

Principles of Agricultural Science – Animal Expanded Lesson Review

The following is a compiled listing of concepts, performance objectives, and essential questions by lesson.

Lesson 1.1 Animal Planet

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. Animals serve many purposes in the lives of humans, including providing life-sustaining products such as meat, milk, and fiber. 2. Organization and record-keeping are important to the success of an agricultural business. 3. Career opportunities exist in animal agriculture for all levels of education in the areas of production, processing, marketing, and regulation. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Determine and analyze the use of animal products over the course of one day. (Activity 1.1.1) • Develop a list of animal products commonly used based on previous experience. (Activity 1.1.1) • Prepare and maintain an <i>Agriscience Notebook</i> to record and store information presented in classroom discussions and activities throughout the course. (Activity 1.1.2) • Select an animal to research throughout the course and develop a format for a management guide. (Project 1.1.4) • Research an animal industry and related careers and share with the class. (Activity 1.1.3) • Document and record animal industries and career opportunities shared during student presentations. (Activity 1.1.3)

Essential Questions

1. How do animals contribute to daily life?
2. What are by-products?
3. What non-consumable items are produced from animals?
4. What are the benefits of keeping an *Agriscience Notebook*?
5. Why is it important to keep a notebook and records organized?
6. How does keeping accurate records help the success of an agricultural business?
7. What are the industries within animal agriculture?
8. How can I develop my interest of animals into a career?

Lesson 1.2 Taming and Naming

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> Domestication of animals is achieved through breeding, handling, and training. Animals are classified several different ways, such as binomial nomenclature, purpose, and characteristics of anatomy and physiology. All living organisms are classified using kingdom, phylum, class, order, family, genus, and species. Dichotomous keys are a classification tool used to identify objects based on their physical features. Animal species were domesticated at different times throughout history for the benefit of the animals and humans. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> Compare domestic and wild animals using the characteristics of domestication. (Activity 1.2.1) Apply a hierarchical organizational system to a food group. (Activity 1.2.2) Determine the classification of the animal in their <i>Producer's Management Guide</i>. (Activity 1.2.3) Design a dichotomous key for the animal in their <i>Producer's Management Guide</i>. (Activity 1.2.3) Design a dichotomous key for five breeds related to the animal in their <i>Producer's Management Guide</i>. (Project 1.2.4) Design a timeline recording the development and domestication of an animal species. (Project 1.2.4)

Essential Questions

- How have domesticated animal species adapted to human interactions over time?
- How do animals benefit from domestication?
- What is the difference between taming animals and domesticating them?
- How have human lives changed due to the domestication of animals?
- How can several classification categories be used on the same object?
- How are animals classified?
- How was binomial nomenclature developed?
- Why were breeds developed?
- How is a dichotomous key used to identify animals?

OPTIONAL Lesson 1.3 Livestock Across the United States

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> Livestock production occurs in different regions of the United States. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> Develop a poster examining the characteristics of a livestock production region. (Project 1.3.1) Explain how the resources available in different regions of the United States support and promote the production of animals. (Project 1.3.1)

2. Characteristics, such as climate, land price, population, industry infrastructure, feed resources, and transportation systems influence where commercial animals are produced in the United States.

- Map the regions of commercial animal production. (Activity 1.3.2)

Essential Questions

1. What makes a region well suited for a certain type of animal production compared to other regions?
2. What influences do large population centers have on agricultural animal production?
3. How do environmental characteristics influence animal production?
4. How do the varieties of crops produced affect the types of animals produced within a region?

Lesson 2.1 Animal Rights or Animal Wrongs?

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. The beliefs of an individual influence the value humans place on live animals and the use of products derived from animals. 2. Animal welfare and animal rights are different belief systems pertaining to the acceptable use of animals. 3. The use of animals for food and fiber sometimes creates ethical dilemmas for producers and consumers. 4. Producers of animal products must consider the welfare of animals for maximum profitability. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Discuss the differences in the interpretation of the meaning of the word value. (Activity 2.1.1) • Assess their values to determine their beliefs about animal use. (Activity 2.1.1) • Determine their current opinions towards the beliefs of animal rightists and animal welfarists. (Activity 2.1.2) • Recognize issues in animal agriculture and discuss the positive and negative impacts of each issue. (Project 2.1.3) • Analyze animal rights and animal welfare videos to determine the message and intent of each video. (Activity 2.1.4) • Develop a Producer's Code of Care document for the humane use of a species of animal under their care. (Project 2.1.5)

Essential Questions

1. How are issues handled by the animal agriculture industry?
2. How do personal beliefs and values affect an individual's perception of animal use?
3. How do animal use philosophies compare?
4. How is the media used to promote the pros and cons of these philosophies?
5. What is the proper standard of care for an animal?
6. How does the treatment of a production animal affect profitability?
7. Why are there dilemmas for producers and consumers concerning the use of animals?
8. How can producers combat misunderstandings in animal agriculture?

Lesson 2.2 Manipulating Manners

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. Animals respond instinctively to stimuli and changes in their surroundings. 2. Animals exhibit both instinctive and learned behaviors. 3. Safe handling and restraint procedures protect the animal and handler. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Investigate the behavior of pillbugs in response to stimuli. (Activity 2.2.1) • Conduct an inquiry lab on the behaviors of pillbugs. (Activity 2.2.1) • Simulate instinctive behaviors for predator and prey animals. (Activity 2.2.2) • Write a brief with annotated references to use as a preparatory guide about animal behavior and safety for farm tours and field trips. (Project 2.2.3) • Research and determine the typical behaviors of a species of animal and become familiar with the safe handling procedures of that animal. (Project 2.2.3)

Essential Questions

1. Why study animal behavior?
2. How do animals respond to differences in their environment?
3. What are instinctive and learned behaviors?
4. How is conditioning used in animal agriculture?
5. How does novelty affect flighty animals?
6. What is a flight zone?
7. How can the flight zone of an animal be used to move and handle animals in a low-stress manner?
8. What are safe and calm practices to use when working with animals?
9. What is an annotated bibliography?
10. Why do researchers write annotated bibliographies?

Lesson 2.3 Home Sweet Home

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. Animal facilities differ based on food requirements, environmental factors, species, use, and size of operations. 2. Producers implement biosecurity practices to reduce the spread of pathogens on farms. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Research the basic feed, water, and shelter requirements for animals. (Activity 2.3.1) • Determine the average environmental conditions of the students' facility location. (Activity 2.3.1) • Experiment to determine the risk levels related to spreading pathogens in a farm scenario. (Activity 2.3.2) • Observe and record culture growth. (Activity 2.3.2)

<p>3. Proper use of scale is important when designing animal facilities.</p> <p>4. Animal facilities are designed to protect the safety and health of animals and handlers and should include biosecurity protocols.</p>	<ul style="list-style-type: none"> • Calculate proportions, scale ratios, and dimensions of building plans. (Activity 2.3.3) • Select an animal facility that provides safe handling and efficient production practices for animals. (Project 2.3.4) • Design and construct a model animal facility. (Project 2.3.4)
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Essential Questions

1. What are the basic needs of animals?
2. How does environment influence the design of animal facilities?
3. What determines the size of animal facilities?
4. How can scale ratio be used in facility design?
5. What are the areas needed in an animal facility?
6. What risks do pathogens pose to farm animals?
7. What are the common risk factors to biosecurity on a farm?
8. How can biosecurity concerns be reduced at animal facilities?

Lesson 3.1 Units of Life

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. Animal cells are comprised of many parts that have essential functions for the survival of animal tissue. 2. Cells use water, oxygen, and glucose to produce energy and metabolic by-products of carbon dioxide and water. 3. Cells use the processes of osmosis and diffusion for the uptake of water and dissolved nutrients required for metabolism and growth. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Identify and label animal cell organelles. (Project 3.1.1) • Develop a pictorial representation of cell function. (Project 3.1.1) • Examine and compare plant and animal cells and their structures under a microscope. (Activity 3.1.2) • Collect and analyze data to provide evidence of cell metabolism. (Activity 3.1.3) • Observe molecules moving across a membrane in a simulation. (Activity 3.1.4) • Conduct an experiment to simulate the process of osmosis in animal cells. (Activity 3.1.5)

Essential Questions

1. What are the functions of cell organelles, and how do they work together?
2. How do cells contribute to the overall function of an animal?
3. How do animal cells convert raw nutrients into energy?
4. What is cellular respiration?
5. Why is understanding animal cells important to understanding animal systems?

6. How does a cell absorb water and nutrients?
7. Why do osmosis and diffusion occur in cells?
8. What is the difference between hypertonic, hypotonic, and isotonic?
9. How does a cell reach equilibrium?

Lesson 3.2 Putting the Puzzle Together

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. External body parts of animals vary among different species and are important as reference tools for animal selection, health, and management. 2. A collection of organized cells create tissue responsible for various life-sustaining functions. 3. The collection of epithelial, connective, muscle, and nerve tissues interact to perform specific functions within the body of an animal. 4. The body structure of a vertebrate animal is comprised of a skeleton made of bone and cartilage with ligaments attached to muscle tissue to provide motion. 5. Multiple organs work together and form physiological systems. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Identify common external animal parts and explain the purpose of each. (Activity 3.2.1) • Identify unique external parts specific for livestock and poultry species and explain the purpose of each part. (Activity 3.2.1) • Examine two types of muscle tissue and describe the differences. (Activity 3.2.2) • Dissect a chicken wing and identify epithelial and connective tissues. (Activity 3.2.2) • Dissect a chicken wing and observe how tendons and ligaments provide movement to the structure of the skeleton. (Activity 3.2.2) • Dissect a fetal pig and identify internal parts and organs that comprise systems. (Activity 3.2.3)

Essential Questions

1. Why are external parts necessary to know?
2. How are tissues formed in the body of an animal?
3. What are the different types of tissues in the body of an animal?
4. How are bones, tendons, and ligaments related?
5. How do muscle tissues differ based on their location in the body of an animal?
6. How do multiple organs work together in the body of an animal?
7. What is the relationship between external body parts and internal systems?
8. How do the various internal systems work together?

Lesson 3.3 Breathing, Beating, and Body Control Centers

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. The respiratory and circulatory systems are closely related and essential for animal life. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Identify and explain the function of the parts of the respiratory and circulatory systems. (Activity 3.3.1)

<p>2. External respiration is a process of gas exchange between the lungs and blood.</p> <p>3. The circulatory system relies on the heart to pump blood throughout the body.</p> <p>4. Respiration and heart rates may be affected by external conditions, such as temperature and physical activity.</p> <p>5. The nervous, endocrine, and renal systems work together to transmit signals, secrete hormones, and filter wastes.</p>	<ul style="list-style-type: none"> • Describe the process of gas exchange in external respiration. (Activity 3.3.2) • Determine the presence of carbon dioxide in exhaled air. (Activity 3.3.2) • Design a travel brochure that highlights the flow of blood throughout the body. (Project 3.3.3) • Conduct an inquiry on the effects of external conditions on respiration rate, pulse, and blood pressure. (Activity 3.3.4) • Map the functions of body systems, specifically the nervous, endocrine, and renal systems, to demonstrate their connection to each other and other systems in the body. (Project 3.3.5)
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Essential Questions

1. How do the respiratory and circulatory systems work together?
2. What is the difference between external and cellular respiration?
3. How are gases exchanged in the lungs?
4. How does the concentration of carbon dioxide in inhaled and exhaled air compare?
5. What is the path of blood flow throughout the body?
6. What is the difference between systemic and pulmonary circulation?
7. What is blood pressure?
8. How do respiration rates, pulse, and blood pressure respond to rest and exercise?
9. How do the nervous, endocrine, and renal systems relate to other systems and reactions within an animal?

Lesson 4.1 Digestion Junction

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. Digestive systems vary among species of animals. 2. Ruminants have a four-chambered stomach consisting of the rumen, reticulum, omasum, and abomasum, each with a specific function. 3. Digestion systems break down, decompose, and absorb nutrients through mechanical, chemical, and biological processes. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Define the terminology commonly used in digestive anatomy. (Activity 4.1.1) • Match livestock species with the proper digestive system. (Activity 4.1.2) • Label, identify and explain the function of various parts of animal digestive systems. (Activity 4.1.3) • Build a model of a digestive system. (Project 4.1.4)

Essential Questions

1. What is the difference between ruminant and monogastric digestive systems?
2. How do methods of prehension differ among animals?
3. How do different animals digest nutrients?
4. What is the difference between a monogastric, ruminant, and avian digestive system?
5. Which species represent ruminant, monogastric, pseudo-ruminant, and avian digestion systems?
6. Why do ruminants have a multi-chambered stomach?
7. Where does most digestion of food occur?

Lesson 4.2 The Need for Feedstuffs

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. The six nutrient groups required by animals include water, carbohydrates, protein, fats, vitamins, and minerals. 2. Animals derive nutrition from a variety of sources, including roughages and concentrates. 3. Feedstuffs of the same type can vary in nutrient composition and nutritional value based on the location, time of harvest, growing conditions, water availability, and soil conditions of the area in which the feed is grown. 4. The nutritional value of a feed can be determined through feed analysis. 5. The specific nutritional requirements of individual animals are dependent upon species, age, and level of production. 6. Animals require nutrients from all six nutrient groups to thrive, survive, and reproduce. 7. Feed labels are an important source of nutritional information. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Identify the six classes of nutrients, the function they serve in the body, and sources of each nutrient. (Activity 4.2.1) • Classify feedstuffs as roughages, concentrates, and supplements. (Activity 4.2.2) • Categorize feedstuffs into the nutrient group each feedstuff provides. (Activity 4.2.2) • Identify and define feed analysis terms. (Activity 4.2.3) • Conduct a dry matter analysis for two feedstuff samples. (Activity 4.2.3) • Conduct inquiry experiment to determine the energy in two feedstuff samples. (Activity 4.2.4) • Evaluate nutrient requirements of various animals at different stages of production. (Activity 4.2.5) • Research and record the nutritional needs of an animal using Nutritional Requirement tables. (Activity 4.2.5) • Read a feed label and interpret the information included on the label. (Activity 4.2.6) • Compare the information on a feed label to the information found on a food label. (Activity 4.2.6)

Essential Questions

1. Which feed sources provide animals with the six essential nutrients?
2. What is nutritional value?
3. Why is understanding nutritional value important to know of a feedstuff?

4. What is feed analysis, and how is it used?
5. How is energy measured?
6. How does a feed differ from a feedstuff?
7. Why are both concentrates and roughages used for animal feeds?
8. Why is nutrition important to animals?
9. Do animals of different species require the same types and amounts of food throughout their lifetime?
10. What are the specific nutrient requirements of an individual animal at different stages of production?
11. How can the nutrient content of a feed vary?
12. What nutritional information is found on feed labels?
13. How does a feed label compare to a food label?

Lesson 4.3 Nutritional Disorders

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. Animal growth, development, and health are directly related to meeting the nutrient requirements of the animal. 2. Nutrient deficiencies in animals may result in poor performance and contribute to economic losses. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Study the nutritional disorders of one species. (Project 4.3.1) • Share nutritional disorders with the class. (Project 4.3.1) • Examine supplement labels to substantiate nutritional disorders associated with feed nutrients. (Activity 4.3.3) • Develop a reference for common nutritional disorders of many animals. (Activity 4.3.2)

Essential Questions

1. How can nutritional disorders be prevented?
2. What is nutrient deficiency?
3. What is nutrient toxicity?
4. What is the difference between nutrient deficiency and toxicity?
5. What determines if an animal has a nutritional deficiency?
6. What disorders are common in different species of livestock?

Lesson 4.4 What's for Dinner?

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. Livestock rations meet the requirements of animals, maximize feed efficiency, and minimize the cost of production. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Describe the characteristics of a good ration. (Activity 4.4.1) • List the steps in balancing a ration. (Activity 4.4.1)

<ol style="list-style-type: none"> 2. Using mathematics and problem solving are important skills for animal producers when formulating rations. 3. The animal industry uses mathematical calculations to formulate rations. 	<ul style="list-style-type: none"> • Complete conversions of feedstuffs from a dry-matter basis to an as-fed basis. (Activity 4.4.1) • Use the Pearson Square to balance a ration using two feedstuffs. (Activity 4.4.2) • Formulate a ration and make a recipe using the Pearson Square. (Activity 4.4.3) • Develop a balanced ration for livestock by hand and by using a computer-based ration-balancing program. (Activity 4.4.4)
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Essential Questions

1. What are the characteristics of a good ration?
2. What are the steps in balancing a ration?
3. How is the water content of feeds determined?
4. How is the Pearson Square method used in formulating a ration?
5. What is the limitation of using the Pearson Square method?
6. What are the advantages of using a ration-balancing computer program?

Lesson 5.1 Where Do Calves Come From?

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. Male and female reproductive systems differ in structure and function. 2. The basic female reproductive system for both mammals and avians includes the ovary, infundibulum, oviducts, uterus, and vagina. 3. The mammalian male reproductive system consists of testes, scrotum, epididymis, vas deferens, prostate gland, Cowper's gland, seminal vesicle, urethra, and penis. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Identify and label the parts of mammalian male and female reproductive tracts. (Activity 5.1.1) • Identify and label the parts of the avian female reproductive tract. (Activity 5.1.2) • Dissect a mammalian female reproductive tract and identify parts within the tract. (Activity 5.1.4) • Observe and compare the reproductive tracts of cows, sows, and ewes. (Activity 5.1.4) • Describe the path of an egg from the ovary to birth. (Activity 5.1.4) • Observe a dissection of a mammalian male reproductive tract and identify the parts within the tract. (Activity 5.1.3) • Draw a flow chart to show the process of sperm maturation. (Activity 5.1.3)

Essential Questions

1. Why is it helpful to be familiar with reproductive anatomy?
2. What are the eight basic parts of the mammalian female reproductive tract?
3. What are the ten basic parts of the male reproductive tract?

4. What are the functions of each of the parts of the female reproductive system?
5. What are the functions of each of the parts of the male reproductive system?
6. How do mammalian and avian reproductive systems compare?

Lesson 5.2 The Pathway to Production

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. Understanding of the estrus cycle and hormonal control is essential for reproductive success. 2. The reproductive cycle of females consists of puberty, the estrous cycle, gestation, parturition, and lactation. 3. The potential fertility and viability of semen may be determined based on its motility, morphology, and concentration 4. Four main breeding methods commonly chosen by producers when breeding livestock have advantages and disadvantages. 5. The breeding season of animals may be manipulated for economic gain. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Identify the main hormones of the estrous cycle and graph the levels of each hormone throughout the cycle. (Activity 5.2.1) • Research and record reproductive facts regarding the species of the animal identified in the <i>Producer's Management Guide</i>. (Activity 5.2.2) • Prepare slides using a variety of buffers and stains. (Activity 5.2.3) • Evaluate semen samples for sperm motility, morphology, and concentration. (Activity 5.2.3) • Distinguish between the different livestock breeding systems. (Activity 5.2.4) • Understand the advantages and disadvantages of breeding methods. (Activity 5.2.4) • Determine the best time to breed an animal and manage the breeding season. (Problem 5.2.5)

Essential Questions

1. How do hormones control the estrous cycle?
2. What are the phases of the estrous cycle?
3. What are the reproductive stages of animals?
4. Why should producers recognize visual indications of estrus exhibited by animals?
5. What visual indications of impending parturition do animals' exhibit?
6. What are the indicators of quality of semen, and how are they evaluated?
7. What are the advantages and disadvantages of various breeding methods?
8. How do reproductive technologies change breeding management?
9. Which species most commonly utilizes each breeding method?
10. How can manipulating the reproductive process benefit animal producers?

Lesson 6.1 A New Pair of Genes

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. Mitosis has five distinct phases necessary for cell division. 2. Eggs, or ova, and sperm undergo meiosis and mitosis for the development of new cell tissue. 3. Egg cell fertilization requires the joining of genetic material in the form of gametes from both male and female parents. 4. Dominant and recessive genes determine the phenotypic characteristics of animals. 5. Genetic traits, such as coat color, muscling, and horns, are passed from one generation to the next. 6. Genetic variations among species occur due to exceptions to the law of dominance. 7. Some animals phenotypic characteristics are expressed as sex-linked traits. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Prepare a slide to examine mitosis in plant tissue. (Activity 6.1.1) • Examine a prepared slide of animal mitosis and make observations of the stages of mitosis. (Activity 6.1.1) • Sketch and label cells depicting meiosis. (Activity 6.1.2) • Write a paragraph describing what occurs during fertilization. (Activity 6.1.2) • Perform computer simulations related to genetic inheritance to learn about the role genetics plays in animal production. (Activity 6.1.3) • Simulate <i>Drosophila</i> mating to study the role genetics plays in animal production. (Activity 6.1.3) • Conduct a trial to test the probability of codominance. (Activity 6.1.4) • Perform computer simulations to predict sex-linked traits in drosophila. (Activity 6.1.4)

Essential Questions

1. Where does cell multiplication take place in an animal?
2. What are the stages (phases) of mitosis?
3. How do meiosis and mitosis differ?
4. How is meiosis involved in animal reproduction?
5. How can specific traits be predicted in offspring?
6. What are dominant genetic traits, and why are they important to understanding genetic probability?
7. What is the Punnett Square method, and how is it used in animal production?

Lesson 6.2 Predicting Genetic Inheritance

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. Punnett Squares predict qualitative traits inherited from a single gene pair. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Use Punnett Squares to predict the probability of genetic frequencies. (Activity 6.2.1)

<ol style="list-style-type: none"> 2. Producers use ratios to compare animals within a contemporary group. 3. Expected Progeny Differences (EPDs) are utilized by producers to select animals for heritable traits. 4. Quantitative traits are inherited through multiple gene pairs and can be affected by the environment. 5. Economically relevant traits can be predictably changed through genetic improvement by selective breeding using EPDs. 6. Pedigrees contain important information for examining genetic history. 	<ul style="list-style-type: none"> • Complete a Punnett Square with a dihybrid cross. (Activity 6.2.1) • Calculate a contemporary group ratio. (Activity 6.2.2) • Compare animals based on their expected EPDs. (Activity 6.2.3) • Evaluate the quantitative traits of livestock using EPDs. (Activity 6.2.3) • Use EPDs in mating decisions. (Activity 6.2.3) • Trace genetic inheritance through a pedigree. (Activity 6.2.4)
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Essential Questions

1. What is genetic inheritance?
2. How are probabilities used in animal agriculture?
3. How are Punnett Squares used in animal agriculture?
4. What is the difference between qualitative and quantitative traits?
5. How would you utilize a ratio when genetically selecting an animal?
6. How would you utilize EPDs during genetic selection?
7. How would you utilize economic indexes during genetic selection?
8. How can pedigrees be used in for selecting an animal?

OPTIONAL Lesson 6.3 Evolutionary Ideas

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. Animals today have descended from common ancestors. 2. Natural selection is an involuntary process of evolution where species adapt to their environment. 3. The diversity of organisms is the result of billions of years of evolutionary adaptation. 4. Genetic mutations are separate events that can lead to change in the characteristics of a species. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Study the process used to determine the common ancestors of species. (Activity 6.3.1) • Diagram a cladogram of seven types of animals. (Activity 6.3.1) • Conduct an experiment on the process of natural selection using the peppered moth. (Activity 6.3.2) • Determine the types of selection that occur in certain environments. (Activity 6.3.3) • Determine the evolutionary path of a species of animal. (Project 6.3.4)

Essential Questions

1. How are organisms related?
2. Why do so many animals have similar structures?
3. How can a cladogram be used to demonstrate relatedness?
4. How does evolution occur?
5. How do predators influence evolution?
6. What forces drive the change in organisms over time?
7. How do animals adapt to live in various environments?
8. Why do similar species evolve differently in separate areas?

Lesson 7.1 Diseased!

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. Animal caretakers observe vital signs, which vary among species, to identify health or illness. 2. Bacteria, viruses, fungi, protozoa, and prions cause infectious diseases. 3. Vectors and fomites are ways of spreading disease agents. 4. Veterinarians and caretakers diagnose diseases through observation of symptoms and physical examinations. 5. Regulatory agencies are responsible for disease prevention and control. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Research and record the vital signs of an animal. (Activity 7.1.1) • Assess vital signs of an animal. (Activity 7.1.1) • Identify and sketch bacteria, mold, and protozoa from prepared slides. (Activity 7.1.2) • Simulate the spread of a contagious disease and trace the route the disease takes through a population. (Activity 7.1.3) • Research and record key facts and symptoms of two animal-related diseases. (Project 7.1.4) • Determine what disease an animal has from case studies. (Activity 7.1.5) • Research governmental regulatory agencies and identify primary purposes and responsibilities each agency has regarding disease prevention and control. (Project 7.1.6) • Argue the role of a regulatory agency in a disease-outbreak scenario. (Project 7.1.6)

Essential Questions

1. What are the signs of good health?
2. What are the signs of poor health?
3. What are the differences in bacteria, viruses, fungi, protozoa, and prions?
4. How do you distinguish between infectious, contagious, and noninfectious diseases?
5. How are diseases transmitted?
6. How are diseases diagnosed?
7. How can observing symptoms lead to a disease diagnosis?

8. What are zoonotic diseases?
9. Why is knowing the vital signs of an animal important?
10. How do you know if an animal can transmit a disease to a human?
11. What is a regulatory agency?
12. How does a regulatory agency limit and control the spread of disease?
13. Who enforces quarantines?

Lesson 7.2 Bugged!

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. A livestock producer's knowledge of parasite life cycles can aid in parasite control and prevention. 2. There are multiple methods to determine the presence of parasitic eggs in an animal, of which the laboratory is the most accurate. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Identify and diagram the life cycle of a common parasite. (Activity 7.2.1) • Classify parasites according to their phylum and site of infestation on the body. (Activity 7.2.1) • Dissect product labels for common dewormers. (Activity 7.2.3) • Prepare slides and observe to determine the presence of parasite eggs. (Activity 7.2.2)

Essential Questions

1. What is a parasite?
2. What is a host?
3. What is the difference between an external and an internal parasite?
4. How do parasites harm animals?
5. What is the life cycle of a parasite?
6. How can you determine if an animal has internal parasites?
7. How can parasites be prevented or controlled in animals?

Lesson 7.3 Pathogens Prevented

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. Disease prevention, morally and economically warranted, includes vaccination, sanitation, ventilation, and nutrition. 2. Record keeping is important in scheduling and administering preventative medications. 3. Vaccines are available for many common diseases. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Demonstrate the proper procedures for filling a syringe to administer medication. (Activity 7.3.1) • Administer intramuscular and subcutaneous shots. (Activity 7.3.1) • Produce an observation tool to use in comparing symptoms of health to symptoms of poor health for their animal. (Project 7.3.2) • Plan preventative care for their animal. (Project 7.3.3) • Design a record-keeping system for medications and vaccines for their animal. (Project 7.3.2) • List common diseases and parasites as well as preventative controls related to their animals. (Project 7.3.3)

Essential Questions

1. What are vaccinations?
2. How do vaccinations increase immunity?
3. How are injections administered?
4. What is the difference between intramuscular and subcutaneous injections?
5. What is the correct vaccination schedule for the animal in my *Producer's Management Guide*?
6. Why is record keeping essential to treating and preventing disease?
7. How do vaccinations increase productivity and profit?
8. What diseases do producers commonly vaccinate livestock?

Lesson 8.1 The Products of Our Toil

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. The primary purpose of livestock production is food and fiber. 2. Grading is used to provide consistent and palatable food products. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Research an animal product and develop a presentation on that animal product. (Project 8.1.1) • Work as a team to prepare and present a class lecture. (Project 8.1.1) • Conduct sensory evaluation trials on meat samples and evaluate the samples. (Activity 8.1.2) • Taste milk samples and determine the defects, if present. (Activity 8.1.3)

- Identify samples of cheese based on appearance and taste. (Activity 8.1.3)
- Grade eggs based on their interior qualities using the candling and breakout methods. (Activity 8.1.4)

Essential Questions

1. Which major product do consumers receive from each type of agricultural animal?
2. What are wholesale and retail cuts?
3. What is the difference between fresh and processed products?
4. Which food safety concerns exist for animal products?
5. What is sensory evaluation?
6. How do flavor, tenderness, and juiciness influence palatability?
7. What causes milk to have off-flavors?
8. How are eggs evaluated?
9. Which characteristics do processors use to assign eggs a grade?

Lesson 8.2 In Search of the Ideal Animal

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> 1. Criterion-based selection establishes priorities and provides consistency when evaluating animal conformation for specific species and purposes. 2. Producers use qualitative and quantitative comparison of live animals to predict value in the marketplace. 3. Offspring performance may be predicted and improved by selecting animals based on performance records. 	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none"> • Make decisions based on given priorities and criteria, and analyze objects as they compare ideal criteria. (Activity 8.2.1) • Research and identify the most-used priorities for evaluating an animal within that animal industry. (Project 8.2.2) • Write, illustrate, and publish a children’s storybook on how to select an animal. (Project 8.2.2) • Determine and recommend most appropriate sires using Expected Progeny Differences. (Problem 8.2.3)

Essential Questions

1. What is criterion-based selection?
2. How can established priorities be used when making decisions?
3. What is conformation?
4. How do evaluating breeding and market animals differ?
5. What criteria are used in evaluating a species of animal?
6. How does data complement visual selection?
7. How are EPDs useful in selecting animals?

Lesson 8.3 Value Added

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none">1. The four elements of marketing are product, price, place, and promotion.2. Brand name recognition, niche marketing, and value-added products increase the value of a good.3. A solid marketing plan is necessary to increase the value and sales of a product and move goods from producer to consumer.	<p><i>Students will learn concepts by doing</i></p> <ul style="list-style-type: none">• Compare similar products based on their features, pricing, distribution, and promotion. (Activity 8.3.1)• Determine a target market and potential products based on the local community. (Project 8.3.2)• Develop a plan to market a product from their project for the <i>Producer's Management Guide</i>. (Project 8.3.2)• Work on a team to determine a market for a product in an appropriate local marketplace. (Problem 8.3.3)

Essential Questions

1. What is the difference between marketing and selling?
2. Why is marketing beneficial in agriculture?
3. How are the four P's of marketing used to improve sales?
4. What specialty markets exist in agriculture?
5. How are products developed and marketed?
6. How does product branding influence the marketing mix?
7. What is niche marketing?