Course Syllabus

Animal Nutrition

AGR. 312  4 Credit Hours

Course Description
The fundamentals of animal nutrition and feedstuffs dealing with principles of digestion, absorption, assimilation and utilization of nutrients, balancing of rations, and identification of feedstuffs. Laboratory period included.

Prerequisites: AGR.108, 109 and Chemistry 211.
Knowledge in use of reagents and glassware required.

Objectives
The objectives of this course is to provide the students with a working knowledge of the following:

A. BODY OF KNOWLEDGE
   1. Presentation of the wide range of quality feedstuffs available for use in the feeding of farm livestock.
   2. An understanding of a feedstuffs components including proteins, fats, carbohydrates, fiber, vitamins and minerals.
   3. Discussion of the proper functioning of the ruminant and non-ruminant digestive systems.
   4. Nutrient use by livestock in the production of meat, milk, wool, and egg production.
   5. Use of the TDN system and NRC energy system and how they are used in evaluating and valuing feedstuffs.
   6. The proper and legal use of feed additives, growth stimulants, and drugs in animal rations.
   7. The causes, diagnosis, and treatment of metabolic and nutritional related diseases and disorders.

B. SKILLS
   1. Proper development of a balanced ration according to current feeding standards designed to meet an animals daily nutrient requirements.
   2. Visual identifications of the wide range of feedstuffs commonly used in livestock rations.
   3. Determination by laboratory proximate analysis of a feedstuffs chemical composition of dry matter, protein, fat, crude fiber, and ash content.
   4. Working knowledge of a feeding trials objectives, initiation, undertaking, data collection, and analysis in determining a feedstuffs nutrient digestibility.

Revised Spring Semester 2007
C. ATTITUDES AND VALUES

1. Appreciation of the role of animal nutrition in livestock feeding to meet current world food needs.

2. The technological complexity of nutrition and the depth of knowledge employed.

3. Appreciation and recognition of the voluminous research conducted over the decades in answering basic questions of metabolism and feedstuff utilization.

Textbook

**APPLIED ANIMAL NUTRITION**, 3rd Ed. by Peter Cheeke - 2005

Other related course books from the National Research Council:

- Nutrient Requirements of Beef Cattle
- " Dairy
- " Horses
- " Sheep
- " Swine
- " Laboratory Animals

Reference Books

- Basic Animal Nutrition and Feeding, Church and Pond
- Feeds and Feeding, Cullison and Lowrey
- Feeds and Feeding, Morrison
- Digestive Physiology and Nutrition of Ruminants, Church
- Stockman's Handbook, Ensminger

List Of Journals

- Journal of Animal Science
- Journal of Dairy Science
- Journal of Nutrition

List Of Periodicals

- Feedstuffs
- Successful Farming
- Hoard's Dairyman

The above are appropriate for the term paper. The List of Journals and List of Periodicals are to be used for papers for missed field trips.
Course Content

I. Classification and Analysis of Livestock Feedstuffs
   - Roughages: pasture, silage, haylage.
   - Concentrates: grains, oil meals.
   - Grain by-products from wheat, corn, and barley processing.

II. The Energy Content of Feeds - Bioenergetics
    - TDN system of feed evaluation.
    - NRC system of energy expression.

III. Review of Nutrients Contained in Feedstuffs
     - H₂O, Carbohydrates, Proteins, Lipids, Fiber, Major Vitamins and Minerals.

IV. Digestive Systems of Farm Livestock
    - Ruminants and Monogastrics.
    - Gastro-intestinal tract functions.
    - Relationship between type of GIT and Type of Diet.

V. Metabolism Trials and Feeding Experiments
    - Factors affecting feed consumption.

VI. Digestion, Absorption and Utilization of Feed Nutrients
    - As regards the ruminant vs. monogastric.
    - Mastication and enzyme action.
    - Nutrient breakdown and absorption.

VII. Feed Requirement for the Various Physiological Processes
     - Maintenance. Growth - Production.
     - Reproduction. Lactation.

VIII. High Energy Feedstuffs and Their Metabolism
      - Cereal grains' composition and feeding value.
      - Mill by-products.

IX. Protein Sources and Their Metabolism
    - Plant and animal protein sources.
    - Non-protein nitrogen.
    - Protein by-product sources.

X. Minerals
    - Functions. Sources.
    - Deficiency Symptoms.

XI. Vitamins
    - Functions. Sources.
    - Deficiency Symptoms.

XII. Feed Additives - Non-nutritive stimulatory substances
     - Antibiotics, Growth Stimulants.
     - Medications.

XIII. Methods of Feed Processing and Preparation
      - Physical Changes - grinding, rolling, mixing, pelleting.
      - Effects on nutritive quality.
XIV. Feed Laws - Rules and Regulations
   Feed registration, labeling, and government inspection.
   Feed tag label requirements.

XV. Nutritional and Physiological Disorders
   Milk Fever    Ketonis 
   Bloat         Grass Tetany 
   Displaced Abomasum.

Library Research
   All students have the option of writing a paper on some topic concerning a problem related to animal nutrition and feeding. From 1 to 10 points will be added to the final exam score depending on the quality of the paper. Papers are due before the final week of classes and an appropriate topic should be approved by the instructor.

Laboratory Work
   Laboratories will be conducted in three areas; field trips, laboratory feed analysis, and livestock ration balancing. Write-ups from field trips are due the following week's lab as are assigned feed balancing exercises. Feedstuff analysis work is due by the last laboratory meeting of the term. If you cannot attend a field trip for any reason you can summarize an article from the Journal of Animal Science for a grade in place of the report.

   Feedstuff samples will be on display throughout the term and 10-15 will be selected for identification on the final exam.

Evaluation Schedule
   Reading material will be assigned as the course progresses. The student will be expected to keep abreast of material on a day-to-day basis. Several announced and unannounced quizzes will be given with the lowest quiz grade being dropped.

   Final grades will be determined according to the following:
   First midterm, 20%
   Second midterm, 20%
   Final, 20%
   Lab, 20%
   Quizzes, 20%

   All papers submitted late will be penalized 30% of grade. Those submitted after one week overdue will receive no grade. Questions are invited and encouraged at anytime throughout the lecture and lab. Students wishing help for any reason should feel free to contact the instructor.

Assignments – All course assignments to be submitted hard copy and not by e-mail!

Professor - Harold Thirey, Professor of Agriculture, Wilmington College
   Pyle Center Box 1305    Wilmington, Ohio 45177  Office: Kettering 306   Ext. 396
Office Hours - Mornings when not in class.
Lecture - 10:00 A.M. Monday/Wednesday/Friday in Ket.302
Lab - Wednesday 1:00 P.M. and 3:00 P.M. in Ket. 310B
Attendance/Absence Policy - Three unexcused absences will result in a grade reduction.
Penalty for Academic Dishonesty - All college policies regarding plagiarism and cheating will apply.