Butler County Community College
Business, Technology and Workforce Development

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COURSE OUTLINE
Principles of Animal Science

Course Description:
AG102. Principles of Animal Science. 3 hours credit. This course will enable the student to understand basic principles in the areas of animal agriculture to include types, purposes, and products of livestock, breeding, nutrition, growth, lactation, reproduction, selection, management, and marketing.

Course Relevance: The principles learned in this course will allow the student to determine if agriculture is a field he or she wishes to pursue as a career.

Required Materials:
Cunningham, M. (2001) Animal Science and Industry (4th ed.). Upper Saddle River, NJ: Prentice Hall Publishing Co.

Learning Outcomes:
The intention is for the student to be able to:
1. Demonstrate an understanding of the various aspects of the animal industry
2. Demonstrate an understanding of the systems of livestock production, management, and marketing
3. Demonstrate the ability to evaluate feeder, breeding, and slaughter animals

Learning PACT
Through the student involvement in this course, the student will develop and document his/her achievement of the following PACT skills:
Primary skills (developed and documented):
1. Critical Thinking
   Through the analysis of various animal science principles, think through the process and make well founded decisions.
2. Problem Solving
   Through the understanding of principles of animal science, solve problems related to animal care, breeding, management and marketing.
3. Field-Related Training
   Through the demonstration of various animal science activities, display a basic performance of these activities.

Secondary skills (developed but not documented):
Time Management
Reading

Assessment Tasks:

These learning outcomes and primary Learning PACT skills will be demonstrated by:

1. Complete assignments and case studies of industry's latest technologies
2. Demonstrate knowledge of animal science on field trips

Course Content:

I. Themes - Key recurring concepts that run throughout this course:
   A. Background information related to animal agriculture and its role in our society and economy

II. Issues - Key issues that will be addressed in this course: areas of conflict that must be understood in order to achieve the intended outcome:
   A. Digestive capabilities relative to feed resources
   B. Genetic variations
   C. Management adjustments to new technology

III. Concepts – Key concepts that must be understood to address the issues:
   A. Material principles and concepts that will prepare the student for more specialized and advanced courses

IV. Skills / Competencies - Actions that are essential to achieve the course outcomes:
   A. Animal Agriculture and Industry
      1. Sketch the general trends in per capita consumption of animal products in the United States and the world
      2. Describe the relationship between family income and consumption of animals products
      3. List two characteristics of each species that permit it to be used in commercial production systems
      4. Compare livestock production systems in capital and labor requirements per unit of production
      5. List at least six animal enterprises relating training and experience needed by operators
      6. Identify the geographic areas where livestock production density is high and explain why
      7. Describe the feed manufacturing, meat processing, and animal product processing industries in terms of size, location, and concentration
      8. List three roles that veterinarians play in the total animal industry
      9. Differentiate between the animal breeding industry and general animal production
      10. List six or more functions related to the animal industries that are performed by universities and governmental agencies

B. Nutrients and Their Sources, the Digestive and Metabolic System, and Nutrition of Ruminants and Non-Ruminants
    1. List the six classes of nutrients and describe the general role each plays in body metabolism
    2. Identify the major component units of carbohydrates, proteins, and fats
    3. Understand the differences in nutrient needs and use according to the purpose of the animal
    4. List the essential amino acids
    5. Know ho water requirements are related to feed intake and other factors
    6. Differentiate between macro and micro minerals and between roughages and concentrates
    7. Sketch and with words differentiate between ruminant and non-ruminant digestive systems
    8. Describe the role of the circulatory system, as related to nutrient utilization
    9. Calculate a ration mix based on protein, given the animal's protein requirement and protein content of ration ingredients
    10. Define and list three examples of feed additives
    11. Explain the significance of ruminant animals in converting roughage into meat or animal product humans can utilize
    12. Explain the significance of concentrate-to-roughage ratios in feeding cattle and lambs

C. Evaluation of Feeder Animals, Animal Growth and Carcass Composition
    1. Describe the degree to which ability to gain and to perform efficiently in feeder animals is inherited
    2. Contrast rate of gain and efficiency of gain among animals of different weights.
    3. Describe the influence of sex and sex condition on the value of animals for feeding
    4. List U.S. feeder cattle grades and differentiate between frame and thickness grades
    5. List six factors that may influence rate and efficiency of gain of lambs, cattle or pigs
    6. Define growth, chronological growth, physiological growth, and other key terms
    7. Calculate average daily gain and weight per day of age, given needed data
    8. Describe how hormones influence growth
    9. Analyze charts that describe the deposition rates for lean, fat, and bone as an animal grows and matures
    10. Differentiate between commercial and custom feeding
    11. List five factors that influence animal performance in feedlots

D. Animal Environment, Animal Health, and Animal Behavior
    1. Define key terms related to animal environments
    2. Contrast seasonal weather in terms of effects on livestock and poultry
    3. Explain how space per animal and nature of floor space may influence profitability of production
    4. List four reasons why ventilation is important in confinement facilities for livestock and poultry
    5. Describe the immunization process and explain why vaccination is practiced
    6. Explain the role of the veterinarian
    7. Describe how behavioral problems influence design of animal facilities, feeding and management

E. Physiology of Reproduction, Reproduction Efficiency, Lactation, Genetics
    1. List advantages for high reproductive efficiency in our herds and flocks
    2. List, locate, and describe each of the structures in the male and female reproductive system
    3. Describe ovarian function in relation to the different phases of the estrous cycle
    4. List hormone changes preceding parturition and the stages of parturition
    5. List the reasons for using artificial insemination, estrous synchronization, super-ovulation and embryo transfer
    6. List those nutrients that are critical for efficient reproduction
    7. Define flushing and explain why it is practiced
    8. Define colostrums and explain why it is valuable to newborn livestock
    9. Describe how hormones regulate milk production
    10. Chart a typical lactation curve
    11. Explain the milk letdown process and physiology of milk secretion within the udder
    12. Explain how genes are transmitted from one generation to another and genetic variation in a breeding herd
    13. Define heritability
    14. List five traits that are important in breeding animals
    15. Describe a simple and useful animal identification system

F. Mating Systems, Breeds of Animals, Marketing and Evaluating Slaughter Animals
    1. Define random mating, inbreeding, outbreeding, and heterosis
    2. Explain why inbreeding is used in development of breeding lines and not generally used in commercial production

3. List those groups of traits, which tend to show high heterosis when breeds are crossed
4. Explain rotational and terminal cross systems
5. Explain why there are different breeds within a species
6. Identify which traits are significant is production systems
7. List five major breeds of swine, beef cattle and sheep
8. Define types of markets for livestock
9. Explain why price is usually a function of supply and demand and why long term cycles are different for species
10. Identify one or more federal agencies involved in supervising reporting marketing function
11. List significant factors that influence the value, per pound, of animal ready for slaughter
12. Differentiate between fed steers and heifers at the same age in finishing, dressing percent and cutability

Learning Units:

I. Animal Agriculture and Industry
II. Nutrients and Their sources
III. Evaluation of Feeder Animals
IV. Animal Environment
V. Physiology of Reproduction, Reproduction Efficiency, Lactation, and Genetics
VI. Mating Systems, Breeds of Animals, Marketing and Evaluating Slaughter Animals

Learning Activities:

Learning activities will be geared towards lecture/demonstrations and practical exercises . Classroom lecture is designed to enable the students to understand the key principles in animal science.

Grade Determination:

The student will be graded on satisfactory completion of assessment tasks (learning activities), attendance, and written examination.