0.05$) in supplemented sheep than T1. ADG of 13, 73, 87 and 83 g/day for T1, T2, T3 and T4, respectively (SEM = 6.0), was also greater ($P < 0.05$) for the supplemented groups than T1. Barley supplementation resulted in a higher ($P < 0.05$) hot carcass weight than T1 (6.0, 10.7, 10.0 and 10.5 kg for T1, T2, T3 and T4, respectively (SEM = 0.56)). Partial budget analysis showed highest net return for T4, but highest MRR for T2, due to the additional cost incurred for preparing barley. Therefore, the results of this study highlighted that treatment of barley as in malting and cracking do not alter the performance of sheep as compared to the untreated barley, but can incur additional cost that consequently reduce MRR. Thus, based on biological performance and MRR, supplementation with raw barley is recommended. In general, supplementing animals with energy dense diet has proven to improve animal performance and profitability.

43. Effects of Substituting Sorghum for Maize on Egg Production, Quality, Fertility and Hatchability of White Leghorn Layers

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Year: 2013

Abstract: A study was conducted to evaluate the effects of replacing sorghum grain (SG) for maize grain (MG) as energy source on feed intake, body weight gain, egg production and quality, feed conversion efficiency, fertility, hatchability, chick quality of white leghorn (WL) chicken, and profitability of the ration at Haramaya University Poultry Farm for 90 days. A total of 225(195 layers and 30 cocks) with uniform body weight (BW) and age were randomly distributed in to 15 pens and assigned to 5 treatments. Treatments were ration containing 0, 25, 50, 75, and 100% of maize in the ration was replaced by sorghum grain for T1, T2, T3 T4 and T5, respectively. Chicken were offered a weighed amount of feed and feed leftover was collected and weighed the next morning. Weight of experimental animals was taken at the beginning and end of the experiment. The CP and ME content of treatment rations ranged 16.5-18% and 2640-3190 kcal/kg DM, respectively. Sorghum grain contained 9.5% and 3968.6 kcal ME/kg DM. Replacing maize with sorghum did not affect dry matter intake, average body weight gain, and average egg weight. Hen-day egg production (44.1, 55.8, 57.5, 56.5 and 54.4% (SEM = 1.56), Egg mass (22.0, 28.3, 29.9, 29.3 and 27.8 (SEM=0.89), and feed conversion efficiency (FCE) (0.27, 0.35, 0.37, 0.35and 0.33 (SEM=0.01) for T1, T2, T3, T4 and T5, respectively were significantly ($P<0.01$) higher for sorghum grain containing diets than only maize grain. Moreover, yolk color, chick weight and chick length, were significantly higher in treatment rations containing sorghum grain. Replacement of maize with sorghum in the diet did not affect albumen height and weight, Haugh unit, yolk index, diameter, weight and height, shell weight and thickness, fertility, hatchability, embryonic mortality, and chick quality by visual score. Feed cost slightly decreased with increasing level of Sorghum grain in the ration because of the lower purchasing price of SG for the experiment. Thus, egg was produced economically in groups in which sorghum grain replaced maize. In conclusion, 100% Sorghum grain substitution for maize in the diet of layers did not negatively affect production parameters. Hence, based on the price of the grains, sorghum can be used as a replacement for maize in layers ration provided that the variety of the sorghum is known.