

Course Title: Analytical Techniques in Animal Nutrition

Course code: ANNF 532

CrHr: 3 (1+2)

Course Description: This course deals with analytical procedures including sample collection, sample preparation techniques and sample preservation. It further deals with Laboratory analysis methods (Proximate and Detergent methods), determination of gross energy, Analysis of individual minerals (macro-and micro-minerals), evaluation of antinutritional factors in feedstuffs), determination of nutrient digestion in animals (*In vitro* and *In sacco*).

Course Outline

1. Introduction
2. Feed evaluation procedures
 - 2.1. Sample Collection
 - 2.2. Sample Processing and preservation for further analysis
3. Laboratory Analysis Methods
 - 3.1. Proximate (Weende System) of feed analysis method
 - 3.1.1. Moisture
 - 3.1.2. Dry Matter (DM) determination
 - 3.1.3. *Ether extract or crude fat determination*
 - 3.1.4. Crude Protein (CP) determination
 - 3.1.5. Crude fiber
 - 3.1.6. Crude Ash (Minerals)
 - 3.1.7. *Organic matter* determination
 - 3.1.8. Nitrogen free extract
 - 3.2. Detergent (Van Soest) methods of feed analysis
 - 3.2.1. Neutral detergent fiber (NDF)
 - 3.2.2. Acid detergent fiber (ADF)
 - 3.2.3. Acid detergent lignin (ADL)
 - 3.2.4. ADL-Ash
4. Determination of the gross energy of feeds (using *Oxygen Bomb Calorimetry*)
5. Mineral determination of feed stuffs, faeces, urine and other biological materials
6. Anti-nutritional factors in feedstuffs (Tannins and others)

7. Determination of feed/nutrient digestion in animals (*In vitro* and *In sacco*),

- **Teaching Methods:** -Lectures, practical, laboratory work and group discussion
- **Assessment/Evaluation:** Quizzes, assignments, laboratory report and presentation of results, tests and final exam
- **Attendance Requirement:** 75% during lecture and 100% during practical
- **References:**

1. Owosu-Apenten R. 2005. Introduction to food chemistry. Boca Raton, CRC Press. 249 p. ISBN 0-8493-1724-X.
2. Skoog D.A., West D.M., F.J. Holler.1997. Fundamentals of analytical chemistry. Fort Worth, Saunders Colledge Publishing: ISBN 0-03-05938-0.
3. Skoog D.A. 1998. Principles of instrumental analysis. Fort Worth, Saunders Colledge Publishing: 849 p. ISBN 0-03-002078-6.
4. Nollet L.M.L. 1998. Handbook of food analysis. New York, Marcel Dekker, Inc.:2041 p. ISBN 0-8247-9683-7

Instructor's role

- Introducing the objectives of the lesson
- Leading how to do chemical analysis
- Organizing students to run lab analysis

Students' role

- Having awareness of the objective
- Answering the brainstorming question individually, in pairs, in small groups and whole class room discussion.
- Practical laboratory analysis
- Reporting laboratory results