Animal Science & Technology
Subject Code: 010150
Course & Unit Descriptions

Course Description:
This course will introduce the learner to career options and skill development including business leadership, problem-solving and communication skills in relation to the science and technology of animals. The course will introduce the student to responsible animal management principles and routine husbandry practices in relation to animal welfare and behavior. Learners will identify and describe the anatomy and physiology of monogastric and ruminant organisms as it applies to nutrition, reproduction, and animal health. Learners will investigate animal genetics and how it impacts principles of animal improvement, selection and marketing. This is the first course in the pathway.

Unit: Careers in Animal Science
Learners will examine the diverse and complex field of animal science and identify all phases of domestic animal production, research, sales, service, business, and education that Animal scientists may be involved. Learners will identify and develop the communication and business leadership skills and knowledge needed in the animal science career field.

Benchmark: 3.10 Business Regulation, Law and Related Issues
Level 1: Identify and describe government regulations and societal issues related to a specific business enterprise or environmental project

Indicators
3.10.06 Identify governmental agencies and non-governmental organizations that impact agricultural/environmental issues
3.10.07 Research history, politics and policies related to issues
3.10.08 Assess the impact of issues affecting the industry and recommend solutions

Academic Standards
English: Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)
Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis F, 8-10)
Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Benchmark: 3.7 Communication Skills
Level 1: Integrate a variety of communication techniques to gather and convey information to an individual or small group

Indicators
3.7.01 Apply techniques to participate in/facilitate a group discussion
3.7.02 Apply active listening strategies
3.7.03 Develop and deliver formal and informal presentations
3.7.04 Articulate ideas and impact audience through verbal and nonverbal communication
3.7.05 Communicate directions in an organized manner appropriate to the audience
3.7.06 Use consensus-building techniques, including parliamentary procedure, to make decisions and compile summary of meeting minutes, conclusions, and next steps
3.7.07 Extract relevant, valid information from materials and cite sources of information

3.7.08 Develop reports and documents that organize information accurately and use formatting techniques for user friendliness
3.7.09 Select and use appropriate channel for workplace communication
3.7.10 Practice etiquette when using communication techniques

Academic Standards

English: Produce functional documents that report, organize and convey information and ideas accurately, foresee readers' problems or misunderstandings and that include formatting techniques that are user friendly. (Writing Applications C, 11-12)

Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)

Social Studies: Evaluate the reliability and credibility of sources. (Social Studies Skills and Methods A, 9 -10)

Benchmark: 3.8 Business Leadership

Level 1: Determine appropriate leadership style for a specific situation and apply to the situation

Indicators

3.8.06 Think critically and use problem-solving skills to analyze complex and diverse concepts
3.8.07 Use reasoning, judgment and imagination to create new possibilities in situations
3.8.08 Manage time with organizational tools and prioritize objectives, responsibilities and tasks
3.8.11 Develop relationships with peer groups, support services, and professional organizations

Academic Standards

English: Use a variety of strategies to enhance listening comprehension. (Communication A, 8-10; Communication A, 11-12)

Math: Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner. (Mathematical Processes H, 8-10)

Social Studies: Critique data and information to determine the adequacy of support for conclusions. (Social Studies Skills and Methods B, 11-12)

Benchmark: 3.9 Emotional Intelligence

Level 1: Exhibit desirable personal and professional appearance, attitudes, behaviors, and work habits

Indicators

3.9.01 Conduct an interpersonal and intrapersonal inventory
3.9.02 Identify how individual actions impact others
3.9.03 Manage personal emotions, behavior and appearance to maintain professionalism
3.9.04 Describe and exhibit appropriate ethical behavior
3.9.05 Accept and use constructive feedback to improve work habits
3.9.06 Employ appropriate coping skills to prevent/handle workplace conflicts
3.9.07 Recognize, respect and utilize the diversity among people and cultures
3.9.08 Foster positive working relationships

Academic Standards

English: Use a variety of strategies to enhance listening comprehension. (Communication A, 8-10; Communication A, 11-12)

Social Studies: Analyze how issues may be viewed differently by various cultural groups. (People in Societies A, 11-12)

Unit: Animal Classification

In this unit, learners will investigate the form and function of the various parts of animals. Students will examine the various systems of the animals that enable them to survive and adapt to fit the various management systems.

Benchmark: 1.2 Body Systems
Level 1: Differentiate the functions of body systems

Indicators
1.2.01 Identify external anatomical parts and functions
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: 1.3 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

Indicators
1.3.01 Identify, classify, evaluate and select animal species and/or breeds
1.3.04 Apply and record animal identification procedures and requirements (e.g., tagging, tattooing, ear notching, banding, branding, painting, electronic microchip implanting)
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)

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

Indicators
1.6.01 Describe the adaptations and special senses (e.g., sight, hearing, smell, touch) of animals and how they contribute to animal behavior
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: Quality Assurance

This unit will help a Student implement a quality assurance program. QA programs will help guide the student in selecting management practices that produce quality animal products in which the well-being of the animal is considered.

Benchmark: 1.1 Nutrition
Level 1: Analyze the nutritional content of a ration and administer it to animals

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

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: 1.2 Body Systems
Level 1: Differentiate the functions of body systems

Indicators
1.2.01 Identify external anatomical parts and functions

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

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

Indicators
1.3.02 Recognize and determine the biotic and abiotic factors that impact the animals' environment (e.g., air, ventilation)
1.3.03 Describe and implement scientific concepts of animal welfare
1.3.04 Apply and record animal identification procedures and requirements (e.g., tagging, tattooing, ear notching, banding, branding, painting, electronic microchip implanting)
1.3.05 Estimate carrying capacity of the environment and its impact on animal health
1.3.06 Explain predator/prey relationships (e.g., predator control, species propagation, invasive species control) and implement measures to control predators when necessary
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

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
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
1.4.10 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

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: 1.5 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

Indicators

1.5.03 Practice ethical/responsible animal population management (e.g., spay, neuter, euthanasia, birth control, relocation, reintroduction, hunting)

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 Behavior

Level 1: 1.6.09 Handle and move animals (e.g., training, restraint, confinement) with regard for safety of animals and handlers

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: 3.1 Marketing

Level 1: Promote a product or service using basic strategies for packaging, display and publicity

Indicators

3.1.11 Evaluate the benefits of commodity check-off programs

Academic Standards

English: Produce functional documents that report, organize and convey information and ideas accurately, foresee readers' problems or misunderstandings and that include formatting techniques that are user friendly. (Writing Applications C, 11-12)

Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)

Social Studies: Analyze how scarcity of productive resources affects supply, demand, inflation and economic choices. (Economics A, 11-12)

Benchmark: 3.10 Business Regulation, Law and Related Issues

Level 1: Identify and describe government regulations and societal issues related to a specific business enterprise or environmental project

Indicators

3.10.02 Explain the purpose and impact of government regulations
3.10.03 Identify local, state and federal regulations relative to compliance
3.10.04 Assess business liability and describe the consequences of noncompliance
3.10.05 Adhere to business-related documentation requirements
3.10.06 Identify governmental agencies and non-governmental organizations that impact agricultural/environmental issues
3.10.08 Assess the impact of issues affecting the industry and recommend solutions

Academic Standards

English: Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)

Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis F, 8-10)

Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Benchmark: 3.12 Agrosecurity and Biosecurity

Level 1: Identify agrosecurity and biosecurity risks for an enterprise

Indicators

3.12.01 Recognize sources and origins of agents that can contaminate processed and unprocessed food products
3.12.03 Identify sources of biological and chemical tampering points
3.12.04 Assess facility security, classify level of risk and recommend improvements
3.12.05 Assess bio-security practices for sourcing of raw ingredients and recommend improvements
3.12.06 Implement biosecurity procedures to prevent cross-site contamination
3.12.07 Screen and test animals and plant products for infectious agents or contamination
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: 3.3 Management

Level 1: Select and organize resources to develop a product or a service to be rendered

Indicators

3.3.06 Develop a continuous-improvement management program
3.3.08 Document business activities

Academic Standards

English: Analyze the features and structures of documents and critique them for their effectiveness. (Reading: Informational Text A, 11-12)

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

Social Studies: Identify factors which inhibit or spur economic growth and cause expansions or recessions. (Economics B, 11-12)

Benchmark: 3.6 Information Management

Level 1: Select and use a computer and computer application for a specific purpose

Indicators

3.6.01 Utilize technology to maintain and monitor business records

Academic Standards

English: Prepare writing for publication that follows an appropriate format and uses a variety of techniques to enhance the final product. (Writing Process F, 11-12)

Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)

Benchmark: 4.1 Safety Procedures

Level 1: Follow safety procedures in general situations with basic tools and equipment, evaluate work environment and seek assistance to rectify the problem

Indicators

4.1.01 Demonstrate knowledge of safety rules and regulations
4.1.02 Interpret safety signs and symbols
4.1.03 Model safe attitudes and behaviors (e.g., lifting, climbing)
4.1.04 Identify safety hazards and take corrective measures
4.1.05 Use safety equipment in accordance with established procedures
4.1.06 Follow established procedures for the administration of first aid and contact emergency medical personnel when necessary

Academic Standards

English: Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)

Benchmark: 4.2 Stationary and Mobile Equipment Maintenance

Level 1: Inspect and provide basic maintenance to basic machinery, instruments, stationary and mobile equipment and facility

Indicators

4.2.03 Ensure presence and function of safety systems and hardware
4.2.05 Perform machine adjustments (e.g., belts, clippers, drive chains)
4.2.08 Maintain machinery, equipment, instruments and facility cleanliness, appearance, and safety
4.2.09 Inspect and maintain fluid conveyance and storage components (e.g., hoses and lines, valves, nozzles)
4.2.10 Conduct preventative maintenance and identify causes of malfunctions and failures
4.2.11 Calibrate metering, monitoring, and sensing equipment
4.2.12 Inspect and maintain tooling

Academic Standards

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

Math: Apply mathematical knowledge and skills routinely in other content areas and practical situations. (Mathematical Processes B, 8-10)

Benchmark: 4.3 Equipment Operation
Level 1: Inspect and safely operate precalibrated equipment

Indicators
4.3.01 Follow manufacturer's recommended operating procedures and adjustment specifications
4.3.02 Describe function, limitations, and proper use of equipment, equipment controls and instrumentation
4.3.03 Perform pre-operation inspection and adjustments
4.3.04 Perform appropriate start-up, operating and shut-down procedures
4.3.05 Identify, select and exhibit the desired application of hand and power tools
4.3.06 Perform post-operating inspection and adjustments

Academic Standards
English: Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)
Math: Apply mathematical knowledge and skills routinely in other content areas and practical situations. (Mathematical Processes B, 8-10)

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

Indicators
5.10.02 Identify the risks associated with solid waste accumulation, utilization and disposal
5.10.03 Determine acceptable site for disposal of solid waste
5.10.05 Describe and monitor solid waste disposal procedures (e.g., landfills, lagoon, run-off)
5.10.06 Describe and implement waste management methods (e.g., composting facility, waste incineration, recycling)
5.10.08 Describe standard operational techniques and identify design requirements for specific purposes (e.g., landfill, lagoon, leachate treatment)
5.10.10 Determine solid waste volume generated by an operation or facility

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: 5.4 Contaminants
Level 1: Determine the presence of contaminants and follow reporting procedures

Indicators
5.4.01 Determine types, sources and impact of natural and man-made contaminants (e.g., manure; wastewater; soil; agricultural, residential and industrial chemicals)
5.4.02 Explain and implement programs and policies related to contaminants
5.4.03 Identify, comply with and implement contaminant control, remediation and prevention practices (e.g., biological, radiological, sanitation, buffer strips for run-off)
5.4.04 Monitor, analyze and evaluate levels of contaminants from point source and non-point source

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

Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Unit : Animal Welfare, Behavior and Husbandry

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: 1.2 Body Systems

Level 1: Differentiate the functions of body systems

Indicators

1.2.01 Identify external anatomical parts and functions

Academic Standards

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

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

Indicators

1.3.02 Recognize and determine the biotic and abiotic factors that impact the animals' environment (e.g., air, ventilation)

1.3.03 Describe and implement scientific concepts of animal welfare

1.3.04 Apply and record animal identification procedures and requirements (e.g., tagging, tattooing, ear notching, banding, branding, painting, electronic microchip implanting)

1.3.05 Estimate carrying capacity of the environment and its impact on animal health

1.3.06 Explain predator/prey relationships (e.g., predator control, species propagation, invasive species control) and implement measures to control predators when necessary

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

Indicators

1.4.01 Evaluate general condition of animal using diagnostic methods (e.g., visual exam, physical exam, vital signs)
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
1.4.08 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
1.4.10 Administer care to animals in case of accident or illness
1.4.11 Classify pharmaceutical drugs and describe general characteristics of each type
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

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: 1.5 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

Indicators

1.5.03 Practice ethical/responsible animal population management (e.g., spay, neuter, euthanasia, birth control, relocation, reintroduction, hunting)

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 Behavior

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

Indicators

1.6.01 Describe the adaptations and special senses (e.g., sight, hearing, smell, touch) of animals and how they contribute to animal behavior
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)
1.6.03 Manipulate an animal's behavioral and natural tendencies through appropriate management practices
1.6.05 Identify social relationships involved in behavioral adjustment and/or adaptation (animal to animal interaction, human to animal interaction)
1.6.06 Describe the animal's vocal, visual and chemical means of communication and interpret the intent
1.6.07 Identify behavioral abnormalities and their cause(s) and employ corrective action
1.6.08 Identify and employ techniques to train and discipline animals for predictive behavior

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: Nutrition

In this unit, the learner will develop balanced feed rations for different classification of animals.

Benchmark: 1.1 Nutrition

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

Indicators

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

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)

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

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

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: 1.2 Body Systems

Level 1: Differentiate the functions of 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: 1.3 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

Indicators

1.3.01 Identify, classify, evaluate and select animal species and/or breeds

1.3.02 Recognize and determine the biotic and abiotic factors that impact the animals' environment (e.g., air, ventilation)

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)

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

Indicators

1.4.01 Evaluate general condition of animal using diagnostic methods (e.g., visual exam, physical exam, vital signs)
1.4.07 Identify gastrointestinal ailments, neuromuscular disorders, respiratory diseases, blood disorders, and bone/joint problems
1.4.09 Identify types of immunity and immune responses and maintain animal health through immunization
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)

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

Indicators

1.5.01 Determine the factors that influence estrus, gestation and parturition and employ appropriate management practices

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 Behavior

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

Indicators

1.6.01 Describe the adaptations and special senses (e.g., sight, hearing, smell, touch) of animals and how they contribute to animal behavior

Academic Standards

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

Unit: Reproduction and Genetics

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

Benchmark: 1.1 Nutrition

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

1.1.10 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: 1.2 Body Systems

Level 1: Differentiate the functions of body systems

Indicators

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: 1.3 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

Indicators

1.3.01 Identify, classify, evaluate and select animal species and/or breeds

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

Indicators
1.4.01 Evaluate general condition of animal using diagnostic methods (e.g., visual exam, physical exam, vital signs)
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: 1.5 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

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

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)

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

Benchmark: 2.3 Genetics
Level 1: Use mono-and di-hybrid crosses to predict genotype and phenotype

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)
2.3.07 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)

Benchmark: 3.10 Business Regulation, Law and Related Issues

Level 1: Identify and describe government regulations and societal issues related to a specific business enterprise or environmental project

Indicators

3.10.02 Explain the purpose and impact of government regulations
3.10.03 Identify local, state and federal regulations relative to compliance
3.10.04 Assess business liability and describe the consequences of noncompliance
3.10.05 Adhere to business-related documentation requirements

Academic Standards

English: Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)
Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis F, 8-10)
Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Benchmark: 3.3 Management

Level 1: Select and organize resources to develop a product or a service to be rendered

Indicators

3.3.06 Develop a continuous-improvement management program
3.3.08 Document business activities
3.3.10 Assess the profitability of a product
3.3.11 Analyze operating results in relation to budget/industry

Academic Standards

English: Analyze the features and structures of documents and critique them for their effectiveness. (Reading: Informational Text A, 11-12)
Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)
Social Studies: Identify factors which inhibit or spur economic growth and cause expansions or recessions. (Economics B, 11-12)

Benchmark: 4.1 Safety Procedures
Level 1: Follow safety procedures in general situations with basic tools and equipment, evaluate work environment and seek assistance to rectify the problem

Indicators
4.1.01 Demonstrate knowledge of safety rules and regulations
4.1.02 Interpret safety signs and symbols
4.1.03 Model safe attitudes and behaviors (e.g., lifting, climbing)
4.1.04 Identify safety hazards and take corrective measures
4.1.05 Use safety equipment in accordance with established procedures
4.1.06 Follow established procedures for the administration of first aid and contact emergency medical personnel when necessary

Academic Standards
English: Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)

Unit: Animal Products Marketing & Selection
In this unit, the learner will develop marketing and management strategies.

Benchmark: 1.1 Nutrition
Level 1: Follow safety procedures in general situations with basic tools and equipment, evaluate work environment and seek assistance to rectify the problem

Indicators
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)

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: 1.2 Body Systems
Level 1: Differentiate the functions of body systems

Indicators
1.2.01 Identify external anatomical parts and functions
1.2.04 Identify the anatomy and describe the physiology of the skeletal systems
1.2.05 Identify the anatomy and describe the physiology of the musculature systems

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

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

Indicators
1.3.01 Identify, classify, evaluate and select animal species and/or breeds

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: 3.1 Marketing
Level 1: Promote a product or service using basic strategies for packaging, display and publicity

Indicators
3.1.01 Select target market and consumers
3.1.02 Research products and service design(s) and determine the technical feasibility of new products
3.1.07 Promote products and services
3.1.09 Select and implement a marketing option (e.g., cash sales, hedge, speculate, options, forward contract, government programs)
3.1.10 Identify and evaluate purchase options (e.g., finance options, lease, cash, rental)
3.1.11 Evaluate the benefits of commodity check-off programs

Academic Standards
English: Produce functional documents that report, organize and convey information and ideas accurately, foresee readers' problems or misunderstandings and that include formatting techniques that are user friendly. (Writing Applications C, 11-12)
Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)
Social Studies: Analyze how scarcity of productive resources affects supply, demand, inflation and economic choices. (Economics A, 11-12)

Benchmark: 3.10 Business Regulation, Law and Related Issues
Level 1: Identify and describe government regulations and societal issues related to a specific business enterprise or environmental project

Indicators
3.10.01 Explain the nature and appropriateness of different types of business contracts
3.10.02 Explain the purpose and impact of government regulations
3.10.03 Identify local, state and federal regulations relative to compliance
3.10.08 Assess the impact of issues affecting the industry and recommend solutions

Academic Standards
English: Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)
Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis F, 8-10)
Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Benchmark: 3.12 Agrosecurity and Biosecurity
Level 1: Identify agrosecurity and biosecurity risks for an enterprise

Indicators
3.12.01 Recognize sources and origins of agents that can contaminate processed and unprocessed food products

3.12.03 Identify sources of biological and chemical tampering points
3.12.04 Assess facility security, classify level of risk and recommend improvements

Academic Standards

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

Benchmark: 3.2 Sales and Customer Service

Level 1: Use customer service and sales techniques to foster positive relationships with customers and conduct sales

Indicators

3.2.01 Identify key components to organize a sale
3.2.02 Develop sales goals and incentive programs
3.2.11 Complete sales transactions and close-out procedures (e.g., handle money, operate cash register, scan bar codes, record sales, write invoices/orders)

Academic Standards

English: Use a variety of strategies to enhance listening comprehension. (Communication A, 8-10; Communication A, 11-12)
Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)

Benchmark: 3.3 Management

Level 1: Select and organize resources to develop a product or a service to be rendered

Indicators

3.3.03 Develop business goals/objectives and mission statement
3.3.08 Document business activities
3.3.10 Assess the profitability of a product

Academic Standards

English: Analyze the features and structures of documents and critique them for their effectiveness. (Reading: Informational Text A, 11-12)
Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)
Social Studies: Identify factors which inhibit or spur economic growth and cause expansions or recessions. (Economics B, 11-12)

Benchmark: 3.4 Finance

Level 1: Budget and monitor income and expenses of an enterprise

Indicators

3.4.07 Manage risk of liabilities
3.4.08 Maintain financial records and interpret and analyze financial statements
3.4.09 Determine cost of doing business (e.g., personnel, depreciation, materials, freight, quality)
3.4.10 Calculate and analyze return on investment (ROI)

Academic Standards

English: Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)
Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)
Social Studies: Analyze how scarcity of productive resources affects supply, demand, inflation and economic choices. (Economics A, 11-12)

Benchmark: 3.6 Information Management
Level 1: Select and use a computer and computer application for a specific purpose

Indicators
3.6.01 Utilize technology to maintain and monitor business records

Academic Standards
English: Prepare writing for publication that follows an appropriate format and uses a variety of techniques to enhance the final product. (Writing Process F, 11-12)
Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)

Benchmark: 4.1 Safety Procedures
Level 1: Follow safety procedures in general situations with basic tools and equipment, evaluate work environment and seek assistance to rectify the problem

Indicators
4.1.01 Demonstrate knowledge of safety rules and regulations
4.1.02 Interpret safety signs and symbols
4.1.03 Model safe attitudes and behaviors (e.g., lifting, climbing)
4.1.04 Identify safety hazards and take corrective measures
4.1.05 Use safety equipment in accordance with established procedures
4.1.06 Follow established procedures for the administration of first aid and contact emergency medical personnel when necessary

Academic Standards
English: Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)

Unit: Body Systems
In this unit, the learner will be able to differentiate the functions of body systems for agriculturally important animals.

Benchmark: 1.2 Body Systems
Level 1: Differentiate the functions of body systems

Indicators
1.2.01 Identify external anatomical parts and functions
1.2.03 Identify the anatomy and describe the physiology of the nervous systems
1.2.04 Identify the anatomy and describe the physiology of the skeletal systems
1.2.05 Identify the anatomy and describe the physiology of the musculature systems
1.2.06 Identify the anatomy and describe the physiology of the circulatory systems
1.2.07 Identify the anatomy and describe the physiology of the integumentary systems (skin) and associated structures
1.2.08 Identify the anatomy and describe the physiology of the respiratory systems
1.2.09 Identify the anatomy and describe the physiology of the urinary systems
1.2.12 Identify the anatomy and describe the physiology of the lymphatic 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)