

Fundamentals of Animal Science Syllabus

RCAS Policies/Procedures

Students will be required to follow all RCAS policies and procedures. To view the RCAS High School Student Handbook, click [handbook](#).

Course Description

The primary goal of the *Principles of Agricultural Science – Animal (ASA)* curriculum is to expose students to agriculture, animal science, and related career options. Throughout the course, students investigate the consumer perceptions and preferences related to animals in local, regional, and global markets. Students gain knowledge and skills related to animal anatomy, physiology, behavior, nutrition, reproduction, health, selection, and marketing through hands-on activities, projects, and problems. By mimicking work similar to that of animal science specialists, such as industry personnel, livestock producers, veterinarians, and zoologists, students learn to document work, solve problems, and communicate solutions to peers and members of the professional community.

In addition, students encounter connections between animal science lessons and Supervised Agricultural Experience and FFA opportunities for experiential learning and leadership development.

Grading

Grading: All grades are based on a 10 point grading scale.

Grading Scale: (100% - 90% A) (89% - 80% B) (79% - 70% C) (69% - 60% D) (59% - 0% F)

Grades will be based on student learning evaluation using performance objectives, rubrics, check for understanding, labs & student notebooks with daily work.

Textbook

Reading

Optional Reading

Animal in Translation, Temple Grandin

Instructional Resources

Canvas

CASE (Curriculum for Agricultural Education, Principles of Agricultural Science - Animal

Essential Questions

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

- Organization and record-keeping are important to the success of an agricultural business.
- Career opportunities exist in animal agriculture for all levels of education in the areas of production, processing, marketing, and regulation.
- 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.
- **Optional Lesson 1.3 Livestock Across the United States**
- Livestock production occurs in different regions of the United States.
- Characteristics, such as climate, land price, population, industry infrastructure, feed resources, and transportation systems influence where commercial animals are produced in the United States.
- The beliefs of an individual influence the value humans place on live animals and the use of products derived from animals.
- Animal welfare and animal rights are different belief systems pertaining to the acceptable use of animals.
- The use of animals for food and fiber sometimes creates ethical dilemmas for producers and consumers.
- Producers of animal products must consider the welfare of animals for maximum profitability.
- Animals respond instinctively to stimuli and changes in their surroundings.
- Animals exhibit both instinctive and learned behaviors.
- Safe handling and restraint procedures protect the animal and handler.
- Animal facilities differ based on food requirements, environmental factors, species, use, and size of operations.
- Producers implement biosecurity practices to reduce the spread of pathogens on farms.
- Proper use of scale is important when designing animal facilities.
- Animal facilities are designed to protect the safety and health of animals and handlers and should include biosecurity protocols.
- Animal cells are comprised of many parts that have essential functions for the survival of animal tissue.
- Cells use water, oxygen, and glucose to produce energy and metabolic by-products of carbon dioxide and water.
- Cells use the processes of osmosis and diffusion for the uptake of water and dissolved nutrients required for metabolism and growth.
- External body parts of animals vary among different species and are important as reference tools for animal selection, health, and management.
- A collection of organized cells create tissue responsible for various life-sustaining functions.
- The collection of epithelial, connective, muscle, and nerve tissues interact to perform specific functions within the body of an animal.
- 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.
- Multiple organs work together and form physiological systems.
- The respiratory and circulatory systems are closely related and essential for animal life.

- External respiration is a process of gas exchange between the lungs and blood.
- The circulatory system relies on the heart to pump blood throughout the body.
- Respiration and heart rates may be affected by external conditions, such as temperature and physical activity.
- The nervous, endocrine, and renal systems work together to transmit signals, secrete hormones, and filter wastes.
- Digestive systems vary among species of animals.
- Ruminants have a four-chambered stomach consisting of the rumen, reticulum, omasum, and abomasum, each with a specific function.
- Digestion systems break down, decompose, and absorb nutrients through mechanical, chemical, and biological processes.
- The six nutrient groups required by animals include water, carbohydrates, protein, fats, vitamins, and minerals.
- Animals derive nutrition from a variety of sources, including roughages and concentrates.
- 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.
- The nutritional value of a feed can be determined through feed analysis.
- The specific nutritional requirements of individual animals are dependent upon species, age, and level of production.
- Animals require nutrients from all six nutrient groups to thrive, survive, and reproduce.
- Feed labels are an important source of nutritional information.
- Animal growth, development, and health are directly related to meeting the nutrient requirements of the animal.
- Nutrient deficiencies in animals may result in poor performance and contribute to economic losses.
- Livestock rations meet the requirements of animals, maximize feed efficiency, and minimize the cost of production.
- Using mathematics and problem solving are important skills for animal producers when formulating rations.
- The animal industry uses mathematical calculations to formulate rations.
- Male and female reproductive systems differ in structure and function.
- The basic female reproductive system for both mammals and avians includes the ovary, infundibulum, oviducts, uterus, and vagina.
- The mammalian male reproductive system consists of testes, scrotum, epididymis, vas deferens, prostate gland, Cowper's gland, seminal vesicle, urethra, and penis.
- Understanding of the estrus cycle and hormonal control is essential for reproductive success.
- The reproductive cycle of females consists of puberty, the estrous cycle, gestation, parturition, and lactation.
- The potential fertility and viability of semen may be determined based on its motility, morphology, and concentration
- Four main breeding methods commonly chosen by producers when breeding livestock have advantages and disadvantages.
- The breeding season of animals may be manipulated for economic gain.
- Mitosis has five distinct phases necessary for cell division.
- Eggs, or ova, and sperm undergo meiosis and mitosis for the development of new cell tissue.
- Egg cell fertilization requires the joining of genetic material in the form of gametes from both male and female parents.

- Dominant and recessive genes determine the phenotypic characteristics of animals.
- Genetic traits, such as coat color, muscling, and horns, are passed from one generation to the next.
- Genetic variations among species occur due to exceptions to the law of dominance.
- Some animals phenotypic characteristics are expressed as sex-linked traits.
- Punnett Squares predict qualitative traits inherited from a single gene pair.
- Producers use ratios to compare animals within a contemporary group.
- Expected Progeny Differences (EPDs) are utilized by producers to select animals for heritable traits.
- Quantitative traits are inherited through multiple gene pairs and can be affected by the environment.
- Economically relevant traits can be predictably changed through genetic improvement by selective breeding using EPDs.
- Pedigrees contain important information for examining genetic history.
- Animals today have descended from common ancestors.
- Natural selection is an involuntary process of evolution where species adapt to their environment.
- The diversity of organisms is the result of billions of years of evolutionary adaptation.
- Genetic mutations are separate events that can lead to change in the characteristics of a species.
- Animal caretakers observe vital signs, which vary among species, to identify health or illness.
- Bacteria, viruses, fungi, protozoa, and prions cause infectious diseases.
- Vectors and fomites are ways of spreading disease agents.
- Veterinarians and caretakers diagnose diseases through observation of symptoms and physical examinations.
- Regulatory agencies are responsible for disease prevention and control.
- A livestock producer's knowledge of parasite life cycles can aid in parasite control and prevention.
- There are multiple methods to determine the presence of parasitic eggs in an animal, of which the laboratory is the most accurate.
- Disease prevention, morally and economically warranted, includes vaccination, sanitation, ventilation, and nutrition.
- Record keeping is important in scheduling and administering preventative medications.
- Vaccines are available for many common diseases.
- The primary purpose of livestock production is food and fiber.
- Grading is used to provide consistent and palatable food products.
- Criterion-based selection establishes priorities and provides consistency when evaluating animal conformation for specific species and purposes.
- Producers use qualitative and quantitative comparison of live animals to predict value in the marketplace.
- Offspring performance may be predicted and improved by selecting animals based on performance records.
- The four elements of marketing are product, price, place, and promotion.
- Brand name recognition, niche marketing, and value-added products increase the value of a good.
- A solid marketing plan is necessary to increase the value and sales of a product and move goods from producer to consumer.

Essential Learning Intentions

1. Agriculture, food, and natural resources systems produce the food, fiber, and fuel that are essential to daily life as well as contribute to the nation's economic wealth.
2. Individuals who pursue a program of study in agricultural education will benefit from leadership development, personal growth, and career exploration.
3. Agriculture is a science that contributes to the development, improvement, and sustainability of living things.
4. Agricultural education establishes a relevant setting for the application of mathematical practices and principles.
5. Effective interpersonal communication skills facilitate group processes and aid in solving complex problems and the achievement of common goals.
6. Reading and writing interpretation skills are necessary for educational and professional development.
7. Safety is an attitude of personal responsibility that must be practiced in the agricultural classroom, laboratory, shop, greenhouse, and facilities.
8. Inquiry activities are important in the practice of scientific processes and in the world of research.
9. The use of technology and computer applications is critical to modern agricultural practices.
10. Consideration of the ethical, environmental, social, and economic impacts of agricultural practices is essential to being a responsible, involved citizen.
11. Individuals involved with the processes of agricultural production must perform specific technical skills proficiently.
12. Critical thinking involves using a variety of problem-solving techniques in real-life contexts.