Secondary Curriculum Maps

Cumberland Valley School District
Soaring to Greatness, Committed to Excellence

Animal Science

The purpose of CASE Principles of Agricultural Science – Animal course is to expose students to the world of agriculture, plant science, and career options. The course is structured to enable all students to have a variety of experiences that will provide an overview of the field of agricultural science with a foundation in animal science so that students may continue through a sequence of courses through high school. Students' experiences will involve the study of animal anatomy, behavior, nutrition, reproduction and health. Throughout the course, students will consider the perceptions, ethics and preferences of individuals within local, regional and world markets. Students will explore hands-on projects and activities to learn the characteristics of animal science and work on major projects and problems similar to those that animal science specialists, such as veterinarians, zoologists, livestock producers or industry personnel face in their respective careers. The knowledge and skills students develop will be used in future courses within the CASE program.

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Course Description

The major focus of the *Principles of Agricultural Science – Animal* (ASA) course is to expose students to the world of agriculture, animal science, and career options. Students participating in the *ASA* course will have experiences in various animal science concepts with exciting hands-on activities, projects, and problems. Students' experiences will involve the study of animal anatomy, physiology, behavior, nutrition, reproduction, health, selection, and marketing. For example, students will acquire skills in meeting the nutritional needs of animals while developing balanced, economical rations. Throughout the course, students will consider the perceptions and preferences of individuals within local, regional, and world markets.

Students will explore hands-on projects and activities to learn the characteristics of animal science and work on major projects and problems similar to those that animal science specialists, such as veterinarians, zoologists, livestock producers, and industry personnel, face in their respective careers.

In addition, students will understand specific connections between animal science lessons and Supervised Agricultural Experience and FFA components that are important for the development of an informed agricultural education student. Students will investigate, experiment, and learn about documenting a project, solving problems, and communicating their solutions to their peers and members of the professional community.

The ASA course of study includes:

- Background and Social Issues of Animal Science
- Anatomy and Physiology
- Nutrition
- Reproduction
- Genetics
- Animal Health
- Animal Selection

CASE
Curriculum for Agricultural Science Education

Principles of Agricultural Science – Animal Detailed Course Outline

Unit 1 – Worlds of Opportunity

Lesson 1.1 Animal Planet

1. Animals are used to sustain human existence by providing many essential products.
2. Animals serve many purposes in the lives of humans.
3. Career opportunities exist in animal agriculture for all levels of education in the areas of production, processing, marketing, and regulation.

Unit 2 – History and Use of Animals

Lesson 2.1 Taming Animals

1. Animal species were domesticated at different times throughout history using different methodologies.
2. Humans benefit from the domestication of animals.
3. Domesticated animals receive their basic needs, such as water, feed, and shelter, from humans.
4. Domestication of animals is achieved through breeding, handling, and training.

Lesson 2.2 Naming Animals

1. All living organisms are classified using kingdom, phylum, class, order, family, genus, and species.
2. Animals are classified several different ways, such as binomial nomenclature, purpose, and characteristics of anatomy and physiology.
3. There are different breeds of animals with common ancestors that have defining characteristics displayed in offspring.
4. Dichotomous keys are a classification tool that can be used to identify objects based on their physical features.

Unit 3 – Animal Handling and Safety

Lesson 3.1 Animal Rights or Animal Wrongs?

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

2. The value humans place on live animals and the use of products derived from animals is influenced by the beliefs of an individual.
3. The use of animals for food and fiber sometimes create ethical dilemmas for producers and consumers.
4. Producers of animal products must consider the welfare of animals during the production process.
5. Profitability is maximized when animals are properly managed.

Lesson 3.2 Manipulating Manners

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.

Lesson 3.3 Home Sweet Home

1. Animals require food, shelter, and water for survival.
2. Animal facilities differ based on environmental factors, species, use, and size of operations.
3. Animal facilities are designed to protect the safety and health of animals and handlers.
4. Animal facilities should include biosecurity precautions.
5. Biosecurity practices are implemented to reduce the spread of pathogens on farms.
6. Safe laboratory procedures include reading and following all instructions, wearing proper personal protective equipment, and cleaning up thoroughly when finished.

Unit 4 – Cells and Tissues

Lesson 4.1 Units of Life

1. Animal cells share similarities and differences with plant cells.
2. Cell organelles can only be seen using a microscope.
3. There are many different classifications of cells based on their utility.
4. Cells use water, oxygen, and glucose to produce energy and metabolic by-products of carbon dioxide and water.
5. Cells use the processes of osmosis and diffusion for the uptake of water and dissolved nutrients required for metabolism and growth.

Lesson 4.2 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.
2. A collection of organized cells create tissue responsible for various life sustaining functions.

3. 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.
4. The collection of epithelial, connective, muscle, and nerve tissues in an organ interact to perform specific functions within the body of an animal.
5. Multiple organs work together and form physiological systems.

Lesson 4.3 Breathing and Beating

1. The respiratory and circulatory systems are closely related and essential for animal life.
2. External respiration is a process of gas exchanges between the lungs and blood.
3. The circulatory system relies on the heart to pump blood throughout the body.
4. Respiration and heart rates may be affected by external conditions, such as temperature and physical activity.

Lesson 4.4 Body Control Centers

1. The nervous system, which is the information control center of the body, uses the central nervous system and the peripheral nervous system to transmit messages.
2. The endocrine system secretes hormones that regulate, stimulate, or inhibit activities within the body.
3. The renal system filters wastes produced in the cells and removes them from the body.
4. Body systems work in harmony to maintain the essential processes needed to sustain life.

Unit 5 – Animal Nutrition

Lesson 5.1 Digestion Junction

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 and absorption is accomplished through a process of mechanical, chemical, and biological decomposition of food by the organs of monogastric, ruminant, pseudo-ruminant, and avian digestive systems.
4. Diet of an animal is determined by its type of digestive system.

Lesson 5.2 The Need for Feed

1. The six nutrient groups all animals require include water, carbohydrates, protein, fats, vitamins, and minerals.
2. Animals require nutrients from all six nutrient groups to thrive, survive, and reproduce.

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

Lesson 5.3 Feedstuffs

1. Animals derive nutrition from a variety of sources including roughages and concentrates.
2. 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.
3. The nutritional value of a feed can be determined through feed analysis.
4. Feed labels are an important source of nutritional information.

Lesson 5.4 Nutritional Disorders

1. Animal growth, development, and health are directly related to meeting nutrient requirements of the animal.
2. A deficiency or toxicity of one or more nutrients may result in poor growth and performance.
3. Animals at various stages of growth and development have different nutrient requirements.
4. Nutrient deficiencies in animals may result in poor performance and contribute to economic losses.

Lesson 5.5 What's for Dinner?

1. Livestock rations are developed to meet the requirements of animals, maximize feed efficiency, and minimize cost of production.
2. Concentrates and roughages form the bulk of a ration.
3. Rations can be formulated using a variety of methods.
4. Supplements are used to complete a ration in order to meet the nutritional requirements of an animal.
5. Using mathematics and problem solving are important skills for animal producers when formulating rations.

Unit 6 – Animal Reproduction

Lesson 6.1 Mom, Where Do Calves Come From?

1. Male and female reproductive systems differ in structure and function.
2. The female reproductive system consists of the ovary, infundibulum, fallopian tubes (oviducts), uterus, cervix, vagina, and vulva.
3. The male reproductive system consists of testes, scrotum, epididymis, vas deferens, prostate gland, Cowper's gland, seminal vesicle, urethra, and penis.

Lesson 6.2 Generating Generations

1. Straight breeding is used to produce purebred breeding stock while crossbreeding is used to produce vigorous market animals.

2. There are four breeding methods a livestock producer may choose when breeding livestock, which have advantages and disadvantages.
3. Artificial insemination and embryo transfer allow producers to improve the genetics of their animals more efficiently.
4. Cloning is possible in livestock, but not practical or widely used at present.
5. The potential fertility and viability of semen may be determined based on its motility, morphology, and concentration.

Lesson 6.3 The Pathway to Production

1. Reproductive processes vary by species of animal.
2. The reproductive cycle of females consists of puberty, the estrous cycle, gestation, parturition, and lactation.
3. Understanding of the estrus cycle and hormonal control is essential for reproductive success.
4. The breeding season of animals may be manipulated for economic gain.

Unit 7 – Genetics

Lesson 7.1 A New Pair of Genes

1. Fertilization of egg cells requires the joining of genetic material in the form of gametes from both male and female parents.
2. Eggs, or ova, undergo meiosis and mitosis for development of new cell tissue.
3. Mitosis has five distinct phases necessary for cell division.
4. Genetic traits, such as coat color, muscling, and horns are passed from one generation to the next by discreet units called genes.
5. Economically relevant traits can be predictably changed through genetic improvement by selective breeding.
6. Dominant and recessive genes determine the phenotypic characteristics of animals.
7. Some animals' phenotypic characteristics are expressed as sex-links traits.

Lesson 7.2 Predicting Genetic Inheritance

1. Genetic inheritance may be from a single gene pair, which is called a qualitative trait or through multiple gene pairs, which is called a quantitative trait.
2. Punnett Squares are used to predict the probability of inheriting qualitative traits.
3. Ratios are used to compare animals within a contemporary group.
4. Quantitative traits are a combination of heritable traits and the environment in which the animals are raised.
5. Expected Progeny Differences are utilized by producers to select animals for heritable traits.

6. Pedigrees contain important information for examining genetic history.

Unit 8 – Animal Health

Lesson 8.1 Popular Pathogens

1. Diseases are transmitted in a variety of ways.
2. Infectious disease agents can be spread by vectors and fomites.
3. Infectious diseases are caused by bacteria, viruses, fungi, protozoa, and prions.
4. Animal health management results in limiting disease and maximizing production.

Lesson 8.2 Diseased!

1. Signs of good health and poor health are used to identify illnesses.
2. The vital signs of animals vary among species.
3. Diseases are diagnosed through observation of symptoms and physical examinations.

Lesson 8.3 Bugged!

1. External parasites live on and in the skin of an animal at the expense of the host.
2. Internal parasites live in the organs of an animal at the expense of the host.
3. Knowledge of the life cycle of parasites can aid in their control.
4. Prevention and control of parasites is important in the production of agricultural, alternative, and companion animals.
5. There are multiple methods to determine the presence of parasite eggs in an animal, of which the laboratory is the most accurate.

Lesson 8.4 Pathogens Prevented

1. Disease prevention includes vaccination, sanitation, ventilation, and nutrition and is morally and economically warranted.
2. Vaccines are available for many common diseases.
3. Record keeping is important in scheduling and administering preventative medications.

Unit 9 – Animal Products, Marketing, and Selection

Lesson 9.1 The Products of Our Toil

1. The primary purpose of livestock production is food and fiber.
2. Grading is used to provide a consistent and palatable product.
3. Products may be categorized as fresh or processed.

4. Consumer demand drives production and availability of fresh and processed goods.

Lesson 9.2 In Search of the Ideal Animal

1. Criterion-based selection establishes priorities and provides consistency when evaluating animals.
2. Animal conformation is evaluated using priorities for each species and purpose of animal.
3. Producers use qualitative and quantitative comparison of live animals to predict value in the marketplace.
4. Offspring performance may be predicted and improved by selecting animals based on performance records.

Lesson 9.3 Value Added

1. The four elements of marketing are product, price, place, and promotion.
2. Marketing of agricultural products is necessary to move goods from producer to consumer.
3. Brand name recognition, niche marketing, and value-added products increase the value of a good.
4. A solid marketing plan is necessary to increase the value and sales of a product.

Optional Lessons

Lesson 2.3 Livestock across the United States

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

Lesson 7.3 Evolutionary Ideas

1. The diversity of organisms is the result of billions of years of evolutionary adaptation.
2. Animals today have descended from common ancestors.
3. Natural selection is an involuntary process of evolution where species adapt to their environment.
4. Genetic mutations are separate events that can lead to change in the characteristics of a species.