

Introduction to Animal Systems

8008 36 weeks

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Course Description

Suggested Grade Level: 9 or 10

Students develop competencies in each of the major areas of the Animal Systems career pathway including animal nutrition, reproduction, breeding, care, and management. Students also learn agricultural mechanics applicable to animal systems. As with all agricultural courses, students will be exposed to principles of leadership and opportunities within student organizations along with Supervised Agricultural Experience opportunities.

As noted in [Superintendent's Memo #058-17 \(2-28-2017\)](#), this Career and Technical Education (CTE) course must maintain a maximum pupil-to-teacher ratio of 20 students to one teacher, due to safety regulations. The 2016-2018 biennial budget waiver of the teacher-to-pupil ratio staffing requirement does not apply.

Task Essentials Table

Template material omitted: General material used to introduce the task list has been omitted.

For the indicated course(s):

- Tasks/competencies designated by plus icons (⊕) in the left-hand column(s) are essential
- Tasks/competencies designated by empty-circle icons (○) are optional
- Tasks/competencies designated by minus icons (⊖) are omitted
- Tasks marked with an asterisk (*) are sensitive.

8008	Tasks/Competencies
+	Identify the role of supervised agricultural experiences (SAEs) in agricultural education.
+	Participate in an SAE.
+	Identify benefits and responsibilities of FFA membership.
+	Describe leadership characteristics and opportunities as they relate to agriculture and FFA.
○	Apply for an FFA award, based on an SAE.
+	Identify marked safety areas.
+	Identify the location and use of eye wash stations.
+	Identify the location of the posted evacuation routes.
+	Locate and demonstrate knowledge of safety data sheets (SDS).
+	Demonstrate the safe use of chemicals.
+	Demonstrate the safe use of standard and metric hand tools.
+	Demonstrate the safe use of power tools.
+	Demonstrate the safe use of precision standard and metric measuring tools.
+	Demonstrate the safe use of personal protective equipment (PPE).
+	Demonstrate the safe use of fire protection equipment.
+	Demonstrate the safe use of equipment.
+	Demonstrate safe practices in the agricultural mechanics lab/workshop.
+	Demonstrate safe practices in handling livestock.
+	Describe animal science and the role of animals in society.
+	Identify basic livestock industry terminology.
○	Evaluate livestock, poultry, and dairy animals.
○	Outline procedures for fitting and showing livestock.
+	Differentiate between animal welfare and animal rights.
+	Assess county, state, and federal agencies that support the animal industry.
+	Interpret rules, policies, and regulations affecting the livestock industry.

<input checked="" type="checkbox"/>	Identify organizations that govern and influence the animal industry.
<input checked="" type="checkbox"/>	Identify environmental issues and regulations pertaining to the animal industry.
<input checked="" type="checkbox"/>	Identify parts and functions of the digestive system of a ruminant, a non-ruminant, and a pseudo-ruminant.
<input checked="" type="checkbox"/>	Identify the nutritional requirements of selected species.
<input checked="" type="checkbox"/>	Balance a ration for a selected animal.
<input checked="" type="checkbox"/>	Evaluate feedstuff for quality.
<input checked="" type="checkbox"/>	Identify parts and functions of the reproductive systems of a male and female animal of a selected species.
<input checked="" type="checkbox"/>	Explain reproduction management systems.
<input checked="" type="checkbox"/>	Explain the breeding of selected animals.
<input checked="" type="checkbox"/>	Maintain health and breeding records.
<input checked="" type="checkbox"/>	Evaluate the possible outcomes of genetic (monohybrid and dihybrid) crosses of animals.
<input checked="" type="checkbox"/>	Describe the types of animal diseases.
<input checked="" type="checkbox"/>	Describe internal and external parasites and their control methods.
<input checked="" type="checkbox"/>	Demonstrate various methods of preventative medicine and disease control.
<input checked="" type="checkbox"/>	Apply animal health practices.
<input checked="" type="checkbox"/>	Describe how to perform emergency first aid on animals.
<input checked="" type="checkbox"/>	Operate livestock tools and equipment.
<input checked="" type="checkbox"/>	Maintain equipment and facilities.
<input checked="" type="checkbox"/>	Discuss animal marketing techniques.
<input checked="" type="checkbox"/>	Complete farm income and expense record forms.
<input checked="" type="checkbox"/>	Demonstrate standard measurement techniques in animal systems.
<input checked="" type="checkbox"/>	Demonstrate drawing for agricultural mechanics as it relates to the Animal Systems pathway.
<input checked="" type="checkbox"/>	Demonstrate metalworking operations as they relate to the Animal Systems pathway.
<input checked="" type="checkbox"/>	Demonstrate woodworking operations as they relate to the Animal Systems pathway.
<input type="checkbox"/>	Demonstrate electrical operations as they relate to the Animal Systems pathway.

<input type="radio"/>	Demonstrate small-engine operations as they relate to the Animal Systems pathway.
<input type="radio"/>	Demonstrate plumbing operations as they relate to the Animal Systems pathway.

Legend: Essential Non-essential Omitted

Note: Competencies 39-43 have been added to ensure compliance with federal legislation: National FFA Organization's Federal Charter Amendments Act (Public Law 116-7, <https://www.congress.gov/116/plaws/publ7/PLAW-116publ7.pdf>). All inquiries may be sent to cte@doe.virginia.gov. Students are provided opportunities for leadership, personal growth, and career success. Instruction is delivered through three major components: classroom and laboratory instruction, supervised agricultural experience (SAE) program, and student leadership (FFA).

Curriculum Framework

Task Number 39

Identify the role of supervised agricultural experiences (SAEs) in agricultural education.

Definition

Identification should include

- defining an SAE program as *an opportunity for students to consider multiple careers and occupations in the agriculture, food, and natural resources (AFNR) industries, learn expected workplace behavior, develop specific skills within an industry, and apply academic and occupational skills in the workplace or a simulated workplace environment*
- researching the Foundational SAE
 - career exploration and planning
 - personal financial planning and management
 - workplace safety
 - employability skills for college and career readiness
 - agricultural literacy
- researching the Immersion SAE
 - entrepreneurship/ownership
 - placement/internships
 - research (experimental, analytical, invention)
 - school business enterprises
 - service learning
- developing a plan to participate in an SAE, based on personal and career goals
- researching available awards and degrees, based on SAE participation.

Teacher resource: [SAE Resources](#), National Council for Agricultural Education

Process/Skill Questions

- What are examples of SAEs related to this course and in the AFNR industries?
- Where can a copy of the Virginia SAE Record Book be found?
- What is an Immersion SAE?
- How does a placement/internship SAE differ from an ownership/entrepreneurship SAE?
- How does an SAE provide relevant work experience and contribute to the development of critical thinking skills?
- How is the SAE an extended individualized instructional component of a student's Career Plan of Study?
- How can an SAE be used to provide evidence of student growth and participation in authentic, work-related tasks?
- What are the four types of SAEs?
- What are the advantages of participating in work-based learning experiences and projects?
- How does one choose an appropriate SAE in which to participate?

Task Number 40

Participate in an SAE.

Definition

Participation should include

- developing, completing, or continuing a plan to participate in an SAE as a work-based learning experience, based on personal and career goals
- documenting experience, connections, positions held, and competencies attained, using the *Virginia SAE Record Book*
- researching available awards and degrees, based on SAE participation.

Teacher resources:

[FFA SAE](#)

[The Agricultural Experience Tracker](#)

[Virginia SAE Record Book](#)

Process/Skill Questions

- What are the advantages of participating in work-based learning experiences and projects?
- How do SAEs help prepare students for the workforce?
- What are some examples of SAEs in AFNR?

Exploring Leadership Opportunities through FFA

Task Number 41

Identify benefits and responsibilities of FFA membership.

Definition

Identification should include

- researching the responsibilities of FFA officers
- locating resources that guide participation in FFA ceremonies
- listing opportunities to participate in community improvement projects and career development events
- explaining significant events in FFA history.

Process/Skill Questions

- How does one become an FFA member?
- What is the FFA's mission and how does it accomplish its mission?
- What are the benefits of FFA membership?
- What are five FFA activities available through your chapter?
- What are some significant events in FFA history?

Task Number 42

Describe leadership characteristics and opportunities as they relate to agriculture and FFA.

Definition

Description should include

- examples of successful leaders
- leadership qualities often exhibited by leaders
- opportunities for leadership in FFA
- methods of conducting an effective meeting.

Process/Skill Questions

- Who are some successful leaders in agriculture?
- What qualities make a successful leader?
- Which leadership qualities do you have?
- Which qualities do you need to improve upon to become a successful leader?
- What is the difference between positive and negative leadership?

Task Number 43

Apply for an FFA award, based on an SAE.

Definition

Application should include

- identifying the type of award
- meeting all SAE criteria to be eligible for the award
- applying for an FFA degree or award.

Process/Skill Questions

- What are the benefits of winning an FFA award?
- What are the benefits and requirements of an FFA degree?
- What FFA awards are available?
- Where are the award applications and their criteria located?
- How are the FFA applications submitted?

Applying Safety Practices in the Agricultural Mechanics Lab/Workshop as it Relates to the Animal Systems Pathway

Task Number 44

Identify marked safety areas.

Definition

Identification should include describing and translating signage and special markings (e.g., floor paint) that identify work and caution areas.

Process/Skill Questions

- What are the different types of work zones?
 - How do you know if additional safety equipment or clothing is needed to enter a safety area?
 - How are walkways identified in the lab/workshop area?
-

Task Number 45

Identify the location and use of eye wash stations.

Definition

Identification should include describing the signage and operating procedures for the unit.

Process/Skill Questions

- What is the color of the sign that signifies an eye wash station?
 - When should you use an eye wash station?
 - What safety equipment provides additional eye protection?
-

Task Number 46

Identify the location of the posted evacuation routes.

Definition

Identification should include

- events that could trigger an evacuation
- the location and interpretation of the posted evacuation route
- the destination and procedures for evacuation.

Process/Skill Questions

- What route should be followed in the event of an evacuation?
 - Where is the evacuation route posted?
 - Why is it important to establish a meeting place in the case of an evacuation?
-

Task Number 47

Locate and demonstrate knowledge of safety data sheets (SDS).

Definition

Demonstration should include identifying

- the location of the sheets within the agricultural mechanics lab/workshop and the purpose they serve
- the administration's (ownership's) responsibility for workers' health and safety

- laws/regulations and practices affecting workers' health and safety
- health and safety hazards
- health and safety programs the responsibility for environmental stewardship
- environmental laws, regulations, and practices
- sustainability initiatives.

Process/Skill Questions

- What environmental concerns should an industry address?
- What environmentally friendly practices and resources are available to an industry?
- What methods can be used to motivate employees to become involved in effective health, safety, and environmental practices?

Task Number 48

Demonstrate the safe use of chemicals.

Definition

Demonstration should include the different types of solvents, soaps, cleaning solutions, fuel, oils, greases, specialty additives, chemical agents, pesticides, and gasses.

Demonstration should also emphasize the correct use, the hazards, and the precautions associated with each, in accordance with manufacturers' instructions and government regulations.

Process/Skill Questions

- Why is it important to read the manufacturer's directions when using chemicals?
- What may be the effects of using chemicals incorrectly?
- Where should chemicals be stored within the lab/workshop?
- What is an SDS?

Task Number 49

Demonstrate the safe use of standard and metric hand tools.

Definition

Demonstration should include the various types of hand tools (including specialty tools, fasteners, and measuring tools) used in agricultural mechanics. Demonstration should emphasize the correct use, the hazards, the precautions, and the maintenance procedures associated with each, in accordance with manufacturers' instructions and government regulations. Hand tools may include, but are not limited to,

- common end wrenches
- various socket set components
- various wrenches
- various screwdrivers

- various styles of pliers
- various hammers
- various punches and chisels
- specialty cutting tools (e.g., hack saw, tubing cutter, hand reamer, file)
- specialty electrical system tools (e.g., volt/ohmmeter, dwell/tachometer, continuity light, timing light, remote starter switch)
- battery specialty tools (e.g., cable puller, terminal and post cleaner, battery lifting or carrying strap)
- lubrication specialty tools (e.g., transmission funnel, oil filter-removing tool, grease gun)
- other miscellaneous specialty tools (e.g., air nozzles, C-clamp, puller set, pressure gauge, screw extractor).

Process/Skill Questions

- Why is it important to use the proper hand tool for each job?
- When a wrench is used, why should it always be pulled toward the body?
- Why is it necessary to keep hand tools clean and free of grease?

Task Number 50

Demonstrate the safe use of power tools.

Definition

Demonstration should include the various types of power tools (including pneumatic and electric tools) encountered in agricultural mechanics.

Demonstration should emphasize the correct use, the hazards, the precautions, and the maintenance procedures associated with each, in accordance with manufacturers' instructions and government regulations. Power tools may include, but are not limited to,

- air impact gun
- air hammer
- air ratchet
- air drill
- drop light
- electric drill
- electric grinder
- finishing sander
- mitersaw
- reciprocating saw
- router
- sabersaw
- random orbit disc sander.

Process/Skill Questions

- What is the purpose of a dead man switch and/or kill switch on power tools? What is the purpose of an emergency stop (e-stop) or emergency power off (EPO) on power tools?
 - When should adjustments be made to power tools?
 - Why is training on the use of a power tool necessary before using it?
 - What are some examples of basic housekeeping standards, and why are they essential?
 - Why is it important to change saw blades when they begin to dull?
 - How are safety procedures similar for each piece of equipment? How are they different?
-

Task Number 51

Demonstrate the safe use of precision standard and metric measuring tools.

Definition

Demonstration should include micrometers, dial indicators, torque wrenches, and other manufacturers' specialty tools.

Process/Skill Questions

- How does heat affect the micrometer?
 - Why are standard and quality tools necessary when repairing agricultural machinery and equipment?
 - What is torque? Why is proper torque important?
-

Task Number 52

Demonstrate the safe use of personal protective equipment (PPE).

Definition

Demonstration should include

- using personal protective clothing and equipment (e.g., protection of the eyes, respiratory system, auditory functions, feet, hands, and body)
- using industry terminology, symbols, and procedures related to the operation of equipment
- maintaining appropriate grooming/hygiene (e.g., precautions related to hair length; loose clothing/jewelry; greasy hands, shoes, or clothing; dirty or scratched eye protection)
- observing all hazards and precautions when operating approved equipment, in accordance with manufacturers' instructions/guidelines and government regulations concerning hazardous material and lab safety.

Process/Skill Questions

- What hazards exist due to loose-fitting clothing or long hair?
 - When is it advisable to use goggles in an agricultural mechanics lab/workshop?
 - Would it ever be necessary to wear ear protection in an agricultural mechanics lab/workshop?
 - Why are steel-toed boots and shoes worn in agricultural mechanics labs/workshops?
 - What PPE should be worn in the lab or workplace?
-

Task Number 53

Demonstrate the safe use of fire protection equipment.

Definition

Demonstration should include

- different types of fires encountered in the agricultural science and mechanics field (Class A, B, C, and D)
- appropriate types of extinguishers to use with each fire
- hazards and the precautions associated with each
- fire emergency procedures that follow government regulations and instructor's guidelines.

Process/Skill Questions

- What are the different types of fire extinguishers?
 - Is the fire extinguisher in your lab/workshop appropriate for all types of fires? Explain.
 - What procedure should students follow in case of an emergency or accident?
-

Task Number 54

Demonstrate the safe use of equipment.

Definition

Demonstration should include the different types of equipment used in the agricultural mechanics field, along with the correct use, the hazards, and the precautions associated with each, in accordance with manufacturer's specifications and instructor's guidelines. Equipment could include, but is not limited to

- pneumatic equipment (e.g., tire machine, pneumatic jack)
- hydraulic equipment (e.g., floor jack, lift rack, hydraulic press, engine hoist)
- electrical equipment (e.g., bench grinder, drill press, jointer, planer, table saw, battery tester and charger).

Process/Skill Questions

- What criteria must be met prior to the use of any tool or equipment?
 - What are unsafe uses of air compressors in the agricultural lab/workshop?
 - What is the safest way to hold a part in a vise?
 - What should be disconnected prior to making any service adjustments to the planer or before changing blades?
 - Why is it essential to make sure that all guards on equipment are in place and securely fastened?
 - Why is it essential to keep the saw table and floor free of tools, wood stock scraps, sawdust, oil, and grease?
 - Why should saw blades be checked periodically for missing teeth and cracks?
 - Why is it essential to make sure that the saw guard, splitter (if available with the guard), anti-kickback device, and push stick are used for all possible sawing operations on a table saw?
 - Why is it important to never raise the saw blade more than 1/4 inch above the material being cut on a table saw?
 - What is the purpose of lowering the blade below the table top before leaving the table saw work area?
 - What are some safety symbols and warning signs commonly found in the lab or workplace?
-

Task Number 55

Demonstrate safe practices in the agricultural mechanics lab/workshop.

Definition

Demonstrating safe practices must include

- passing written tests with 100% accuracy on
 - general lab/workshop safety
 - safety and operating procedures for all tools, equipment, and machinery
 - the major parts of all tools, equipment, and machinery
- passing a proficiency/performance test with 100% accuracy for all tools, equipment, and machinery
- following manufacturer's instructions and reviewing safety manuals, when applicable
- following all safety guidelines and procedures when using tools, equipment, and machinery in the agricultural mechanics lab/workshop
- selecting appropriate personal protective equipment (PPE) for the operation of concern
- following the safety standards and regulations of the U.S. Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), the Equipment and Engine Training Council (EETC) Education Committee, and Safety Data Sheets (SDS).

Process/Skill Questions

- What information should be sent with emergency responders to the hospital with the student if a chemical is splashed in an eye or wound?
- Are state and national safety standards followed in school labs/workshops? Explain.
- What agency requires labs/workshops and businesses to use the services of companies such as Safety Clean?
- What are the dangers of running an engine in a confined space without proper ventilation?

- Why is it important to achieve 100% accuracy on tests regarding safety and operating procedures before using tools, equipment, and machinery?

Task Number 56

Demonstrate safe practices in handling livestock.

Definition

Demonstration should include

- awareness of livestock behavior (e.g., primal reflex reactions when they are threatened, in pain or under stress; defense of food, shelter, territory, and young)
- observation of livestock to determine their temperament (e.g., raised or pinned ears, raised tail, hair on the back, bared teeth, pawing the ground, and snorting)
- proper use of equipment
- proper use and maintenance of facilities
- remaining in control of potentially dangerous situations
- avoiding actions and situations that make the animals or the handler vulnerable to injury
- awareness of aggressive intact males
- awareness of females with young
- sanitary practices to prevent zoonoses (e.g., keeping facilities clean, testing, immunizing, and sanitary practices in animal handling).

Resource: [Livestock Safety](#), Dr. Steve Schmidt, Department of Animal Sciences, Auburn University

Process/Skill Questions

- Why is it important to understand stress in an animal as it relates to proper handling?
- Why is it important to understand livestock's panoramic vision as it relates to approaching them?
- How does noise impact the handling of livestock?
- How can moving objects disrupt livestock handling?
- How does sense of smell impact animal behavior?
- How can color and lighting have an adverse effect on animals being worked?
- How can poor facility planning and improper maintenance impact livestock behavior (e.g., clutter, sudden change in color and texture, flooring, drain grates)?
- Why is it important to understand animal behavior?
- What are the major causes of incidents involving animals?
- What are common problems that should be avoided when working an animal (e.g., horseplay, improper lifting, not enough help for the task)? Why?
- What precautions should be taken to reduce or eliminate risks with livestock?
 - wearing personal protective equipment (e.g., using eye protection and gloves in milking parlors because leptospira organisms can enter the body through eyes and open wounds)
 - protecting against zoonotic diseases
 - having sufficient bull-confinement and restraint facilities
 - having man-passes to allow handlers to get away from animals in an emergency
 - having pens, chutes, gates, fences, and loading ramps in proper working order
 - properly designed treatment stalls

- appropriate animal-restraint equipment
 - Do individual species (beef cattle, dairy cattle, horses, sheep, swine) require the use of specific PPE? Explain.
 - Do individual species require special handling procedures?
-
-

Exploring the Animal Industry

Task Number 57

Describe animal science and the role of animals in society.

Definition

Description should include animals used for service, companionship, work, medicine, clothing, recreation, food, and economic importance. It should also include their contributions to past and modern civilizations.

Process/Skill Questions

- What are the roles of service animals in a society?
- How do people use animals in a work role?
- Why are animals used in research?
- What types of recreational activities are animals used for?
- How did the domestication of animals contribute to advancements in societies?
- How do different countries or cultures define companion animals?
- How are animals used as resources?
- What kind of animals can be therapy animals? How are these animals utilized?
- What is an animal-assisted therapist?

Task Number 58

Identify basic livestock industry terminology.

Definition

Identification should include

- *bovine*
- *ovine*
- *caprine*
- *equine*

- *porcine*
- *avian*

as well as terms related to

- size
- gender
- breeds
- reproductive status
- production systems (conventional, organic, natural, cow/calf, etc.).

Process/Skill Questions

- Why is it important to understand terms commonly used in the animal industry?
- What are the origins for terms used to describe the size of a horse?
- Where did terms like *bovine*, *equine*, and *avian* originate?

Task Number 59

Evaluate livestock, poultry, and dairy animals.

Definition

Evaluation should include

- defining and using terms used in the livestock, poultry, and dairy cattle evaluation process to include
 - observing and analyzing physical characteristics
 - gathering information independently and through team collaboration
 - communicating the information orally
- classifying livestock according to the USDA grading system
- assessing desirable traits in market and breeding livestock and defending the livestock selection.

Evaluation should also include preparing and delivering results orally with regard to desirable selection, production, management, and marketing techniques for the following:

- Market Steer
 - Degree of muscling
 - Degree of finish
 - Growth capacity
 - Soundness and structural correctness
 - Balance
 - Frame size
- Poultry
 - Carcass evaluation (chickens or turkeys)
 - Egg interior and exterior quality
 - Boneless further processed products
 - Bone-in further processed products
 - Poultry carcass parts identification

- Live poultry evaluation (meat-type and egg-type)
- Dairy
 - Skills and information needed in dairy cattle selection and herd management
 - Physical characteristics of dairy cattle
 - Classes of dairy cattle

Process/Skill Questions

- What FFA Career Development Events (CDEs) are related to this task/competency?
 - Why is it important to understand how to evaluate livestock, poultry, and dairy cattle?
 - What are desirable traits in market and breeding livestock?
 - How does developing the ability to select livestock satisfy consumer demands, provide increased economic returns to producers, and meet the needs of the industry?
 - Why is it important to understand and interpret performance data based on industry standards?
-

Task Number 60

Outline procedures for fitting and showing livestock.

Definition

Outline should include

- fitting procedures and rules for local livestock shows
- ethics related to fitting livestock for shows.

Process/Skill Questions

- Why are ethics an important element in the fitting of livestock for shows?
 - In what livestock shows would you consider participating?
 - What equipment is necessary when fitting livestock animals?
-

Task Number 61

Differentiate between animal welfare and animal rights.

Definition

Differentiation will include the definitions of *animal welfare* and *animal rights*. It also includes identification of organizations that apply the ideals of each group's doctrine.

Process/Skill Questions

- What is animal welfare?
- What are animal rights?
- Why should people in animal systems be concerned about animal rights and animal welfare?
- What is the mission of animal control? What are their policies?
- What is the mission of humane societies? What are their policies?

Task Number 62

Assess county, state, and federal agencies that support the animal industry.

Definition

Assessment should include the purposes, funding sources, people served, and actions taken by the different agencies.

Process/Skill Questions

- What agencies are involved in the animal industry?
- Why do governments fund agencies that support the animal industry?
- What are the responsibilities of each agency?
- Why would agencies need funding?
- What county regulations are in place for housing livestock?

Task Number 63

Interpret rules, policies, and regulations affecting the livestock industry.

Definition

Interpretation should include the purpose, definitions, and enforcement of the rules, policies, and regulations.

Process/Skill Questions

- How are agricultural issues raised before becoming legislation?
- What rules govern the livestock industry?
- What policies and regulations affect the livestock industry?
- How are rules, policies, and regulations enforced?

Task Number 64

Identify organizations that govern and influence the animal industry.

Definition

Identification should include

- Virginia Farm Bureau
- United States Department of Agriculture (USDA)
 - Farm Service Agency (FSA)
 - National Agricultural Statistics Service (NASS)
 - Animal and Plant Health Inspection Service (APHIS)
- Farm Credit
- Virginia Department of Agriculture and Consumer Services (VDACS)
- Virginia Department of Game and Inland Fisheries (VDGIF)
- breed associations
- industry associations.

Process/Skill Questions

- What is the role of the USDA?
- What agricultural organizations support the National FFA Organization and in what way?
- What are some examples of breed organizations?
- Which organizations offer assistance with starting an animal industry?
- How does VDACS institute regulations?
- What cybersecurity issues might be addressed by these organizations?

Task Number 65

Identify environmental issues and regulations pertaining to the animal industry.

Definition

Identification should include

- waste management
- pasture management
- manure management
- contamination of ground and surface waters (e.g., ammonia, nitrogen, phosphorus, organic matter, micronutrients, disease causing organisms)
- the greenhouse effect
- air quality impact (e.g., methane, ammonia, carbon dioxide, hydrogen sulfide)
- microbial breakdown of organic compounds and how it impacts water quality and biochemical oxygen demand (BOD)
- water use (e.g., options for handling milking center and feedlot wastewater)
- antibiotics in the environment and antibiotic resistance
 - prescription
 - over-the-counter
 - water soluble
 - feed.

Process/Skill Questions

- What are the waste management regulations in your area?
- How can the manure generated from livestock and poultry farms contaminate surface and ground water? What are the environmental concerns and implications of each type of contamination?
- What are bio aerosols? How do they become airborne? How do they cause human and animal diseases and microbial toxins?
- How does the anaerobic decomposition of manure during storage produce methane, a greenhouse gas?
- How can water use be reduced?
- What is the argument against antibiotic use in the animal industry?
- What regulations are instituted on local farms during drought?
- How should pastures with given livestock (e.g., cattle, sheep) be managed to mitigate environmental issues?

Using Basic Scientific Skills in Animal Nutrition

Task Number 66

Identify parts and functions of the digestive system of a ruminant, a non-ruminant, and a pseudo-ruminant.

Definition

Identification should include all parts of each digestive system and their functions respective to the appropriate system.

Process/Skill Questions

- How does a ruminant system differ from a non-ruminant system?
- What is a pseudo-ruminant system?
- How does the type of digestive system affect what an animal can eat?
- How does an animal's diet affect its production?

Task Number 67

Identify the nutritional requirements of selected species.

Definition

Identification should include

- water
- protein
- carbohydrates
- fats

- vitamins
- minerals

and their functions in an animal's diet.

Process/Skill Questions

- Why is water essential to animals?
- What is the role of protein in an animal's diet?
- What are an animal's energy sources?
- What are the nutritional requirements at different stages of life?
- What are macro minerals? Micro minerals?

Task Number 68

Balance a ration for a selected animal.

Definition

Balancing should include calculating the proper amounts of protein, carbohydrates, fats, vitamins, and minerals to meet the nutritional requirements of the selected animal.

Process/Skill Questions

- How many calories should this animal eat in a day?
- What percentage of the ration should be carbohydrates?
- How much fat does this animal need?
- What is the Pearson's square? How is it used to balance a ration?
- What are some sources of crude protein for livestock rations?

Task Number 69

Evaluate feedstuff for quality.

Definition

Evaluation should include nutritional value, palatability, and toxicity.

Process/Skill Questions

- What characteristics of feedstuff determine its quality?
- Why is palatability important?
- What can make feedstuff toxic? What measures can be taken to reduce the risks of toxins in feedstuff?
- Why are feed labels important?
- Why is feed analysis important?
- How does pasture maintenance/management affect feedstuff quality?

Describing Basic Scientific Skills in Animal Reproduction and Breeding

Task Number 70

Identify parts and functions of the reproductive systems of a male and female animal of a selected species.

Definition

Identification should include the parts and functions of the male and female reproductive systems.

Process/Skill Questions

- What are the parts of the female reproductive system?
- What are the parts of the male reproductive system?
- What changes occur in the female reproductive system during gestation?
- When does a male reach sexual maturity? Why is this essential information?
- When does a female reach sexual maturity? Why is this essential information?

Task Number 71

Explain reproduction management systems.

Definition

Explanation should include the purpose and methods of manipulating and detecting estrus (heat), proper facilities, safe handling of animals, and detection of pregnancy. Explanation should also include

- photoperiod
- manipulation
- hormone injection
- teasing
- embryo transfer
- artificial insemination.

Process/Skill Questions

- What are the advantages of controlling reproductive cycles?

- How can a producer synchronize estrus?
- What are the advantages of estrus synchronization?
- What hormones can be used to control reproductive cycles?
- What is standing heat?
- What certifications are required to artificially inseminate livestock?
- Why is artificial insemination valuable to livestock producers?
- Why is embryo transfer important to livestock producers?
- What are some concerns associated with artificial insemination and embryo transfer regarding genetic variation?
- How do you know the animal is ready to breed?
- What facilities are required for the safe breeding of the animals?
- How do you check for pregnancy?
- Why does caring for newborn livestock require a significant amount of time?
- Does a veterinarian need to be present during the birth process? Why, or why not?
- How does the birthing process differ among various livestock species?
- What supplies are necessary for the livestock birthing process?

Task Number 72

Explain the breeding of selected animals.

Definition

Explanation should include the purpose and methods of controlled breeding of domestic animals to improve desirable traits.

Process/Skill Questions

- What is selective breeding?
- What is the earliest archaeological evidence of selective breeding?
- What are the advantages of selective breeding? Disadvantages?
- How are the branches of science to include: biology, genetics, molecular genetics, biotechnology, computer science and statistics involved in the selective breeding process?
- What are the differences between selective breeding and natural selection?
- How did selective breeding influence domestication?
- How has selective breeding helped to identify genes that control growth, energy metabolism, development, and behavior? How have these and other traits been manipulated by selective breeding?
- How can selective breeding be used to reduce diseases and improve product quality?
- What are some characteristics that are highly desirable to pass on to offspring?
- What is cloning? What are the benefits of cloning animals?
- How can cloning and genetic altering produce genetic superiority?
- What are some ethical concerns and implications of cloning?

Task Number 73

Maintain health and breeding records.

Definition

Maintenance should include an accurate record-keeping system in line with industry standards for the species and its purpose.

Process/Skill Questions

- Why are records important?
 - What data must be recorded?
 - How should records be stored?
-

Task Number 74

Evaluate the possible outcomes of genetic (monohybrid and dihybrid) crosses of animals.

Definition

Evaluation should include the use of a Punnett Square to determine possible genotypes and phenotypes of the offspring from a monohybrid and a dihybrid cross.

Process/Skill Questions

- What is a monohybrid cross?
- What is a dihybrid cross?
- What is a genotype?
- What is a phenotype?
- How does one set up a Punnett square for a dihybrid cross?

Managing Animal Health

Task Number 75

Describe the types of animal diseases.

Definition

Description should include

- the definition of disease

- the difference between infectious and noninfectious diseases
- the types of disease causing organisms
 - the three types of bacteria and characteristics of each
 - the characteristics of viruses
 - the characteristics of protozoa
 - the characteristics of fungi
- how an animals immune system works
- how antigens enter the body
- the function of red and white blood cells (e.g., phagocytes, lymphocytes, erythrocytes)
- how vaccines work
- what are antibodies and how do they work
- how passive and active immunity differ
- the differences between naturally acquired and artificially acquired immunity.

Process/Skill Questions

- What are some indications that an animal may be sick?
- What is meant by infectious disease? Noninfectious disease?
- What are communicable diseases?
- What is an animal's first line of defense in fighting an infectious disease?
- How are fungi a disease-causing agent in animals?
- What role do phagocytes and lymphocytes play in fighting disease?
- What are antigens?
- How are diseases spread from one animal to another?
- What are two types of noninfectious diseases?

Task Number 76

Describe internal and external parasites and their control methods.

Definition

Description should include

- common internal and external parasites that infect agricultural animals
- how parasitism causes harm to host animals
- how the life cycle of a parasite can be used to manage the parasite
- how parasites facilitate the transmission of diseases
- symptoms of internal parasitic infections
- symptoms of external parasitic infections
- preventative measures and control methods (e.g., medication, systemic pesticides, biological controls).

Process/Skill Questions

- What is a parasite?
- How do roundworms, tapeworms, flukes, ticks, lice, and various flies cause damage to their hosts?

- How are parasitic infections transmitted (e.g., contaminated water, food, soil, blood)?
- What are three methods that can be used to control parasites?
- Why should preventative methods and treatments be rotated?
- What are biological controls and how are they used?
- Why is it important to understand the life cycle of a parasite?

Task Number 77

Demonstrate various methods of preventative medicine and disease control.

Definition

Demonstration should include using industry standards to protect agricultural animals from diseases and maintain their health by

- following vaccination protocols and schedules
- implementing sanitation procedures
- adhering to quarantine protocols
- utilizing management methods to prevent disease transmission and to treat for diseases.

Process/Skill Questions

- What is preventative medicine?
- What is a vaccine? How does it work?
- What is immunity?
- What is a serum?
- How can one control disease transmission?
- How does one treat a disease outbreak?

Task Number 78

Apply animal health practices.

Definition

Application should include

- identifying signs of animal health
 - signs of contentment
 - herd behavior
 - aggression
 - health
 - fear
 - how a handler should respond to each behavior
- using preventative medicine
- breeding for healthy animals

- keeping accurate records
- maintaining the facility.

Process/Skill Questions

- What animal behaviors indicate stress or poor health?
- What animal behaviors indicate aggression?
- Why is it important to understand animal behavior?
- How do you immunize animals?
- How do you identify appropriate injection sites?
- What measures can be put into place in your facility to keep the animals healthy?
- What is biosecurity? Why is biosecurity important in maintaining an animal's health?

Task Number 79

Describe how to perform emergency first aid on animals.

Definition

Description should include

- identification of wounds, illness, or disease
- common first-aid procedures
- safety practices used to keep the animal and the handler safe
- humane care.

Process/Skill Questions

- What are some signs of an animal in distress?
- How can you protect yourself while treating an animal?

Using Basic Skills in the Operation and Management of an Animal Enterprise

Task Number 80

Operate livestock tools and equipment.

Definition

Operation should include safe procedures for use and proper sanitation and maintenance of tools and equipment including

- ear tag applicator
- tattoo pliers
- implant gun
- animal handling equipment.

Process/Skill Questions

- What equipment and machinery will be used with the given species?
 - What safety procedures must be followed to operate this equipment?
 - How should the equipment be cleaned to preserve it?
 - What is the difference between cleaning and disinfecting?
 - How can it be determined if the National Institute for Occupational Safety and Health (NIOSH) requirements have been met?
-

Task Number 81

Maintain equipment and facilities.

Definition

Maintenance should include sanitation requirements when making improvements and repairs to the equipment and facilities needed for a given species.

Process/Skill Questions

- How do you sanitize equipment and facilities?
 - How can you improve the existing facilities?
 - How do you repair the equipment or facilities you are using?
-

Task Number 82

Discuss animal marketing techniques.

Definition

Discussion should include

- consumer wants and needs
- supply and demand considerations
- local, national, and international marketing opportunities
- programs (e.g., check-offs for group marketing of goods).

Process/Skill Questions

- What is marketing?
- How does one determine what the consumer wants?
- What portion of costs does a marketing division receive?

Task Number 83

Complete farm income and expense record forms.

Definition

Completion should include

- identifying the parts of an income statement
- computing the income, expenses, and profit and loss of the farm
- analyzing income statements for the strengths and weaknesses of the farm.

Process/Skill Questions

- How often should income and expense records be updated?
 - What is a profit and loss statement?
 - What can income statements communicate about a farm's strengths and weaknesses?
 - Who should maintain these documents for the farm?
-
-

Incorporating Mechanical Skills as Related to the Animal Systems Pathway

Task Number 84

Demonstrate standard measurement techniques in animal systems.

Definition

Demonstration may include

- accurately reading a ruler with graduations in U.S. customary system and metric units
- calculating volume and area
- using conversion factors (e.g., fractions to decimals, pints to quarts, feet to meters)
- using decimals and fractions in basic mathematical calculations.

Process/Skill Questions

- What measurement techniques are used in animal science?
- Why is it important to be able to use conversion factors?
- What geometric shapes' volume or area may need to be measured in animal science?
- What are the minimum space requirements for specific livestock? How are they calculated?

Task Number 85

Demonstrate drawing for agricultural mechanics as it relates to the Animal Systems pathway.

Definition

Demonstration may include

- identifying and selecting equipment and supplies for drawing
- drawing views of objects and landscaping plans
- drawing a laboratory project plan
- exploring computer-aided design (CAD) programs.

Process/Skill Questions

- What views of objects can be drawn?
- What are the steps in drawing an object?
- What is the purpose of a project plan?
- What CAD programs are used in agribusiness?
- What are the advantages of using CAD programs?

Task Number 86

Demonstrate metalworking operations as they relate to the Animal Systems pathway.

Definition

Demonstration may include

- identifying metals by physical properties
- identifying metalworking tools, equipment, and supplies
- identifying the processes involved in changing the physical property of metals
- selecting tools, equipment, and supplies for tool fitting
- reconditioning an agricultural mechanics tool
- identifying arc and gas welding tools, equipment, and supplies
- using the arc and gas welding equipment following all recommended safety procedures and guidelines
- performing flat/downhand welding

- estimating a bill of materials
- constructing an approved metalworking project
- preparing and applying finishes.

Process/Skill Questions

- How is metalworking used in agriculture?
- What safety measures must be taken when working with metals?
- What steps are involved in changing the physical property of metals?
- What are the procedures for each application of tool fitting?
- What are the steps involved in reconditioning an agricultural mechanical tool?
- Why is tool reconditioning important?
- What safety precautions should be taken when arc welding?
- What procedures should be followed when arc welding?
- What is the procedure for correctly performing flat/downhand welding?
- What steps are involved in constructing a metalworking project?

Task Number 87

Demonstrate woodworking operations as they relate to the Animal Systems pathway.

Definition

Demonstration may include

- identifying and using hand tools, handheld power tools, woodworking tools, and supplies
- selecting and using wood fasteners
- estimating a bill of materials
- constructing an agricultural woodworking project, using hand tools and/or handheld power tools following all recommended safety procedures and guidelines
- preparing and applying finishes in accordance with manufacturer's instructions and guidelines.

Process/Skill Questions

- What safety precautions apply to the use of hand tools, handheld power tools, and woodworking tools?
- What types of wood fasteners are used in woodworking?
- What are the steps in estimating a bill of materials?
- What is the purpose of a bill of materials in a project plan?
- What are the steps in constructing a woodworking project?

Task Number 88

Demonstrate electrical operations as they relate to the Animal Systems pathway.

Definition

Demonstration may include

- explaining the terminology, principles, and symbols of electricity
- using tools and equipment related to electricity following all recommended safety procedures and guidelines
- using calculations related to electricity
- constructing an approved electrical project.

Process/Skill Questions

- What types of tools are used in electrical work?
- What electrical projects relate to the animal industry?
- What electrical certifications are needed for electrical installation, inspection, and/or testing (e.g., new installations, alterations, additions)?
- What is *ampacity*? How does this relate to the current limits that can be carried by certain gauges of wire?

Task Number 89

Demonstrate small-engine operations as they relate to the Animal Systems pathway.

Definition

Demonstration may include

- explaining the principles, terminology, language, and theory of small engines
- using tools and equipment related to small engines following all recommended safety procedures and guidelines
- completing an approved small-engines project (e.g., troubleshooting, maintaining, servicing).

Process/Skill Questions

- What are the symbols used in small-engine work?
- What types of tools are used in small-engine work?
- What small-engine projects would relate to the Animal Systems pathway?

Task Number 90

Demonstrate plumbing operations as they relate to the Animal Systems pathway.

Definition

Demonstration may include

- explaining the terminology, principles, and symbols of plumbing
- using tools and equipment related to plumbing
- using calculations related to plumbing
- completing an approved plumbing project.

Process/Skill Questions

- What types of tools are used in plumbing work?
- What plumbing projects would relate to the Animal Systems pathway?
- What certifications must one have to perform plumbing work?

SOL Correlation by Task

39	Identify the role of supervised agricultural experiences (SAEs) in agricultural education.	English: 9.3, 9.5, 10.3, 10.5
40	Participate in an SAE.	English: 9.5, 9.8, 10.5, 10.8
41	Identify benefits and responsibilities of FFA membership.	English: 9.5, 9.6, 9.7, 9.8, 10.5, 10.6, 10.7, 10.8
42	Describe leadership characteristics and opportunities as they relate to agriculture and FFA.	English: 9.5, 10.5 History and Social Science: VUS.8, VUS.9, VUS.10, VUS.11, WHII.8, WHII.10, WHII.11
43	Apply for an FFA award, based on an SAE.	English: 9.5, 10.5
44	Identify marked safety areas.	
45	Identify the location and use of eye wash stations.	
46	Identify the location of the posted evacuation routes.	
47	Locate and demonstrate knowledge of safety data sheets (SDS).	English: 9.5, 10.5
48	Demonstrate the safe use of chemicals.	Science: CH.1
49	Demonstrate the safe use of standard and metric hand tools.	
50	Demonstrate the safe use of power tools.	
51	Demonstrate the safe use of precision standard and metric measuring tools.	
52	Demonstrate the safe use of personal protective equipment (PPE).	
53	Demonstrate the safe use of fire protection equipment.	
54	Demonstrate the safe use of equipment.	
55	Demonstrate safe practices in the agricultural mechanics lab/workshop.	English: 9.5, 10.5

		History and Social Science: GOVT.16 Science: CH.1
56	Demonstrate safe practices in handling livestock.	
57	Describe animal science and the role of animals in society.	Science: BIO.4
58	Identify basic livestock industry terminology.	English: 9.5, 10.5
59	Evaluate livestock, poultry, and dairy animals.	
60	Outline procedures for fitting and showing livestock.	
61	Differentiate between animal welfare and animal rights.	English: 9.3, 10.3
62	Assess county, state, and federal agencies that support the animal industry.	History and Social Science: GOVT.8, GOVT.9
63	Interpret rules, policies, and regulations affecting the livestock industry.	English: 9.3, 9.5, 10.3, 10.5
64	Identify organizations that govern and influence the animal industry.	History and Social Science: VUS.8
65	Identify environmental issues and regulations pertaining to the animal industry.	History and Social Science: GOVT.8, GOVT.9
66	Identify parts and functions of the digestive system of a ruminant, a non-ruminant, and a pseudo-ruminant.	Science: BIO.4d
67	Identify the nutritional requirements of selected species.	Science: BIO.2
68	Balance a ration for a selected animal.	Mathematics: A.4, A.5 Science: PH.2
69	Evaluate feedstuff for quality.	
70	Identify parts and functions of the reproductive systems of a male and female animal of a selected species.	Science: BIO.4d
71	Explain reproduction management systems.	English: 9.6, 10.6
72	Explain the breeding of selected animals.	English: 9.6, 10.6
73	Maintain health and breeding records.	
74	Evaluate the possible outcomes of genetic (monohybrid and dihybrid) crosses of animals.	English: 9.5, 10.5 Science: BIO.5d, BIO.5f
75	Describe the types of animal diseases.	
76	Describe internal and external parasites and their control methods.	History and Social Science: VUS.8 Science: BIO.4
77	Demonstrate various methods of preventative medicine and disease control.	History and Social Science: VUS.8 Science: BIO.4f
78	Apply animal health practices.	History and Social Science: VUS.8 Science: BIO.1, BIO.4
79	Describe how to perform emergency first aid on animals.	English: 9.6, 10.6 History and Social Science: VUS.8

80	Operate livestock tools and equipment.	
81	Maintain equipment and facilities.	
82	Discuss animal marketing techniques.	History and Social Science: GOVT.14, VUS.10
83	Complete farm income and expense record forms.	
84	Demonstrate standard measurement techniques in animal systems.	Mathematics: G.14
85	Demonstrate drawing for agricultural mechanics as it relates to the Animal Systems pathway.	Mathematics: G.14
86	Demonstrate metalworking operations as they relate to the Animal Systems pathway.	Science: CH.2h
87	Demonstrate woodworking operations as they relate to the Animal Systems pathway.	
88	Demonstrate electrical operations as they relate to the Animal Systems pathway.	Mathematics: A.1, A.3, A.4, A.5 Science: PH.11
89	Demonstrate small-engine operations as they relate to the Animal Systems pathway.	Science: PH.5, PH.6
90	Demonstrate plumbing operations as they relate to the Animal Systems pathway.	Mathematics: A.1, A.3, A.4, A.5

FFA Information

The National FFA is an organization dedicated to preparing members for leadership and careers in the science, business, and technology of agriculture. Local, state, and national activities and award programs provide opportunities to apply knowledge and skills acquired through agriculture education.

For additional information about the student organization, see the [National FFA website](#) and the [Virginia FFA Association website](#).

The following leadership development events are available for this course:

- [Agricultural Issues](#)
- [Employment Skills](#)
- [Extemporaneous Public Speaking](#)
- [Parliamentary Procedure](#)
- [Prepared Public Speaking](#)

The following career development events are available for this course:

- [Agricultural Communications](#)
- [Agricultural Sales](#)
- [Agronomy](#)
- [Agricultural Technology & Mechanical Systems](#)
- [Dairy Cattle Evaluation and Management](#)
- [Environmental & Natural Resources](#)
- [Farm and Agribusiness Management](#)
- [Floriculture](#)
- [Food Science and Technology](#)

- [Forestry](#)
- [Horse Evaluation](#)
- [Marketing Plan](#)
- [Meats Evaluation and Technology](#)
- [Nursery/Landscape](#)
- [Poultry Evaluation](#)
- [Veterinary Science](#)

Entrepreneurship Infusion Units

Entrepreneurship Infusion Units may be used to help students achieve additional, focused competencies and enhance the validated tasks/competencies related to identifying and starting a new business venture. Because the unit is a complement to certain designated courses and is not mandatory, all tasks/competencies are marked “optional.”

Appendix: Credentials, Course Sequences, and Career Cluster Information

Industry Credentials: Only apply to 36-week courses

- Agricultural Biotechnology Assessment
- Animal Systems Assessment
- Beef Quality Assurance Examination
- College and Work Readiness Assessment (CWRA+)
- Customer Service Specialist (CSS) Examination
- Food Safety & Science Certification Examination
- Fundamentals of Animal Science Certification Examination
- Meat Evaluation Certification Examination
- National Career Readiness Certificate Assessment
- Principles of Livestock Selection and Evaluation Certification Examination
- Workplace Readiness Skills for the Commonwealth Examination

Concentration sequences: *A combination of this course and those below, equivalent to two 36-week courses, is a concentration sequence. Students wishing to complete a specialization may take additional courses based on their career pathways. A program completer is a student who has met the requirements for a CTE concentration sequence and all other requirements for high school graduation or an approved alternative education program.*

- Agricultural Business Fundamentals I (8022/36 weeks)
- Agricultural Business Management III (8026/36 weeks)
- Agricultural Business Operations II (8024/36 weeks)
- Agricultural Production Technology (8010/36 weeks)
- Agricultural Structural Systems (8017/36 weeks)
- Applied Agricultural Concepts (8072/18 weeks)
- Applied Agricultural Concepts (8073/36 weeks)
- Biological Applications in Agriculture (8086/36 weeks)
- Biotechnology Applications in Agriculture (8087/36 weeks)
- Biotechnology Foundations in Agricultural and Environmental Science (8085/36 weeks)
- Equine Science (8015/18 weeks)
- Equine Science (8080/36 weeks)
- Equine Science, Advanced (8094/36 weeks)
- Fisheries and Wildlife Management (8041/36 weeks)
- Foundations of Agriculture, Food, and Natural Resources (8006/36 weeks)
- Livestock Production Management (8012/36 weeks)
- Operating the Farm Business (8014/36 weeks)
- Small Animal Care I (8083/36 weeks)
- Small Animal Care I (8081/18 weeks)
- Small Animal Care II (8084/36 weeks)
- Veterinary Science I (8088/36 weeks, 140 hours)
- Veterinary Science II (8089/36 weeks, 140 hours)

Career Cluster: Agriculture, Food and Natural Resources	
Pathway	Occupations
Agribusiness Systems	Agricultural Commodity Broker Agricultural Economist

Career Cluster: Agriculture, Food and Natural Resources	
Pathway	Occupations
	Agricultural Loan Officer Agricultural Products Sales Representative Farm, Ranch Manager Feed, Farm Supply Store Sales Manager
Animal Systems	Agricultural Products Sales Representative Animal Breeder, Husbandry Animal Geneticist Animal Nutritionist Animal Scientist Aquacultural Manager Poultry Manager Veterinarian Veterinary Technician
Environmental Service Systems	Environmental Compliance Inspector Environmental Sampling and Analysis Technician Hazardous Materials Handler Toxicologist Water Conservationist
Food Products and Processing Systems	Biochemist Food Scientist
Natural Resources Systems	Fish and Game Officer Fisheries Technician Forest Manager, Forester Forest Technician Microbiologist Park Manager Park Technician Wildlife Manager
Power, Structural, and Technical Systems	Agricultural Engineer Agricultural Equipment Parts Manager Agricultural Equipment Parts Salesperson Machinist Welder