I. **TITLE:**

Principles of Animal Nutrition and Ration Formulation

II. **CATALOG DESCRIPTION:**

A study of digestion, absorption, and utilization of nutrients, characteristics of feedstuffs and practice in formulating rations for livestock. Prerequisites: AGR 100.

III. **PURPOSE:**

To teach a basic understanding on nutrition as it is related to nutrient composition of feedstuffs and nutrient requirements of various species of livestock.

IV. **COURSE OBJECTIVES:**

A. To understand the chemical nature of the feed nutrients.
B. To understand analytical procedures for feeds and how to interpret and apply analysis information.
C. To understand the breakdown and utilization of nutrients through digest processes.
D. To classify feedstuffs according to the purpose within the body.
E. To get an overview of nutritional deficiency disorders in livestock.
F. To get an overview of the benefits and problems of feed additives.
G. To understand general ration balancing procedures for any species and to specifically formulate rations that meet livestock nutritional needs for a desired level of performance.

V. **CONTENT OUTLINE:**

A. The feed nutrients
   1. General functions of feed nutrients
   2. Proximate analysis of feedstuffs
   3. Use of the Van Soest analysis in feed evaluation
   4. Protein nutrition
   5. Mineral nutrition
      a. The macro minerals
b. The micro minerals

6. Vitamin nutrition

B. Nutrient digestion, absorption, and transport
   1. The digestive tract
   2. Digestive processes
   3. Apparent digestibility
   4. Total digestible nutrients
   5. Energy utilization

C. Feeds and feed groups
   1. Air-dry energy feeds
   2. High protein feeds
   3. Air-dry roughages
   4. Other high moisture feeds
   5. Identifying feeds from their composition
   6. Hays and Silages
   7. Problems of feed storage
   8. Processing feeds

D. Formulation balanced rations
   1. Formulating based on balanced daily ration
   2. Formulating feed mixtures using the Pearson’s Square Method
   3. Use of algebraic equations in the formulation of feed mixtures
   4. Formulation and using premixes
   5. Weights, measures, volumes, and capacities

E. Balancing rations
   1. Calculating a balanced daily ration
   2. Balancing a daily ration using as feed weights and composition figures
   3. Balancing a daily ration using dry feed weights and composition of figures
   4. Balancing a ration with minimum use of the metric system
   5. Balancing rations for beef cattle
   6. Balancing rations for dairy cows
   7. Balancing rations for horses
   8. Balancing rations for sheep
   9. Balancing rations for swine

VI. INSTRUCTIONAL ACTIVITIES:

A. Section discussion
B. Hypothetical presentations
C. Situational planning
D. Resource persons
E. Demonstrations
F. Problem sets
VII. FIELD AND CLINICAL EXPERIENCES:

B. *Livestock Feed and Feeding*, 2nd edition, Church
C. *Animal Feeding and Nutrition*, 5th edition, Jurgens
D. *Animal Nutrition and Feeding*, Gillespie
E. *N.R.C., Nutrient Requirements of Dairy Cattle*, 1984
F. *N.R.C., Nutrient Requirements of Dairy Cattle*, 1989
G. *N.R.C., Nutrient Requirements of Horses*, 1989
H. *N.R.C., Nutrient Requirements of Swine*, 1988
I. *N.R.C., Nutrient Requirements of Sheep*, 1985
J. Handouts

VIII. RESOURCES:

None

IX. GRADING PROCEDURES:

Lecture exams – 40%
Lab exams and Homework – 40%
Final Exam – 20%

A = 90 – 100
B = 80 – 89
C = 70 – 79
D = 60 – 69
E = Below 60

X. ATTENDANCE POLICY:

Please refer to the most current copy of the Murray State University’s Undergraduate Bulletin and Graduate Bulletin.

XI. ACADEMIC HONESTY POLICY:

(Adopted by the MSU Board of Regents)
Cheating, plagiarism (submitting another person’s material as one’s own), or doing work for another person which will receive academic credit are all impermissible. This includes the use of unauthorized books, notebooks, or other sources in order to secure or give help during an examination, the unauthorized copying of examinations, assignments, reports, term papers, or the presentation on unacknowledged material as if it were the student’s own work. Disciplinary action may be taken beyond the academic discipline administered by the faculty member who teaches the course in which the cheating took place.
NOTE: The School of Agriculture Faculty have adopted and implemented an Academic Honesty Policy in addition to the University Honesty Policy, which can be found in the current Undergraduate Bulletin and Graduate Bulletin. The policy sets guidelines regarding acts of dishonesty and the procedure to follow should an event occur. It is each Agriculture student’s responsibility to obtain and read a copy of this document. The School’s Academic Honesty Policy can be obtained by asking for a copy from any Agriculture Faculty member or the Secretary.

XII. TEXT AND REFERENCES:

Animal Feeding and Nutrition, Jurgens.

XIII. PREREQUISITES:

AGR 100 (Animal Science)

XIV. STATEMENT OF AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY:

Murray State University endorses the intent of all federal and state laws created to prohibit discrimination. Murray State University does not discriminate on the basis of race, color, national origin, gender, sexual orientation, religion, age, veteran status, or disability in employment, admissions, or the provision of services and provides, upon request, reasonable accommodation including auxiliary aids and services necessary to afford individuals with disabilities equal access to participate in all programs and activities. For more information, contact Sabrina Y. Dial, Director of Equal Opportunity, Murray State University, 103 Wells Hall, Murray, KY 42071-3318. Telephone: 270-809-3155 (voice), 270-809-3361 (TDD).

XV. MSU SCHOOL OF AGRICULTURE CELL PHONE POLICY

The School of Agriculture recognizes that in today’s world cell phones are a familiar and often necessary form of communication for students.

It shall be the policy of the School that no cell phone usage shall be allowed in class and/or labs without the prior consent of the course instructor. This shall include verbal calling, incoming calls, email, text messaging, and use of cell phone calculators on tests and quizzes.

Cell phones must be kept off and out of sight (i.e. secured to a person’s belt or kept in a bag or purse away from desks and lab counters).
Should a student’s cell phone be visible, ring, or other form of unauthorized usage that is interruptive to the class or lab, the student may be asked to leave class and not return for that class/lab period.

Upon prior consent of the instructor, a student may obtain permission to have their phone on in case of an emergency or in critical family situations.

This policy also includes pagers and other electronic equipment such as blackberries and/or computers/laptops.