ASA Detailed Course Outline

Unit 1 – History and Use of Animals

Lesson 1.1 Animal Planet

1. Animals serve many purposes in the lives of humans, including providing life-sustaining products such as meat, milk, and fiber.

   - Determine and analyze the use of animal products over the course of one day.
   - Develop a list of animal products commonly used based on previous experience.

2. Organization and record-keeping are important to the success of an agricultural business.

   - Prepare and maintain an *Agriscience Notebook* to record and store information presented in classroom discussions and activities throughout the course.
   - Select an animal to research throughout the course and develop a format for a management guide.

3. Career opportunities exist in animal agriculture for all levels of education in the areas of production, processing, marketing, and regulation.

   - Research an animal industry and related careers and share with the class.
   - Document and record animal industries and career opportunities shared during student presentations.

Lesson 1.2 Taming and Naming

1. Domestication of animals is achieved through breeding, handling, and training.

   - Compare domestic and wild animals using the characteristics of domestication.

2. Animals are classified several different ways, such as binomial nomenclature, purpose, and characteristics of anatomy and physiology.

   - Apply a hierarchical organizational system to a food group.

3. All living organisms are classified using kingdom, phylum, class, order, family, genus, and species.

   - Determine the classification of the animal in their *Producer's Management Guide*.

4. Dichotomous keys are a classification tool used to identify objects based on their physical features.

   - Design a dichotomous key for the animal in their *Producer's Management Guide.*
   - Design a dichotomous key for five breeds related to the animal in their *Producer's Management Guide*.

5. Animal species were domesticated at different times throughout history for the benefit of the animals and humans.

   - Design a timeline recording the development and domestication of an animal species.

Optional Lesson 1.3 Livestock Across the United States

1. Livestock production occurs in different regions of the United States.

   - Develop a poster examining the characteristics of a livestock production region.
   - Explain how the resources available in different regions of the United States support and promote the production of animals.

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.

Unit 2 – Animal Handling and Safety

Lesson 2.1 Animal Rights or Animal Wrongs?

1. The beliefs of an individual influence the value humans place on live animals and the use of products derived from animals.

   - Discuss the differences in the interpretation of the meaning of the word value.
   - Assess their values to determine their beliefs about animal use.

2. Animal welfare and animal rights are different belief systems pertaining to the acceptable use of animals.

   - Determine their current opinions towards the beliefs of animal rightists and animal welfarists.

3. The use of animals for food and fiber sometimes creates ethical dilemmas for producers and consumers.

   - Recognize issues in animal agriculture and discuss the positive and negative impacts of each issue.
   - Analyze animal rights and animal welfare videos to determine the message and intent of each video.

4. Producers of animal products must consider the welfare of animals for maximum profitability.

   - Develop a Producer's Code of Care document for the humane use of a species of animal under their care.

Lesson 2.2 Manipulating Manners

1. Animals respond instinctively to stimuli and changes in their surroundings.

   - Investigate the behavior of pillbugs in response to stimuli.
   - Conduct an inquiry lab on the behaviors of pillbugs.

2. Animals exhibit both instinctive and learned behaviors.

   - Simulate instinctive behaviors for predator and prey animals.
   - Write a brief with annotated references to use as a preparatory guide about animal behavior and safety for farm tours and field trips.

3. Safe handling and restraint procedures protect the animal and handler.

   - Research and determine the typical behaviors of a species of animal and become familiar with the safe handling procedures of that animal.

Lesson 2.3 Home Sweet Home

1. Animal facilities differ based on food requirements, environmental factors, species, use, and size of operations.

   - Research the basic feed, water, and shelter requirements for animals.
   - Determine the average environmental conditions of the students' facility location.

2. Producers implement biosecurity practices to reduce the spread of pathogens on farms.

   - Experiment to determine the risk levels related to spreading pathogens in a farm scenario.
   - Observe and record culture growth.

3. Proper use of scale is important when designing animal facilities.

   - Experiment to determine the risk levels related to spreading pathogens in a farm scenario.

- Observe and record culture growth.
4. Animal facilities are designed to protect the safety and health of animals and handlers and should include biosecurity protocols.
    - Select an animal facility that provides safe handling and efficient production practices for animals.
    - Design and construct a model animal facility

Unit 3 – Cells and Tissues

Lesson 3.1 Units of Life

1. Animal cells are comprised of many parts that have essential functions for the survival of animal tissue.
    - Identify and label animal cell organelles.
    - Develop a pictorial representation of cell function.
    - Examine and compare plant and animal cells and their structures under a microscope.
2. Cells use water, oxygen, and glucose to produce energy and metabolic by-products of carbon dioxide and water.
    - Collect and analyze data to provide evidence of cell metabolism.
3. Cells use the processes of osmosis and diffusion for the uptake of water and dissolved nutrients required for metabolism and growth.
    - Observe molecules moving across a membrane in a simulation.
    - Conduct an experiment to simulate the process of osmosis in animal cells.

Lesson 3.2 Putting the Puzzle Together

1. External body parts of animals vary among different species and are important as reference tools for animal selection, health, and management.
    - Identify common external animal parts and explain the purpose of each.
    - Identify unique external parts specific for livestock and poultry species and explain the purpose of each part.
2. A collection of organized cells create tissue responsible for various life-sustaining functions.
    - Examine two types of muscle tissue and describe the differences.
3. The collection of epithelial, connective, muscle, and nerve tissues interact to perform specific functions within the body of an animal.
    - Dissect a chicken wing and identify epithelial and connective tissues.
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.
    - Dissect a chicken wing and observe how tendons and ligaments provide movement to the structure of the skeleton.
5. Multiple organs work together and form physiological systems.
    - Dissect a fetal pig and identify internal parts and organs that comprise systems.

Lesson 3.3 Breathing, Beating, and Body Control Centers

1. The respiratory and circulatory systems are closely related and essential for animal life.
    - Identify and explain the function of the parts of the respiratory and circulatory systems.
2. External respiration is a process of gas exchange between the lungs and blood.
    - Describe the process of gas exchange in external respiration.

- Determine the presence of carbon dioxide in exhaled air.

3. The circulatory system relies on the heart to pump blood throughout the body.

   - Design a travel brochure that highlights the flow of blood throughout the body.

4. Respiration and heart rates may be affected by external conditions, such as temperature and physical activity.

   - Conduct an inquiry on the effects of external conditions on respiration rate, pulse, and blood pressure.

5. The nervous, endocrine, and renal systems work together to transmit signals, secrete hormones, and filter wastes.

   - 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.

Unit 4 – Animal Nutrition

Lesson 4.1 Digestion Junction

1. Digestive systems vary among species of animals.

   - Define the terminology commonly used in digestive anatomy.
   - Match livestock species with the proper digestive system.

2. Ruminants have a four-chambered stomach consisting of the rumen, reticulum, omasum, and abomasum, each with a specific function.

   - Label, identify and explain the function of various parts of animal digestive systems.

3. Digestion systems break down, decompose, and absorb nutrients through mechanical, chemical, and biological processes.

   - Build a model of a digestive system.

Lesson 4.2 The Need for Feedstuffs

1. The six nutrient groups required by animals include water, carbohydrates, protein, fats, vitamins, and minerals.

   - Identify the six classes of nutrients, the function they serve in the body, and sources of each nutrient.

2. Animals derive nutrition from a variety of sources, including roughages and concentrates.

   - Classify feedstuffs as roughages, concentrates, and supplements.

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.

   - Categorize feedstuffs into the nutrient group each feedstuff provides.

4. The nutritional value of a feed can be determined through feed analysis.

   - Identify and define feed analysis terms.
   - Conduct a dry matter analysis for two feedstuff samples.
   - Conduct inquiry experiment to determine the energy in two feedstuff samples.

5. The specific nutritional requirements of individual animals are dependent upon species, age, and level of production.

   - Evaluate nutrient requirements of various animals at different stages of production.

6. Animals require nutrients from all six nutrient groups to thrive, survive, and reproduce.

   - Research and record the nutritional needs of an animal using Nutritional Requirement tables.

7. Feed labels are an important source of nutritional information.

- Read a feed label and interpret the information included on the label.
- Compare the information on a feed label to the information found on a food label.

Lesson 4.3 Nutritional Disorders

1. Animal growth, development, and health are directly related to meeting the nutrient requirements of the animal.

- Study the nutritional disorders of one species.
- Share nutritional disorders with the class.
- Examine supplement labels to substantiate nutritional disorders associated with feed nutrients.

2. Nutrient deficiencies in animals may result in poor performance and contribute to economic losses.

- Develop a reference for common nutritional disorders of many animals.

Lesson 4.4 What's for Dinner?

1. Livestock rations meet the requirements of animals, maximize feed efficiency, and minimize the cost of production.

- Describe the characteristics of a good ration.
- List the steps in balancing a ration.

2. Using mathematics and problem solving are important skills for animal producers when formulating rations.

- Complete conversions of feedstuffs from a dry-matter basis to an as-fed basis.

3. The animal industry uses mathematical calculations to formulate rations.

- Use the Pearson Square to balance a ration using two feedstuffs.
- Formulate a ration and make a recipe using the Pearson Square.
- Develop a balanced ration for livestock by hand and by using a computer-based ration-balancing program.

Unit 5 – Animal Reproduction

Lesson 5.1 Where Do Calves Come From?

1. Male and female reproductive systems differ in structure and function.

- Identify and label the parts of mammalian male and female reproductive tracts.

2. The basic female reproductive system for both mammals and avians includes the ovary, infundibulum, oviducts, uterus, and vagina.

- Identify and label the parts of the avian female reproductive tract.
- Dissect a mammalian female reproductive tract and identify parts within the tract.
- Observe and compare the reproductive tracts of cows, sows, and ewes.
- Describe the path of an egg from the ovary to birth.

3. The mammalian male reproductive system consists of testes, scrotum, epididymis, vas deferens, prostate gland, Cowper's gland, seminal vesicle, urethra, and penis.

- Observe a dissection of a mammalian male reproductive tract and identify the parts within the tract.
- Draw a flow chart to show the process of sperm maturation.

Lesson 5.2 The Pathway to Production

1. Understanding of the estrus cycle and hormonal control is essential for reproductive success.

    - Identify the main hormones of the estrous cycle and graph the levels of each hormone throughout the cycle.

2. The reproductive cycle of females consists of puberty, the estrous cycle, gestation, parturition, and lactation.

    - Research and record reproductive facts regarding the species of the animal identified in the *Producer's Management Guide*.

3. The potential fertility and viability of semen may be determined based on its motility, morphology, and concentration.

    - Prepare slides using a variety of buffers and stains.
    - Evaluate semen samples for sperm motility, morphology, and concentration.

4. Four main breeding methods commonly chosen by producers when breeding livestock have advantages and disadvantages.

    - Distinguish between the different livestock breeding systems.
    - Understand the advantages and disadvantages of breeding methods.

5. The breeding season of animals may be manipulated for economic gain.

    - Determine the best time to breed an animal and manage the breeding season.

Unit 6 – Genetics

Lesson 6.1 A New Pair of Genes

1. Mitosis has five distinct phases necessary for cell division.

    - Prepare a slide to examine mitosis in plant tissue.
    - Examine a prepared slide of animal mitosis and make observations of the stages of mitosis.

2. Eggs, or ova, and sperm undergo meiosis and mitosis for the development of new cell tissue.

    - Sketch and label cells depicting meiosis.

3. Egg cell fertilization requires the joining of genetic material in the form of gametes from both male and female parents.

    - Write a paragraph describing what occurs during fertilization.

4. Dominant and recessive genes determine the phenotypic characteristics of animals.

    - Perform computer simulations related to genetic heritage to learn about the role genetics plays in animal production.

5. Genetic traits, such as coat color, muscling, and horns, are passed from one generation to the next.

    - Simulate *Drosophila* mating to study the role genetics plays in animal production.

6. Genetic variations among species occur due to exceptions to the law of dominance.

    - Conduct a trial to test the probability of codominance.

7. Some animals phenotypic characteristics are expressed as sex-linked traits.

    - Perform computer simulations to predict sex-linked traits in drosophila.

Lesson 6.2 Predicting Genetic Inheritance

1. Punnett Squares predict qualitative traits inherited from a single gene pair.

    - Use Punnett Squares to predict the probability of genetic frequencies.
    - Complete a Punnett Square with a dihybrid cross.

2. Producers use ratios to compare animals within a contemporary group.

   - Calculate a contemporary group ratio.
3. Expected Progeny Differences (EPDs) are utilized by producers to select animals for heritable traits.

   - Compare animals based on their expected EPDs.
4. Quantitative traits are inherited through multiple gene pairs and can be affected by the environment.

   - Evaluate the quantitative traits of livestock using EPDs.
5. Economically relevant traits can be predictably changed through genetic improvement by selective breeding using EPDs.

   - Use EPDs in mating decisions.
6. Pedigrees contain important information for examining genetic history.

   - Trace genetic inheritance through a pedigree.

Optional Lesson 6.3 Evolutionary Ideas

1. Animals today have descended from common ancestors.

   - Study the process used to determine the common ancestors of species.
   - Diagram a cladogram of seven types of animals.
2. Natural selection is an involuntary process of evolution where species adapt to their environment.

   - Conduct an experiment on the process of natural selection using the peppered moth.
3. The diversity of organisms is the result of billions of years of evolutionary adaptation.

   - Determine the types of selection that occur in certain environments.
4. Genetic mutations are separate events that can lead to change in the characteristics of a species.

   - Determine the evolutionary path of a species of animal.

Unit 7 – Animal Health

Lesson 7.1 Diseased!

1. Animal caretakers observe vital signs, which vary among species, to identify health or illness.

   - Research and record the vital signs of an animal.
   - Assess vital signs of an animal.
2. Bacteria, viruses, fungi, protozoa, and prions cause infectious diseases.

   - Identify and sketch bacteria, mold, and protozoa from prepared slides.
3. Vectors and fomites are ways of spreading disease agents.

   - Simulate the spread of a contagious disease and trace the route the disease takes through a population.
4. Veterinarians and caretakers diagnose diseases through observation of symptoms and physical examinations.

   - Research and record key facts and symptoms of two animal-related diseases.
   - Determine what disease an animal has from case studies.
5. Regulatory agencies are responsible for disease prevention and control.

   - Research governmental regulatory agencies and identify primary purposes and responsibilities each agency has regarding disease prevention and control.
   - Argue the role of a regulatory agency in a disease-outbreak scenario.

Lesson 7.2 Bugged!

1. A livestock producer's knowledge of parasite life cycles can aid in parasite control and prevention.

   - Identify and diagram the life cycle of a common parasite.
   - Classify parasites according to their phylum and site of infestation on the body.
   - Dissect product labels for common dewormers.

2. There are multiple methods to determine the presence of parasitic eggs in an animal, of which the laboratory is the most accurate.

   - Prepare slides and observe to determine the presence of parasite eggs.

Lesson 7.3 Pathogens Prevented

1. Disease prevention, morally and economically warranted, includes vaccination, sanitation, ventilation, and nutrition.

   - Demonstrate the proper procedures for filling a syringe to administer medication.
   - Administer intramuscular and subcutaneous shots.
   - Produce an observation tool to use in comparing symptoms of health to symptoms of poor health for their animal.
   - Plan preventative care for their animal.

2. Record keeping is important in scheduling and administering preventative medications.

   - Design a record-keeping system for medications and vaccines for their animal.

3. Vaccines are available for many common diseases.

   - List common diseases and parasites as well as preventative controls related to their animals.

Unit 8 – Animal Products, Selection, and Marketing

Lesson 8.1 The Products of Our Toil

1. The primary purpose of livestock production is food and fiber.

   - Research an animal product and develop a presentation on that animal product.
   - Work as a team to prepare and present a class lecture.

2. Grading is used to provide consistent and palatable food products.

   - Conduct sensory evaluation trials on meat samples and evaluate the samples.
   - Taste milk samples and determine the defects, if present.
   - Identify samples of cheese based on appearance and taste.
   - Grade eggs based on their interior qualities using the candling and breakout methods.

Lesson 8.2 In Search of the Ideal Animal

1. Criterion-based selection establishes priorities and provides consistency when evaluating animal conformation for specific species and purposes.

   - Make decisions based on given priorities and criteria, and analyze objects as they compare ideal criteria.

2. Producers use qualitative and quantitative comparison of live animals to predict value in the marketplace.

   - Research and identify the most-used priorities for evaluating an animal within that animal industry.
   - Write, illustrate, and publish a children's storybook on how to select an animal.

3. Offspring performance may be predicted and improved by selecting animals based on performance records.

- Determine and recommend most appropriate sires using Expected Progeny Differences.

Lesson 8.3 Value Added

1. The four elements of marketing are product, price, place, and promotion.

   - Compare similar products based on their features, pricing, distribution, and promotion.

2. Brand name recognition, niche marketing, and value-added products increase the value of a good.

   - Determine a target market and potential products based on the local community.
   - Develop a plan to market a product from their project for the *Producer's Management Guide*.

3. A solid marketing plan is necessary to increase the value and sales of a product and move goods from producer to consumer.

   - Work on a team to determine a market for a product in an appropriate local marketplace.