Animal Nutrition, Health and Reproduction
Subject Code: 010915
Course & Unit Descriptions

Course Description:
Learners will apply principles of nutritional management for various classes of animals. Learners will analyze nutritional content/quality of feeds; formulate rations; develop feeding recommendations; identify deficiency symptoms and implement corrective methods as needed. Care/management plans are developed that reflect the classification of animals and follows best practices and legal compliance. Learners will monitor/evaluate the quality of animal habitats and estimate carrying capacity as it relates to the impact of the environment and animal health.

Unit: Principles of Nutrition
In this unit, the student will determine classification and function of nutrients, deficiency symptoms, digestive processes, characterization of feedstuffs, and formulation of diets for various classes of animals.

Benchmark: 1.1 Nutrition
Level 1: Analyze the nutritional content of a ration and administer it to animals
Level 2: Prepare/formulate and administer a ration and evaluate its effects on animals

Indicators
1.1.02 Determine the role of nutrients and the nutritional requirements (matter and energy) for different life processes of the animal (e.g., maintenance/homeostasis, growth, reproduction, lactation)
1.1.03 Analyze nutritional content and quality of feeds (e.g., fiber, sodium, proteins, carbohydrates, lipids)

Academic Standards
English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)
Math: Write and solve real-world, multi-step problems involving money, elapsed time and temperature, and verify reasonableness of solutions. (Measurement F, 8-10)
Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10)

Unit: Digestive Systems
In this unit the student will identify the form and function of the animal digestive system and describe the interrelationship with other body systems. Students will use knowledge gained to identify gastrointestinal symptoms/disorders and implement species-specific preventative/corrective treatment and maintenance options.

Benchmark: 1.2 Body Systems
Level 1: Differentiate the functions of body systems
Level 2: Describe the interrelationship of the animal body systems

Indicators
1.2.02 Identify the anatomy and describe the physiology of the digestive systems
1.2.14 Compare and contrast variations of systems among species and their adaptive values

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Benchmark: 1.4 Animal Health

Level 1: Identify prevalent diseases/disorders across animal groups and implement treatment and maintenance options to remedy an animal's health and welfare

Level 2: Evaluate animal condition and implement treatment and maintenance options for species-specific diseases/disorders

Indicators

1.4.07 Identify gastrointestinal ailments, neuromuscular disorders, respiratory diseases, blood disorders, and bone/joint problems

1.4.10 Administer care to animals in case of accident or illness

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)

Science: Explain the characteristics of life as indicated by cellular processes and describe the process of cell division and development. (Life Sciences B, 9-10)

Unit: Feed and Feed Uses

The learner will develop an understanding of nutrient requirements and development of appropriate feeding management programs for the various phases of the life cycle.

Benchmark: 1.1 Nutrition

Level 1: Analyze the nutritional content of a ration and administer it to animals

Level 2: Prepare/formulate and administer a ration and evaluate its effects on animals

Indicators

1.1.01 Identify types, composition, quality and compatibility of feeds, feed additives, and feed byproducts

1.1.03 Analyze nutritional content and quality of feeds (e.g., fiber, sodium, proteins, carbohydrates, lipids)

1.1.06 Determine feed efficiency in relation to cost and availability of feeds

1.1.07 Formulate, prepare, and investigate rations and diets for production, specialty markets, and special diets (e.g., natural, organic, liver diet, heart diet, kidney diet)

1.1.08 Select and implement feeding and watering practices and systems for varying populations and purposes (e.g., reduce waste)

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Math: Write and solve real-world, multi-step problems involving money, elapsed time and temperature, and verify reasonableness of solutions. (Measurement F, 8-10)

Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10)

Unit: Nutritional Deficiencies

The learner will develop appropriate feed management programs for special-needs situations including nutritional management of various diseases.

Benchmark: 1.1 Nutrition
Level 1: Analyze the nutritional content of a ration and administer it to animals
Level 2: Prepare/formulate and administer a ration and evaluate its effects on animals

Indicators
1.1.04 Identify and treat major nutrient deficiency and toxicity symptoms
1.1.05 Describe possible toxins, pathogens and contaminants found in feedstuffs (biological and nonbiological) and their impact on animals
1.1.07 Formulate, prepare, and investigate rations and diets for production, specialty markets, and special diets (e.g., natural, organic, liver diet, heart diet, kidney diet)
1.1.10 Determine the ecological relationships between feed/agronomic production systems and feed quality

Academic Standards
English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)
Math: Write and solve real-world, multi-step problems involving money, elapsed time and temperature, and verify reasonableness of solutions. (Measurement F, 8-10)
Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10)

Benchmark: 1.4 Animal Health
Level 1: Identify prevalent diseases/disorders across animal groups and implement treatment and maintenance options to remedy an animal's health and welfare
Level 2: Evaluate animal condition and implement treatment and maintenance options for species-specific diseases/disorders

Indicators
1.4.01 Evaluate general condition of animal using diagnostic methods (e.g., visual exam, physical exam, vital signs)

Academic Standards
English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)
Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)
Science: Explain the characteristics of life as indicated by cellular processes and describe the process of cell division and development. (Life Sciences B, 9-10)

Unit: Standards of Animal Health
The learner will evaluate an animal's condition using diagnostic methods and implement treatment and/or maintenance options.

Benchmark: 1.4 Animal Health
Level 1: Evaluate animal condition and implement treatment and maintenance options for species-specific diseases/disorders
Level 2: Evaluate animal condition and implement treatment and maintenance options for species-specific diseases/disorders

Indicators
1.4.01 Evaluate general condition of animal using diagnostic methods (e.g., visual exam, physical exam, vital signs)
1.4.03 Identify signs of pain, distress, disease and allergic reactions

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)

Science: Explain the characteristics of life as indicated by cellular processes and describe the process of cell division and development. (Life Sciences B, 9-10)

Unit: Preventative Animal Health

Learners will be able to assess an animal's health for signs indicative of a developing health problem. The learner will be able to monitor and evaluate feeding programs, sanitation, vaccinations, parasitic infections and grooming routines and implement corrective methods as needed.

Benchmark: 1.4 Animal Health

Level 1: Identify prevalent diseases/disorders across animal groups and implement treatment and maintenance options to remedy an animal's health and welfare

Level 2: Evaluate animal condition and implement treatment and maintenance options for species-specific diseases/disorders

Indicators

1.4.04 Collect specimens to perform urinalysis, hematology, cytology, skin scraping and fecal sample examinations

1.4.08 Monitor and evaluate the quality of an animal's habitat (natural or artificial) and implement corrective methods as needed

1.4.09 Identify types of immunity and immune responses and maintain animal health through immunization

1.4.12 Describe the routes of administration for medications (e.g., intranasal, oral, IV, subQ, IM) and the process of drug absorption, distribution, metabolism, withdrawal and excretion

1.4.13 Calculate pharmaceutical dosages/mixtures, administer drug treatments and monitor potential problems associated with incorrect administration and common adverse effects

1.4.14 Recognize normal and abnormal dental structures and conditions, identify teeth and use dental terminology to accurately chart dental morphology

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)

Science: Explain the characteristics of life as indicated by cellular processes and describe the process of cell division and development. (Life Sciences B, 9-10)

Unit: Diseases and Parasites

The learner will identify the most common infectious and noninfectious diseases affecting animals and provide information related to their prevention and treatment.

Benchmark: 1.4 Animal Health

Level 1: Identify prevalent diseases/disorders across animal groups and implement treatment and maintenance options to remedy an animal's health and welfare

Level 2: Evaluate animal condition and implement treatment and maintenance options for species-specific diseases/disorders

Indicators

1.4.02 Describe diseases/disorders and their symptoms that are caused by microorganisms, parasites, genetic defects and environmental factors
1.4.03 Identify signs of pain, distress, disease and allergic reactions
1.4.04 Collect specimens to perform urinalysis, hematology, cytology, skin scraping and fecal sample examinations
1.4.07 Identify gastrointestinal ailments, neuromuscular disorders, respiratory diseases, blood disorders, and bone/joint problems
1.4.10 Administer care to animals in case of accident or illness
1.4.12 Describe the routes of administration for medications (e.g., intranasal, oral, IV, subQ, IM) and the process of drug absorption, distribution, metabolism, withdrawal and excretion
1.4.13 Calculate pharmaceutical dosages/mixtures, administer drug treatments and monitor potential problems associated with incorrect administration and common adverse effects
1.4.18 Explain zoonoses and communicable diseases common to humans and animals

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)
Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)
Science: Explain the characteristics of life as indicated by cellular processes and describe the process of cell division and development. (Life Sciences B, 9-10)

Benchmark: 1.6 Animal Behaviors

Level 1: Observe an animal's natural tendencies and predict changes in behavior when the environment is changed
Level 2: Apply management practices to animals that result in desired behavioral change

Indicators

1.6.07 Identify behavioral abnormalities and their cause(s) and employ corrective action
1.6.09 Handle and move animals (e.g., training, restraint, confinement) with regard for safety of animals and handlers

Academic Standards

Science: Describe how human activities can impact the status of natural systems. (Life Sciences G, 9 -10)

Benchmark: 3.12 Agrosecurity and Biosecurity

Level 1: Identify agrosecurity and biosecurity risks for an enterprise
Level 2: Implement a security plan addressing facility needs and tampering points

Indicators

3.12.07 Screen and test animals and plant products for infectious agents or contamination

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Unit: Environmental Management

Based on the natural behavior of an animal, a student will be able to develop animal management systems that consider the welfare of the animal.

Benchmark: 1.3 Care and Management

Level 1: Describe the fundamental care and management practices for animals and select, handle, mark, manage environmental conditions, and provide general care for a limited number of animals or animal species

Level 2: Describe comprehensive care practices for animals and apply advanced management procedures to select, handle, mark, and manage environmental conditions

Indicators

1.3.02 Recognize and determine the biotic and abiotic factors that impact the animals' environment (e.g., air, ventilation)
1.3.05 Estimate carrying capacity of the environment and its impact on animal health
1.3.08 Identify, evaluate and perform general animal care/welfare procedures based on animal's use, species and life stage (e.g., weaning, dehorning, castrating, trimming hooves, milking, weighing, grooming, dental cleaning, dental floating, nail trimming)
1.3.09 Perform sanitation and disinfection procedures for care and management of animal

Academic Standards

Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)
Science: Explain the structure and function of ecosystems and relate how ecosystems change over time. (Life Sciences F, 9-10)

Benchmark: 1.4 Animal Health

Level 1: Identify prevalent diseases/disorders across animal groups and implement treatment and maintenance options to remedy an animal's health and welfare
Level 2: Evaluate animal condition and implement treatment and maintenance options for species-specific diseases/disorders

Indicators

1.4.02 Describe diseases/disorders and their symptoms that are caused by microorganisms, parasites, genetic defects and environmental factors
1.4.08 Monitor and evaluate the quality of an animal's habitat (natural or artificial) and implement corrective methods as needed

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)
Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)
Science: Explain the characteristics of life as indicated by cellular processes and describe the process of cell division and development. (Life Sciences B, 9-10)

Benchmark: 1.6 Animal Behavior

Level 1: Observe an animal's natural tendencies and predict changes in behavior when the environment is changed
Level 2: Apply management practices to animals that result in desired behavioral change

Indicators

1.6.09 Handle and move animals (e.g., training, restraint, confinement) with regard for safety of animals and handlers

Academic Standards

Science: Describe how human activities can impact the status of natural systems. (Life Sciences G, 9 -10)

Benchmark: 3.12 Agrosecurity and Biosecurity

Level 1: Identify agrosecurity and biosecurity risks for an enterprise
Level 2: Implement a security plan addressing facility needs and tampering points

Indicators
3.12.08 Use biocontainment practices (e.g., quarantine, eradicate) to manage pests and disease vectors

Academic Standards
English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Benchmark: 5.10 Solid Waste and Renewable Resource Management
Level 1: Collect and dispose of solid waste using best available technology
Level 2: Control and process solid waste using available and alternative technology

Indicators
5.10.01 Collect, analyze, and treat waste materials (e.g., mortalities, manure, garbage)

Academic Standards
English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)
Math: Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision. (Measurement E, 8-10)
Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10)

Benchmark: 5.13 Hazardous Materials Management
Level 1: Differentiate between restricted and non-restricted hazardous materials
Level 2: Follow handling, storage, and recording procedures for hazardous materials

Indicators
5.13.04 Demonstrate safe management, handling, disposal and/or recycling procedures for hazardous and regulated materials and hazardous waste
5.13.06 Perform site evaluation to determine presence and storage of hazardous materials
5.13.09 Maintain hazardous material handling documentation

Academic Standards
English: Apply reading comprehension strategies to understand grade-appropriate text. (Reading Process A, 8-10; Reading Process A, 11-12)
Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis F, 8-10)
Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10)

Benchmark: 5.6 Emergency Response
Level 1: Comply with all components of an emergency response plan
Level 2: Simulate the appropriate response to an emergency situation

Indicators
5.6.01 Analyze factors that influence environmental conditions
5.6.02 Identify responses to emotional, physiological and environmental stress

Academic Standards
English: Use appropriate self-monitoring strategies for comprehension. (Reading Process C, 8-10; Reading Process C, 11-12)

Unit: Reproductive Anatomy
The learner will identify and differentiate the form and function of the animal reproductive system.

Benchmark: 1.2 Body Systems
Level 1: Differentiate the functions of body systems
Level 2: Describe the interrelationship of the animal body systems

Indicators
1.2.01 Identify external anatomical parts and functions
1.2.10 Identify the anatomy and describe the physiology of the male and female reproductive systems
1.2.11 Identify the anatomy and describe the physiology of the endocrine systems
1.2.13 Identify the anatomy and describe the physiology of the mammary systems
1.2.14 Compare and contrast variations of systems among species and their adaptive values

Academic Standards
English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Unit: Breeding Systems and Selection

In this unit, the learner will use population management plans and differentiate reproductive processes to improve efficiency of animal breeding programs.

Benchmark: 1.5 Population Management
Level 1: Differentiate reproductive processes across species and determine the extent to which breeding programs can be implemented for an intended purpose or outcome
Level 2: Develop, implement and evaluate a reproduction and/or population management plan

Indicators
1.5.01 Determine the factors that influence estrus, gestation and parturition and employ appropriate management practices
1.5.02 Evaluate and employ breeding methods (e.g., artificial insemination, embryo transfer, natural selection, selective breeding, invitro fertilization)
1.5.03 Practice ethical/responsible animal population management (e.g., spay, neuter, euthanasia, birth control, relocation, reintroduction, hunting)
1.5.04 Manipulate an animal's reproductive processes (e.g., sex-sorted semen, birth control, heat synchronization, nutritional flushing)
1.5.05 Select and implement reproductive management practices (e.g., male to female ratios, fertility, soundness for breeding, age and weight for breeding and timing, other requirements for breed and species integrity) and monitor embryos/fetuses

Academic Standards
Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)
Science: Describe how human activities can impact the status of natural systems. (Life Sciences G, 9 -10)

Benchmark: 1.6 Animal Behaviors
Level 1: Observe an animal's natural tendencies and predict changes in behavior when the environment is changed
Level 2: Apply management practices to animals that result in desired behavioral change

Indicators
1.6.02 Describe and identify innate animal behavioral traits (e.g., protection, ingestion, homing, sleeping, grooming, elimination, sexual, care-giving, combative, evasive, breed differences)
1.6.09 Handle and move animals (e.g., training, restraint, confinement) with regard for safety of animals and handlers

Academic Standards

Science: Describe how human activities can impact the status of natural systems. (Life Sciences G, 9 -10)

Unit: Genetics

In this unit, the learner will use applications of genetics to improve efficiency of animal breeding programs.

Benchmark: 2.3 Genetics

Level 1: Use mono-and di-hybrid crosses to predict genotype and phenotype
Level 2: Model the molecular basis of genetic transfer

Indicators

2.3.01 Predict and explain offspring genotypes and phenotypes using Mendel's Laws and Punnett Square
2.3.02 Explain alternative forms of transmission (e.g., Non-Mendelian inheritance)
2.3.03 Explain, model and predict the three dimensional shape, bonding patterns (covalent and hydrogen bonds) and antiparallel nature of deoxyribonucleic acid (DNA)
2.3.04 Model the Central Dogma Theory (e.g., replication, transcription, translation)
2.3.05 Describe the processes involved in gene regulation (e.g., histone acytelation, RNA stability, co-translational modifications and post-translational modifications)
2.3.06 Describe the properties and molecular structure of peptide/protein (i.e. primary, secondary, tertiary, quaternary)
2.3.07 Discuss alternative types of gene expression (e.g., sex-limited, sex-linked, partial dominance, epistatic, pleiotropic)

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)
Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis F, 8-10)
Science: Explain the genetic mechanisms and molecular basis of inheritance. (Life Sciences C, 9-10)

Unit: Gestation, Parturition and Care

The learner will perform and evaluate animal care and management practices that emphasize responsible reproductive decision-making and stewardship.

Benchmark: 1.3 Care and Management

Level 1: Describe the fundamental care and management practices for animals and select, handle, mark, manage environmental conditions, and provide general care for a limited number of animals or animal species
Level 2: Describe comprehensive care practices for animals and apply advanced management procedures to select, handle, mark, and manage environmental conditions

Indicators

1.3.07 Evaluate and perform animal care procedures during and following parturition (e.g., navel cord, afterbirth, colostrums, orphaned animals)
1.3.08 Identify, evaluate and perform general animal care/welfare procedures based on animal's use, species and life stage (e.g., weaning, dehorning, castrating, trimming hooves, milking, weighing, grooming, dental cleaning, dental floating, nail trimming)
1.3.09 Perform sanitation and disinfection procedures for care and management of animal

Academic Standards

Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)

Science: Explain the structure and function of ecosystems and relate how ecosystems change over time. (Life Sciences F, 9-10)

Benchmark: 1.4 Animal Health

Level 1: Identify prevalent diseases/disorders across animal groups and implement treatment and maintenance options to remedy an animal's health and welfare

Level 2: Evaluate animal condition and implement treatment and maintenance options for species-specific diseases/disorders

Indicators

1.4.01 Evaluate general condition of animal using diagnostic methods (e.g., visual exam, physical exam, vital signs)

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)

Science: Explain the characteristics of life as indicated by cellular processes and describe the process of cell division and development. (Life Sciences B, 9-10)

Benchmark: 1.6 Animal Behavior

Level 1: Observe an animal's natural tendencies and predict changes in behavior when the environment is changed

Level 2: Apply management practices to animals that result in desired behavioral change

Indicators

1.6.02 Describe and identify innate animal behavioral traits (e.g., protection, ingestion, homing, sleeping, grooming, elimination, sexual, care-giving, combative, evasive, breed differences)

1.6.09 Handle and move animals (e.g., training, restraint, confinement) with regard for safety of animals and handlers

Academic Standards

Science: Describe how human activities can impact the status of natural systems. (Life Sciences G, 9 -10)