

# Operating the Farm Business

8014 36 weeks

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## Acknowledgments

The components of this instructional framework were developed by the following curriculum development panelists:

Kristin Beery, Instructor, Augusta County Public Schools  
Michael J. Carter, Jr., Small Farm Resource Center Manager, Virginia State University, Petersburg  
Ashley Craun, Past President, Young Farmers of Virginia, Spotsylvania  
Mark Deavers, Vice President, Young Farmers of Virginia, Spotsylvania  
Jessica Gwaltney, Instructor, Giles County Public Schools  
Kimberley Nixon, Owner, Glenmary Farm, LLC, Rapidan  
Robert J. Nobblitt, Farmer, Orange County  
James Pugh, Instructor, Charlotte County Public Schools  
Sarah Jane Thomsen, Virginia Agribusiness Council, North Chesterfield

Correlations to the Virginia Standards of Learning were reviewed and updated by:

Leslie R. Bowers, English Teacher (ret.), Newport News Public Schools  
Vickie L. Inge, Mathematics Committee Member, Virginia Mathematics and Science Coalition  
Anne F. Markwith, New Teacher Mentor (Science), Gloucester County Public Schools  
Michael L. Nagy, Social Studies Department Chair, Rustburg High School, Campbell County Public Schools

The framework was edited and produced by the CTE Resource Center:

Heather A. Widener, Writer/Editor  
Kevin P. Reilly, Administrative Coordinator

LaVeta Nutter, Specialist, Agriculture Education and Related Clusters  
J. Anthony Williams, Curriculum and Instruction Coordinator  
Dr. David S. Eshelman, Director, Workforce Development and Initiatives  
George R. Willcox, Director, Operations and Accountability

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## Course Description

**Suggested Grade Level:** 12

In this capstone course, students research successful business and management practices. Students explore the role of new and evolving technologies related to managing and operating an agricultural enterprise. Emphasis is placed on best management practices used in production agriculture, safety in an agricultural enterprise, and understanding agricultural markets.

*Recommended prerequisites: Agricultural Business Operations II (8024) and/or Agricultural Business Management III (8026)*

*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

8014	Tasks/Competencies
⊕	Identify the role of supervised agricultural experiences (SAEs) in agricultural education.
⊕	Participate in an SAE.
⊕	Identify the benefits and responsibilities of FFA membership.
⊕	Describe leadership characteristics and opportunities as they relate to agriculture and FFA.
○	Apply for an FFA degree and/or an agricultural proficiency award.
⊕	Apply supply and demand analysis to a product, commodity, or service for an agriculture, food, and natural resources (AFNR) business.

<input checked="" type="radio"/>	Explain opportunity cost in production agriculture.
<input checked="" type="radio"/>	Explain the relationships between inputs and outputs.
<input checked="" type="radio"/>	Identify ethical standards and best management practices (BMP) for an agricultural business.
<input checked="" type="radio"/>	Identify the procedures, licenses, permits, regulations, and laws related to starting a business.
<input checked="" type="radio"/>	Develop a business plan for an agricultural production enterprise.
<input checked="" type="radio"/>	Evaluate how to recruit, train, and retain employees.
<input type="radio"/>	Discuss an expansion plan.
<input checked="" type="radio"/>	Describe the need for estate planning.
<input checked="" type="radio"/>	Identify the elements required to form a legally binding contract for services.
<input checked="" type="radio"/>	Develop a risk-management plan for an agricultural production enterprise.
<input checked="" type="radio"/>	Identify the components of a farm rent/lease agreement.
<input checked="" type="radio"/>	Develop a sample nutrient management plan (NMP).
<input checked="" type="radio"/>	Determine the inputs needed to grow a crop.
<input checked="" type="radio"/>	Describe how an AFNR business can minimize waste, maximize efficiency, and increase profits.
<input checked="" type="radio"/>	Develop a crop rotation plan.
<input checked="" type="radio"/>	Analyze the use of conservation tillage practices and erosion control systems.
<input checked="" type="radio"/>	Interpret various agencies' soil conservation program requirements.
<input checked="" type="radio"/>	Explain the importance of the U.S. Food and Drug Administration's (FDA) Food Safety Modernization Act (FSMA).
<input checked="" type="radio"/>	Explain Good Agricultural Practices (GAP) and Good Handling Practices (GHP).
<input checked="" type="radio"/>	Describe veterinary practices performed by a livestock owner/manager.
<input checked="" type="radio"/>	Develop a healthcare plan for a livestock production enterprise.
<input checked="" type="radio"/>	Develop a biosecurity plan.
<input checked="" type="radio"/>	Describe livestock waste management systems.
<input checked="" type="radio"/>	Develop a conservation plan.
<input type="radio"/>	Identify elements for maintenance of a wildlife habitat.

<input type="radio"/>	Develop plans for a hunting/fishing enterprise.
<input type="radio"/>	Explain multiple functions of farm ponds.
<input checked="" type="radio"/>	Identify agroforestry management practices to create environmental, economic, and social benefits.
<input checked="" type="radio"/>	Identify silviculture practices for forest crop improvement.
<input type="radio"/>	Identify planting and harvesting techniques.
<input type="radio"/>	Identify regeneration methods necessary for the continuous growth of trees.
<input type="radio"/>	Design plans to establish forest roads.
<input type="radio"/>	Identify conditions needed to harvest trees for optimal profit.
<input type="radio"/>	Develop a forest fire prevention plan.
<input checked="" type="radio"/>	Describe use of pesticides. (Students should not use any pesticides)
<input checked="" type="radio"/>	Identify technologies used in pesticide application.
<input type="radio"/>	Obtain pesticide applicator certification.
<input type="radio"/>	Calibrate a sprayer.
<input checked="" type="radio"/>	Identify marked safety areas.
<input checked="" type="radio"/>	Identify the location and use of eye wash stations.
<input checked="" type="radio"/>	Identify the location of the posted evacuation routes.
<input checked="" type="radio"/>	Demonstrate knowledge of safety data sheets (SDS).
<input checked="" type="radio"/>	Demonstrate the use of chemicals.
<input checked="" type="radio"/>	Demonstrate the use of standard and metric hand tools.
<input checked="" type="radio"/>	Demonstrate the use of power tools.
<input checked="" type="radio"/>	Demonstrate the use of precision standard and metric measuring tools.
<input checked="" type="radio"/>	Demonstrate the use of protective clothing and equipment.
<input checked="" type="radio"/>	Demonstrate the use of fire protection equipment.
<input checked="" type="radio"/>	Demonstrate the use of equipment.
<input checked="" type="radio"/>	Demonstrate safety in the agricultural mechanics lab/workshop.
<input checked="" type="radio"/>	Identify general safety procedures for the operation of farm equipment.

+	Select farm machinery and equipment.
+	Identify farm structures and uses.
+	Identify steps in constructing a farm building.
+	Construct a farm building using carpentry tools and equipment.
+	Use metal fabrication tools and/or equipment.
+	Research agricultural diversification practices that generate additional sources of farm income.
+	Research marketing opportunities.
+	Examine alternative or niche market opportunities.
+	Develop a plan for an agritourism operation.
+	Identify AFNR business structures.
+	Explain agricultural literacy and its relationship to public perceptions.
+	Develop financial, marketing, and risk management plans for the farm business.
+	Develop an enterprise budget for an agricultural production business.
+	Examine strategies for tracking, reporting, and managing inventory.
+	Reconcile a bank statement.
+	Analyze a paystub.
+	Complete a sample state and federal income tax form.
+	Construct a complete income statement using cost and accrual basis.
+	Identify the difference between real depreciation and income tax depreciation.
+	Calculate the financial health of a farm business.
+	Research monitoring and sensing technologies used in agricultural enterprises.
+	Identify apps used in agricultural businesses.
+	Explore careers related to agricultural technology.

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).

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# 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](#)

#### 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

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## Task Number 41

### Identify the benefits and responsibilities of FFA membership.

#### Definition

Identification should include

- benefits
  - listing opportunities to participate in community improvement projects and career development events (CDEs) and leadership development events (LDEs)
  - exploring leadership development opportunities
- responsibilities
  - researching the responsibilities of FFA officers, committees, and members
  - locating resources that guide participation in FFA activities
  - explaining the FFA Creed, Motto, Salute, and mission statement
  - explaining the meaning of the FFA emblem, colors, and symbols
  - explaining significant events and the history of the organization.

### **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 and responsibilities of FFA membership?
- What five FFA activities are available through the local chapter?
- What are some significant events in FFA history? How have these events shaped membership over time?
- What is the FFA program of activities (POA), and how is it used?

## **Task Number 42**

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

#### **Definition**

Description should include

- examples of successful leaders
- types of leadership
  - autocratic
  - participative
  - laissez-faire
  - servant
  - followership
- positive leadership qualities and traits of successful leaders
- opportunities for participating in leadership activities in FFA
- demonstrating methods for conducting an effective meeting.

### **Process/Skill Questions**

- Who are some successful leaders in the agriculture industry?
- What qualities make a successful leader?

- What are leadership traits?
- What is the difference between positive and negative leadership?

## Task Number 43

### Apply for an FFA degree and/or an agricultural proficiency award.

#### Definition

Application should include

- identifying types of FFA degrees
  - Greenhand
  - Chapter
  - State
  - American
- identifying proficiency award areas
  - entrepreneurship
  - placement
  - combined
  - agriscience research
- exploring CDEs and LDEs related to this course
- identifying all SAE criteria to be eligible for the award
- identifying the type of award
- applying for an FFA award.

Teacher resource: [FFA Agricultural Proficiency Awards](#)

#### Process/Skill Questions

- Where are the awards and their application criteria located?
- What are the benefits of winning an FFA award?
- What are the benefits and requirements of an FFA degree?
- What FFA awards are available?
- How does the FFA degree program reward FFA members in all phases of leadership, skills, and occupational development?
- What is the highest degree that can be conferred upon an FFA member at the national level?
- What are the requirements for a Greenhand FFA degree?

## Applying Economic Principles Specific to Agricultural Production

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## Task Number 44

# **Apply supply and demand analysis to a product, commodity, or service for an agriculture, food, and natural resources (AFNR) business.**

## **Definition**

Application should include

- a reinforcement of economic terms, to include
  - *market*
  - *consumption*
  - *price*
  - *consumer surplus*
  - *elasticity*
  - *supply curve*
  - *demand curve*
  - *indifference curve*
  - *scarcity*
  - *disequilibrium*
- the relationship among supply, demand, and price equilibrium (i.e., for an agricultural product, service, or commodity).

## **Process/Skill Questions**

- How could a graph show supply and demand?
- How does supply and demand influence price?
- What factors affect the price of a commodity and the quantity demanded?
- How do substitutes, labor costs, and production technology affect the quantity of a product, commodity, or service supplied in the market?

## **Task Number 45**

### **Explain opportunity cost in production agriculture.**

#### **Definition**

Explanation should include

- a definition of *opportunity cost*
- resources that have alternative uses and their values.

#### **Process/Skill Questions**

- What are the opportunity costs associated with growing crops for food, feed, fiber, oil, ornamental use, and industrial use?
- Why should an agricultural manager analyze opportunity cost?
- What is the opportunity cost for attending college?

## Task Number 46

### Explain the relationships between inputs and outputs.

#### Definition

Explanation should include

- a definition of the *law of diminishing returns*
- a description of the relationship of adding an additional unit of input and the effect on output
- considerations related to aspects such as
  - human capital
  - equipment costs
  - land costs
  - capital investment.

#### Process/Skill Questions

- What is a *break-even analysis*, and how is it applied in agricultural production?
- What is the *law of diminishing returns*?
- How would one evaluate profit, using the formula:  $\text{marginal cost} = \text{marginal revenue}$ ?

## Operating an Agricultural Business

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## Task Number 47

### Identify ethical standards and best management practices (BMP) for an agricultural business.

#### Definition

Identification should include how ethical practices

- build customer loyalty
- attract new customers
- reduce negative public perceptions
- encourage employee retention.

#### Process/Skill Questions

- How are ethical practices related to a business' public reputation?
- What are examples of unethical business practices?

## Task Number 48

### Identify the procedures, licenses, permits, regulations, and laws related to starting a business.

#### Definition

Identification should include

- local, state, and federal licenses needed to start a business
- permits (e.g., zoning, health, pesticide use, land application, forestry, emissions)
- local, state, and federal laws pertaining to starting a business
- steps to acquire a business license
- the importance of professional guidance (e.g., legal, accounting).

#### Process/Skill Questions

- What is the purpose of a business license?
- How does one obtain a business license?
- What are the local laws and fees related to acquiring a business license?
- What is a business partnership?

## Task Number 49

### Develop a business plan for an agricultural production enterprise.

#### Definition

Development should include

- all of the elements of a business plan
  - executive summary
  - business description
  - market analysis
  - organization management
  - sales strategies
  - funding requirements
  - financial analysis and projections
- marketing, including direct marketing
  - defining *direct marketing*
  - identifying local sources for direct marketing
  - developing a marketing plan for a specific enterprise
- determination of risks and potential for success.

#### Process/Skill Questions

- How can examining other business plans help new owners formulate their own?

- What are the components of a business plan for a local farm business?
- What are the most limiting factors in creating an agricultural enterprise?
- How should a farm enterprise engage in marketing?

## **Task Number 51**

### **Evaluate how to recruit, train, and retain employees.**

#### **Definition**

Evaluation should include

- an explanation of the need for hired labor in agriculture relative to the local area
- a job description for each employee, outlining responsibilities and protocols
- the importance of employee policies and procedures (e.g., employee handbook)
- recruitment channels (e.g., word of mouth, social media).

#### **Process/Skill Questions**

- How can one determine the labor needs and roles in a farm business?
- What are good outlets for advertising a job opening?
- What are the inherent challenges involved in hiring employees in an AFNR business?

## **Task Number 51**

### **Discuss an expansion plan.**

#### **Definition**

Discussion should include

- identifying needs to expand a farm operation
- assessing additional resources needed for expansion
- assessing additional income that could be gained from expansion
- determining new partners, including whether family members would be interested in participating in and/or eventually taking over the operation.

#### **Process/Skill Questions**

- What is the availability of resources needed for expansion?
- What opportunities for expansion exist?
- How would a business owner generate a partial budget to determine if an expansion plan is feasible?
- How would one determine if expansion is feasible?

## **Task Number 52**

## **Describe the need for estate planning.**

### **Definition**

Description should include

- terminology related to estate planning, such as
  - medical power of attorney
  - will
  - trust
  - insurance
  - inheritance
- reasons to have an estate plan
- transition planning
- the feasibility of the plan
- the role of taxes.

### **Process/Skill Questions**

- Why would a farm owner construct an estate plan to pass farm assets to his or her children?
- What are the consequences of not having an estate plan?
- What are the benefits of having an estate plan?
- How do taxes affect estates?

## **Task Number 53**

### **Identify the elements required to form a legally binding contract for services.**

#### **Definition**

Identification should include

- reasons farm businesses would do custom work for other farms
- reasons to outsource services
- elements that must be covered in the contract (e.g., offer, acceptance, consideration, mutuality of obligation, competency, capacity, and legality).

#### **Process/Skill Questions**

- What are the elements required to demonstrate the formation of a legally binding contract?
- What happens when contracts are breached?
- What is a service contract?
- How would one describe the expectation of services?

## **Task Number 54**

# **Develop a risk-management plan for an agricultural production enterprise.**

## **Definition**

Development should include

- analysis of types and amounts of insurance needed
- analysis of liability types (e.g., in an agritourism operation or in a production enterprise)
- the use of the futures market in protecting product price
- options for contract pricing (forward pricing) for products or services rendered.

## **Process/Skill Questions**

- What are potential consequences of not having a risk-management plan in place for an agricultural production enterprise?
- What resources are available to develop a risk-management plan for an agricultural production enterprise?
- How do fluctuations in input and output prices cause income gains and losses?

## **Task Number 55**

### **Identify the components of a farm rent/lease agreement.**

#### **Definition**

Identification should include explaining the value of each component of the rent/lease agreement, such as

- identification of landlord and tenant
- description of the property
- duration of the lease
- rent
- taxes
- utilities
- permitted and prohibited use
- entry
- maintenance and repair
- alterations and improvements
- stewardship and conservation
- subletting
- termination
- default
- monitoring and reporting
- insurance and liability
- dispute resolution.

#### **Process/Skill Questions**

- What are the advantages of renting or leasing farm assets?
- What are the disadvantages of renting or leasing farm assets?
- What are the advantages of renting and leasing vs. owning farm assets?

# Using Plant and Environmental Science in Agricultural Production

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## Task Number 56

### Develop a sample nutrient management plan (NMP).

#### Definition

Development should include

- definition and interpretation of a *nutrient management plan* (including what constitutes a significant change in an NMP)
- state and local requirements for permitting
- an inventory and analysis of nutrient sources on the farm
- procedures for handling and storage to minimize nutrient loss
- soil testing and determination of nutrient need for crops
- fertilizer selection (e.g., organic, commercial) and application methods, procedures, and timing
- calibration of equipment (e.g., sprayer, spreader)
- BMP
- description of the role of public comment
- creation of a template for the NMP
- record-keeping requirements.

#### Process/Skill Questions

- Why do producers need nutrient management plans?
- How can nutrient management plans help the environment?
- Why is recordkeeping essential for NMP records?
- What are the consequences for not implementing/having an NMP?

## Task Number 57

### Determine the inputs needed to grow a crop.

#### Definition

Determination should include

- cost of seed
- fertilizer
- weed and disease control
- fuel costs
- land costs (e.g., rent, mortgage)
- labor costs
- equipment costs
- marketing costs
- insurance costs
- depreciation
- evaluation of breakeven cost.

Determination should also include subsidies and incentives offered through the state and federal government.

### **Process/Skill Questions**

- What is the most expensive input in crop production?
- Why are budgets important when planning to produce a crop?
- What government programs are available to offset costs for producers?

## **Task Number 58**

**Describe how an AFNR business can minimize waste, maximize efficiency, and increase profits.**

### **Definition**

Description should include

- microeconomic principles
- macroeconomic principles
- use of technology
- opportunity costs
- risk management.

### **Process/Skill Questions**

- How does risk management relate to efficiency?
- How can consultation with a third party help a farm owner evaluate current efficiency and find ways to improve efficiency?

## **Task Number 59**

**Develop a crop rotation plan.**

### **Definition**

Development should include

- a farm map
- crop rotation needs for erosion control and soil improvement
- BMP for nutrient and pesticide residues.

Development should also include subsidies and incentives offered through the state and federal government.

### **Process/Skill Questions**

- What is a crop rotation plan?
- What are the consequences of not using a crop rotation plan?
- What additional resources are available to producers to implement crop rotation plans?

## **Task Number 60**

### **Analyze the use of conservation tillage practices and erosion control systems.**

#### **Definition**

Analysis should include

- evaluation of soil map and soil conservation practices
- consideration of the various tillage systems for erosion control
- exploration of tillage systems using BMP to improve soil and water quality, improve plant health, and minimize off-site impacts from excess nutrients, pesticides, and sediments.

### **Process/Skill Questions**

- What type of equipment is used for conventional and zero tillage?
- Why has there been a movement to increase zero tillage practices?
- What are the pros and cons of conventional tillage vs. no or minimal tillage?

## **Task Number 61**

### **Interpret various agencies' soil conservation program requirements.**

#### **Definition**

Interpretation should include local, regional, state, and national agencies and their

- purposes
- services
- policies
- procedures.

## Process/Skill Questions

- What programs are available at the local soil conservation office?
- Why are there soil conservation programs, and who monitors them?
- Where is the funding coming from for these programs and why does it change every few years?
- What are the benefits of soil conservation and water quality plans?
- What is the Chesapeake Bay Watershed Implementation Plan?

## Task Number 62

### **Explain the importance of the U.S. Food and Drug Administration's (FDA) Food Safety Modernization Act (FSMA).**

#### **Definition**

Explanation should include how the FSMA is focusing on preventing foodborne illnesses that threaten public health and the economic well-being of the food system through the regulatory procedures and guidelines used to implement FSMA:

- Accredited Third-Party Certification
- Current Good Manufacturing Practice and Hazard Analysis and Risk-Based Preventive Controls for Human Food
- Current Good Manufacturing Practice and Hazard Analysis and Risk-Based Preventive Controls for Food for Animals
- Foreign Supplier Verification Programs (FSVP)
- Mitigation Strategies to Protect Food Against Intentional Adulteration
- Sanitary Transportation of Human and Animal Food
- Standards for Growing, Harvesting, Packing, and Holding of Produce for Human Consumption
- Voluntary Qualified Importer Program (VQIP)

## Process/Skill Questions

- What is the significance of FSMA with regard to food safety and the public welfare?
- How can commercial processing reduce microorganisms that are a concern to public health?
- What measures are required to prevent ill personnel from contaminating covered produce?

## Task Number 63

### **Explain Good Agricultural Practices (GAP) and Good Handling Practices (GHP).**

#### **Definition**

Explanation should include discussing audit and accreditation programs provided by the Agricultural Marketing Service (AMS) based on International Organization for Standardization (ISO) Standards and/or Hazard Analysis and Critical Control Point (HACCP) Principles and Guidelines. These programs provide producers and

suppliers of agricultural products the opportunity to assure customers of their ability to provide consistency in the quality of products or services.

### **Process/Skill Questions**

- How are fruits and vegetables produced, handled, packed, and stored as safely as possible to minimize risks of microbial food safety hazards?
- How does the AMS create domestic and international marketing opportunities for U.S. producers of food, fiber, and specialty crops?
- What services are provided by AMS to ensure the quality and availability of wholesome food for the nation's consumers?

## **Producing Livestock**

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### **Task Number 64**

**Describe veterinary practices performed by a livestock owner/manager.**

#### **Definition**

Description should include

- listing common procedures performed by a livestock owner/manager
- identifying reasons a producer would perform veterinary practices on livestock
- explaining situations requiring veterinary consultation
- interpreting the [Veterinary Feed Directive](#).

#### **Process/Skill Questions**

- How can one calculate the savings a producer gains by performing his or her own veterinary practices?
- What are some practices that a producer would not be able to perform, and why?
- How has the Veterinary Feed Directive changed feedstuffs and farmer/veterinarian relationships?

### **Task Number 65**

**Develop a healthcare plan for a livestock production enterprise.**

#### **Definition**

Development should include

- vaccination and medication schedule
- internal and external parasite control methods
- pest control methods (e.g., flies, mites)
- disease management
- nutrition management
- Hazard Analysis and Critical Control Points (HACCP) plan
- a health plan to be used in local enterprises.

### **Process/Skill Questions**

- What would be involved in analyzing a livestock health plan to make recommendations for improvement?
- What is involved in developing an HACCP plan?
- What are some of the disadvantages of not having a written plan for production enterprises?

## **Task Number 66**

### **Develop a biosecurity plan.**

#### **Definition**

Development should include

- quarantine (e.g., for new livestock and any livestock showing symptoms of illness)
- sanitation protocols
- worker education and training
- visitor protocols
- transportation protocols.

### **Process/Skill Questions**

- Why is a biosecurity plan important?
- What are examples of biosecurity plans from local farms and businesses?
- How would a biosecurity plan be created for a local farm?

## **Task Number 67**

### **Describe livestock waste management systems.**

#### **Definition**

Description should include

- local, state, and federal requirements
- handling, storage, and utilization of wastes generated from animal confinement operations
- collecting, scraping, or washing wastes from confinement areas
- storage structures for liquid waste (e.g., lagoons, ponds, steel or concrete tanks)

- storage structures for solid waste (e.g., sheds, pits).

Development should also include an explanation of the relationship between the nutrient management plan and waste management requirements.

### **Process/Skill Questions**

- How would one analyze local waste management systems for possible violations?
- How would one develop an improvement plan for deficient waste management systems?
- How do waste management plans vary for different species?
- How does adequate storage ensure wastes are only applied when soil and weather conditions are ideal for maximum nutrient use?

## **Managing Natural Resources**

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### **Task Number 68**

#### **Develop a conservation plan.**

##### **Definition**

Development should include consideration of

- wildlife
- soil
- water
- air
- forested land.

##### **Process/Skill Questions**

- What are some common practices to conserve soil?
- How is the air affected by agriculture?
- What are ways to minimize harm to wildlife habitats?
- What are common practices to minimize water pollution?
- What is conservation, and why is it important to agriculture?

### **Task Number 69**

#### **Identify elements for maintenance of a wildlife habitat.**

##### **Definition**

Identification should include the following:

- Food
- Water
- Cover/shelter
- Home range
- Habitat destruction concerns
- Invasive species concerns
- Population control

Identification should also include an explanation of how biodiversity provides a habitat for pollinators, water retention, soil tilth, nutrient cycling, erosion control, carbon storage, and other ecosystem services.

### **Process/Skill Questions**

- Why is it important to maintain a habitat for wildlife on a farm?
- What animal habitat requirements are common to the local area?
- What is habitat destruction?
- What are common invasive species?
- Why might farmers have a sacrificial crop for wildlife?

## **Task Number 70**

### **Develop plans for a hunting/fishing enterprise.**

#### **Definition**

Development should include

- cost
- profit
- business plan
- insurance
- types of operations
- conservation of environment/sustainability.

### **Process/Skill Questions**

- What are common sources of income derived from hunting enterprises?
- What are common sources of income derived from fishing enterprises?
- What types of insurance would be necessary to run a fishing or hunting enterprise?
- What practices would need to be implemented to ensure sustainability of the operation?

## **Task Number 71**

### **Explain multiple functions of farm ponds.**

## Definition

Explanation should include

- aquaculture enterprises
- water storage and distribution (e.g., irrigation, fire control)
- wildlife habitat (e.g., beneficial insects, birds, mammals, amphibians).

## Process/Skill Questions

- How would a farm pond affect the environment and provide for enhancement of the microclimate?
- What are some examples of common aquaculture enterprises?
- What practices would need to be implemented to ensure the usability and effectiveness of an irrigation pond?

# Managing a Forest Enterprise

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## Task Number 72

**Identify agroforestry management practices to create environmental, economic, and social benefits.**

## Definition

Identification should include

- agroforestry farming systems
  - alley cropping
  - forest farming
  - silvopasture
- linear agroforestry practices
  - riparian forest buffers
  - windbreaks (e.g., shelterbelts, hedgerows, living snow fences)
- forest products (e.g., pulp, hardwood, byproducts)
- silviculture
- Christmas tree farming.

## Process/Skill Questions

- What resources are available for landowners interested in integrating agroforestry management practices on their farms?
- What are the advantages and disadvantages of silvopasture systems?
- How does Christmas tree farming differ from forest farming?
- What forest products and by-products are produced in Virginia forests?

## **Task Number 73**

### **Identify silviculture practices for forest crop improvement.**

#### **Definition**

Identification should include

- describing external forces requiring improvement cutting
  - catastrophic
    - fire
    - blowdown
    - flooding
    - insect outbreaks
    - disease infestations
    - killing temperature
    - mechanical injury
  - irritants
    - animal predation
    - insects
    - diseases
    - nutrient and moisture deficiency
    - anthropogenic
- describing improvement cutting techniques
- removing low-value or damaged trees
- cutting for salvage or sanitation.

#### **Process/Skill Questions**

- What measures can a silviculturist take to supplement or substitute for natural regeneration?
- What are possible regeneration problems that may arise after salvage cutting?
- What are the similarities and differences between salvage and sanitation cuttings?

## **Task Number 74**

### **Identify planting and harvesting techniques.**

#### **Definition**

Identification should include, as needed,

- timber harvest practices
  - clearcutting systems
  - shelterwood systems
  - selection systems
- site preparation
- forestry equipment

- delimiters
- stump grinders
- mulchers
- yarders
- forwarders
- log loaders
- harvesters (e.g., feller bunchers)
- drum choppers
- bulldozers
- use of pulpwood and sawtimber.

## Process/Skill Questions

- What are the advantages and disadvantages of natural reproduction methods?
- Why is it advisable to secure the advice of a local forester when considering artificial reproduction (i.e., planting trees from seedlings or tree seed)?
- What are some of the methods used to fell trees?
- What are some common machines and equipment used to harvest trees?
- How can a prescribed or controlled burn restore health to a forest ecosystem?
- What are the benefits of using prescribed fire to meet management objectives?

## Task Number 75

### Identify regeneration methods necessary for the continuous growth of trees.

#### Definition

Identification should include

- defining *natural regeneration* and *artificial regeneration*
  - natural regeneration
    - seeding
    - vegetative reproduction
  - artificial (reforestation)
  - direct seeding
  - planting
- explaining the effects of management practices on growth and external quality
- thinning
- cutting
  - release
  - sanitation
  - salvage
- explaining regeneration methods that produce even-aged and uneven-aged stands and how their management practices differ.

## Process/Skill Questions

- Why are growing space, nutrients, and moisture important considerations for the continuous growth of trees?
- How can an increment borer be used to inform regeneration decisions?
- What are the different management strategies applied to uneven-aged and even-aged stands of timber?
- What is the purpose of salvage cutting?
- What is sanitation cutting and why is it important?
- What is timber stand improvement?

## Task Number 76

### Design plans to establish forest roads.

#### Definition

Design should reflect BMP that protect the environment and comply with legal standards.

#### Process/Skill Questions

- Why is understanding slope and grade essential for planning woodland access roads and skid trails?
- What considerations should be made when planning to locate forest roads near streambeds?
- Why are drainage and side-ditch construction crucial for forest roads?
- What are temporary stream crossing techniques?
- When should low-cost bridge construction be considered?
- Why does road depth and soil type determine culvert size beneath forest access roads?

## Task Number 77

### Identify conditions needed to harvest trees for optimal profit.

#### Definition

Identification should include age, size, market, and

- definition of *board foot*, *cubic foot*, and *standard cord*
- local forest product markets
- list of the three major types of log rules
- examination of methods used to measure logs
- description of
  - diameter limit cutting
  - lump sum or boundary cutting
  - marked cutting
  - by-the-piece cutting
  - mill-run or tally cutting
  - log scale cutting
- elements of a contract to promote optimal profit.

#### Process/Skill Questions

- How is a Biltmore stick used to estimate board feet in standing timber?
- What are the advantages and disadvantages of using contracts, sealed bids, direct negotiation, and auction bids when selling timber for optimal profit?
- What importance do byproducts (i.e., wood slabs, chips, bark, sawdust, and fuelwood) have when calculating or estimating the potential optimal profit for a timber stand?
- Why is a fire protection and responsibility clause important when writing timber sale contract provisions? What are other contract considerations to include?

## **Task Number 78**

### **Develop a forest fire prevention plan.**

#### **Definition**

Development should include

- identifying the major causes of wildfire in Virginia over the past 20 years
- identifying the major fire detection methods
- researching Virginia’s forest fire laws
- identifying the two general methods used in controlling a forest fire
- creating a forest fire prevention marketing campaign.

#### **Process/Skill Questions**

- Why are burning laws an important part of forest fire prevention? What is the 4 p.m. burn law?
- Why are spring (March and April) and fall (October and November) known as Virginia’s wildfire season? What factors contribute to this situation?
- What are some of the most common hand tools used to fight forest fires?
- What is the difference between a direct and indirect attack on a forest fire?
- What are some of the safety concerns related to fighting forest fires?
- What are some types of mechanized equipment often used to fight forest fires?
- How can awareness and education reduce the number of forest fires?

## **Understanding Pesticide Use and Safety**

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### **Task Number 79**

#### **Describe use of pesticides. (Students should not use any pesticides)**

#### **Definition**

Description should include

- determining pesticide types needed for a production operation
  - understanding pesticide classifications and formulations
  - identifying, for a given pesticide, the directions, use, warnings, and limitations
  - using integrated pest management (IPM) by scouting and using thresholds to determine economic feasibility of application
  - selecting the least invasive pesticide possible
- explaining safety practices for various pesticide applications
  - identifying the information on the pesticide label prior to use
  - identifying necessary personal protective equipment (PPE)
  - describing procedures for handling, applying, cleaning up, storing, and disposing of pesticides (according to the label)
  - describing environmental concerns when using the pesticide
  - identifying legal responsibilities and liability concerns
  - describing emergency procedures in case of a pesticide spill or accident
  - describing emergency and first aid procedures in case of personal contact or poisoning
  - outlining record-keeping requirements
- calibrating the spray equipment.

### **Process/Skill Questions**

- Where can one find information about the use and warnings of a specific pesticide?
- What are the advantages and disadvantages of using pesticides to meet the food/fiber needs of an increasing population?
- Why does a farmer need to understand the life cycles of pests to ensure successful pesticide application?
- What is the public's general perception of pesticide safety?
- How long must a farmer maintain records of pesticide applications?
- What are the major classes/groupings of pesticides?
- Which federal agency regulates pesticides?
- What factors should be considered when selecting a pesticide?

## **Task Number 80**

### **Identify technologies used in pesticide application.**

#### **Definition**

Identification should include technologies such as

- geographic information system (GIS)
- global positioning system (GPS)
- unmanned aircraft system (UAS)
- prescriptions
- variable-rate fertilization and pesticide application.

### **Process/Skill Questions**

- How are UAS technologies used in pesticide application?
- How are unmanned aerial vehicles (UAVs) used to identify pests, diseases, and the damage they cause?

- What is *precision agriculture*?
- How do variable rate applications work with farming equipment?
- What are some emerging technologies in pesticide application?

## Task Number 81

### Obtain pesticide applicator certification.

#### Definition

Obtaining should include

- studying materials on the Virginia Private Pesticide Applicator exam
- exploring state law and United States Environmental Protection Agency (EPA) regulations related to pesticides
- age considerations
- taking the Virginia Private Pesticide Applicator exam.

#### Process/Skill Questions

- What are the major categories for commercial applicator certification in Virginia?
- Why must a person who applies pesticides have a pesticide license?
- How can one obtain a private or commercial pesticide license?
- What is the difference between a Private Pesticide Applicator license and a Commercial Pesticide Applicator license?
- What are the differences in a restricted-use and a non-restricted-use pesticide?

## Task Number 82

### Calibrate a sprayer.

#### Definition

Calibration should include

- determining the rate at which to apply pesticide
- determining the area of land which will be used to test the spraying equipment
- performing a test application using the calibration formula
- adjusting spraying equipment to correct the calibration.

#### Process/Skill Questions

- Why would a farmer want to calibrate spraying equipment?
- What variables can affect the rate at which a pesticide is applied?
- Why should pesticide applicators always consider sprayer calibration?
- What effect does pressure have on calibration?
- What three variables determine application rates?

# Practicing Safety in Agricultural Production Enterprises

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## Task Number 83

### 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.

Teacher Resource: [The Safety Best Practice Guide for CTE](#), Virginia Department of Education

#### 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 84

### Identify the location and use of eye wash stations.

#### Definition

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

#### 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?
- What is the American National Standards Institute (ANSI)?
- How are emergency eye wash stations kept ANSI-compliant?

## Task Number 85

### 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 may trigger an evacuation?
- Why is it important to know evacuation routes?

## **Task Number 86**

### **Demonstrate knowledge of safety data sheets (SDS).**

#### **Definition**

Demonstration should include identifying

- the location of SDS 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 and 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 health, safety, and environmental practices?

## **Task Number 87**

### **Demonstrate the use of chemicals.**

#### **Definition**

Demonstration should include the different types of

- solvents
- soaps
- cleaning solutions
- fuels
- oils

- greases
- specialty additives
- gasses.

Demonstration should also emphasize the use, hazards, and precautions associated with each type of chemical, 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 consequences of using chemicals incorrectly?
- Where should chemicals be stored within the lab/workshop?

## **Task Number 88**

### **Demonstrate the 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 use, the hazards, the precautions, and the maintenance procedures associated with each, in accordance with manufacturers' instructions and government regulations. Hand tools could include

- socket set components
- wrenches (including common end wrenches)
- screwdrivers
- pliers
- hammers
- 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, timing light, remote starter switch)
- battery specialty tools (e.g., cable puller, terminal and post cleaner, lifting or carrying strap)
- lubrication specialty tools (e.g., transmission funnel, oil filter-removal 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 89**

### **Demonstrate the use of power tools.**

## Definition

Demonstration should include power tools (including pneumatic and electric tools) encountered in agricultural mechanics, such as

- air impact wrench
- air hammer
- air ratchet
- air drill
- electric drill
- electric grinder.

Demonstration should emphasize the correct use, the hazards, the precautions, and the maintenance procedures associated with each type of power tool, in accordance with manufacturers' instructions and government regulations.

## 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?

## Task Number 90

### **Demonstrate the 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 a micrometer?
- Why are standard and quality tools necessary when repairing agricultural machinery and equipment?
- What is *torque*? Why is proper torque important?

## Task Number 91

### **Demonstrate the use of protective clothing and equipment.**

#### Definition

Demonstration should include

- types of personal protective equipment (PPE) (e.g., protection of the eyes, respiratory system, auditory functions, feet, hands, and body)
- precautions related to grooming/hygiene (e.g., hair length, loose clothing/jewelry, greasy hands, shoes, or clothing).
- the use of PPE, in accordance with manufacturer instructions and government regulations concerning hazardous materials 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?
- When might it 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?

## **Task Number 92**

### **Demonstrate the use of fire protection equipment.**

#### **Definition**

Demonstration should include identifying

- types of fires (Class A, B, C, and D) encountered in agricultural science and mechanics labs
- type of extinguisher for each type of fire and the hazards and the precautions associated with each
- fire emergency procedures that follow government regulations and instructor's guidelines.

### **Process/Skill Questions**

- Why are there different types of fire extinguishers?
- What procedure should students follow in case of an emergency or accident?

## **Task Number 93**

### **Demonstrate the use of equipment.**

#### **Definition**

Demonstration should include the equipment used in agricultural mechanics, and the correct use, hazards, and precautions associated with each, in accordance with manufacturer's specifications and instructor's guidelines. Equipment could include

- 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, battery testers and chargers).

### **Process/Skill Questions**

- What are unsafe uses of air compressors in the agricultural lab/workshop?
  - What is the safest way to hold a part in a vise?
  - When is the cleaning tank used?
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## **Task Number 94**

### **Demonstrate safety in the agricultural mechanics lab/workshop.**

#### **Definition**

Demonstration should 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 instructions and reviewing safety manuals, when applicable
- following all safety guidelines and procedures when using tools, equipment, and machinery
- selecting PPE for the operation
- following the safety standards and regulations of the EPA, Occupational Safety and Health Administration (OSHA), the Equipment and Engine Training Council (EETC) Education Committee, and SDS.

Teacher Resource: [The Safety Best Practice Guide for CTE](#), Virginia Department of Education

#### **Process/Skill Questions**

- 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?
- What information should be sent with emergency responders to the hospital with the student if a chemical is splashed in an eye or wound?

## **Task Number 95**

### **Identify general safety procedures for the operation of farm equipment.**

#### **Definition**

Identification includes

- completing the National Safe Tractor and Machinery Operation Program (NSTMOP) where applicable
- servicing

- identifying service schedules and procedures for farm machinery
- maintaining records of service work performed on machinery (e.g., oil changes, filter changes, greasing, fluid level checks, tire pressure adjustments)
- servicing a tractor
- preparing a farm implement or machinery for field work
- selecting lubricants and fuel
- maintaining
  - checking equipment for repairs
  - checking equipment for worn parts
- repairing
  - identifying repairs
  - consulting service or shop manuals
  - determining repairs needed (e.g., woodworking, welding)
  - following applicable safety procedures
  - performing repair
  - testing the piece of machinery
- storing
  - following procedures in the operator's manual
  - storing equipment in a dry place
  - storing equipment out of direct sunlight
  - following procedures for seasonal or long-term storage.

Identification also includes

- controls
- lockout-tagout procedures
- power takeoff
- shields
- PPE

Teacher Resources:

[National Safe Tractor and Machinery Operation Program \(NSTMOP\) program overview](#), Penn State Extension  
[National Safe Tractor and Machinery Operation Program \(NSTMOP\) instructor training course](#), Penn State Extension

*Teachers must become certified to teach and organize the NSTMOP to then certify students.*

### **Process/Skill Questions**

- Where does a farmer find a reputable dealer/service center for farm equipment?
- What PPE should be used for tractor and equipment operation?
- What are the most common injuries from equipment operation on the farm?
- How can farming accidents and injuries be prevented?
- Why is it necessary to service farm machinery according to the operator's manual?
- Why is it important to keep records of service work performed on farm machinery?

## **Using Mechanics in Agriculture**

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## **Task Number 96**

### **Select farm machinery and equipment.**

#### **Definition**

Selection should include

- determining the appropriate type of machinery for the job
- determining appropriate horsepower for a specific task in production agriculture.

#### **Process/Skill Questions**

- What factors should be considered when determining type and horsepower rating for a farm machinery purchase?
- Why would a farmer choose not to purchase the largest piece of farm machinery available?
- Why would a farmer not purchase the least expensive or smallest piece of farm machinery available, even if he or she needed to cut costs?
- How can farm machinery make a production agriculture enterprise more profitable?

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## **Task Number 97**

### **Identify farm structures and uses.**

#### **Definition**

Identification should include

- examining types of buildings and/or structures used in production agriculture
- selecting the type of building and/or structure to meet the needs of a production agriculture operation
- exploring factors to consider when selecting a type of farm building or structure.

#### **Process/Skill Questions**

- What types of buildings/structures are used in production agriculture?
- What factors help to determine which type of building and/or structure to use?
- What should be considered when selecting a site for an agricultural building or structure?

## **Task Number 98**

### **Identify steps in constructing a farm building.**

## Definition

Identification should include

- designing the agricultural facility
  - selecting a building to meet the needs of the agricultural operation
  - selecting a site for construction
  - determining site preparation requirements
- determining plumbing, electrical, and ventilation systems
- estimating the cost of the facility
- comparing financing options
- determining the appropriate permits for construction
- determining labor requirements for project construction.

## Process/Skill Questions

- Why is it important to check local building codes and regulations that pertain to farm buildings?
- Where does a farmer go to check for local building codes and regulations?
- What are the steps in constructing a farm building?
- Why is it important to check local rules and regulations that pertain to farm buildings?
- Why are site selection and grading important in planning to build a farm structure?
- What factors should one consider when selecting the type and size of a farm building?

## Task Number 99

### **Construct a farm building using carpentry tools and equipment.**

## Definition

Construction should include

- deciding on the type of building to construct
- preparing the site
- identifying the parts of the building (e.g., truss, joist, rafters)
- planning mechanical systems needed in the structure, including plumbing, electrical, and ventilation
- estimating the cost of the building
- constructing the building
- following all safety procedures and guidelines for
  - using hand tools
  - operating power tools
  - operating machinery and equipment.

## Process/Skill Questions

- How can one estimate the costs for a construction project for a farm building or structure?
- What are the types of buildings/structures used in production agriculture? What factors will help determine which type of building/structure to use?
- What should be considered when selecting a site for the agricultural building/structure?

- Why must mechanical systems (e.g., plumbing, electrical, ventilation) be planned before construction begins?
  - How can the cost of the planned building/structure be estimated?
  - What are the steps in planning, designing, and constructing a building/structure used in production agriculture?
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## Task Number 100

### Use metal fabrication tools and/or equipment.

#### Definition

Use should include

- following metalworking safety procedures
- fabricating parts to repair farm machinery.

#### Process/Skill Questions

- What is *fabrication*?
- Why is fabricating important to a farmer?
- What are the essential pieces of fabrication equipment needed on the farm?
- How can fabrication save farmers time and money?

## Diversifying Agricultural Enterprises

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### Task Number 101

### Research agricultural diversification practices that generate additional sources of farm income.

#### Definition

Research should include

- defining *diversified production*
- exploring diversified animal production
- examining diversified crop and specialty production
- examining alternative methods to diversify farm income (e.g., rural tourism and hospitality, generating green energy).

## Process/Skill Questions

- How can diversification improve farm income?
- What are some alternative methods of diversifying farm income?
- What are some risks of diversifying farm income?

## Task Number 102

### Research marketing opportunities.

#### Definition

Research should include various production systems and

- performance-based grower contracts
- open-market sales
- private-treaty sales
- niche marketing.

## Process/Skill Questions

- What are possible advantages of a contract?
- What are possible disadvantages of a contract?

## Task Number 103

### Examine alternative or niche market opportunities.

#### Definition

Examination should include

- defining *niche marketing*
- identifying alternative agriculture (e.g., apiary integration)
- exploring organic farming
- determining local markets.

## Process/Skill Questions

- How can niche marketing enhance income?
- What are some alternative agriculture operations?
- How does an enterprise become a certified organic operation?
- How do cultural traditions affect niche markets?

## Task Number 104

## **Develop a plan for an agritourism operation.**

### **Definition**

Development should include

- identifying agritourism opportunities
- analyzing the cost-effectiveness of an agritourism operation
- designing a marketing campaign for an agritourism operation.

### **Process/Skill Questions**

- What is *agritourism*?
- What are the local opportunities for agritourism?
- How can agritourism improve an agriculture operation?
- What is the value of agritourism from the public's perception?
- How does a farm operator launch an agritourism business? What steps must be taken?

## **Task Number 105**

### **Identify AFNR business structures.**

#### **Definition**

Identification should include

- cooperatives
  - defining *cooperatives*
  - listing the types of cooperatives
  - researching the benefits of cooperatives
  - differentiating between successful and unsuccessful cooperatives
- limited liability company (LLC)
- corporation
- partnerships
- sole proprietorship.

#### **Process/Skill Questions**

- Why would one want to become part of a cooperative?
- What are some factors that determine a cooperative's success?

## **Task Number 106**

### **Explain agricultural literacy and its relationship to public perceptions.**

## Definition

Explanation should include a definition of *agricultural literacy* and how it can improve communication about

- animal rights and animal welfare
- right-to-farm laws
- farmers' advocacy
- production facilities
- genetically modified organisms (GMOs)
- organic and conventional production
- pesticide and chemical use
- agroterrorism.

## Process/Skill Questions

- What is the difference between animal rights and animal welfare?
- What are examples of issues that arise from right-to-farm laws?
- What is the value of advocating for agriculture?
- How could agroterrorism affect national and global markets?

# Developing and Analyzing Agricultural Production Records

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## Task Number 107

### Develop financial, marketing, and risk management plans for the farm business.

#### Definition

Development should include

- risk management strategies
- marketing strategies
- strategic farm business planning, including financing options
  - credit needs for farm businesses (i.e., operating loans, cost of loans, interest)
  - operating and capital expenditures
  - estate planning
  - human resources
  - leasing and insurance.

#### Process/Skill Questions

- How can loan applications be analyzed?
- How would a business owner assemble a comprehensive credit plan?

## **Task Number 108**

### **Develop an enterprise budget for an agricultural production business.**

#### **Definition**

Development should include

- determining the true cost of production for an individual farm enterprise
- computing enterprise income, receipts, and operating expenses.

#### **Process/Skill Questions**

- How would one construct a balance sheet?
- How would one analyze a balance sheet for liquidity and solvency?

## **Task Number 109**

### **Examine strategies for tracking, reporting, and managing inventory.**

#### **Definition**

Examination may include

- spreadsheets
- databases
- inventory software.

#### **Process/Skill Questions**

- Why is it important for an agricultural business to manage inventory?
- What are the differences between first-in, first-out (FIFO) and last-in, first-out (LIFO) accounting?

## **Task Number 110**

### **Reconcile a bank statement.**

#### **Definition**

Reconciliation should include

- comparing deposits in the business records with deposits reflected in the bank statement
- adjusting the balance on the bank statement to the corrected balance

- accounting for deposits in transit
- deducting outstanding checks
- adding/deducting bank errors
- adjusting the cash account to reflect bank charges, non-sufficient funds checks, and errors in accounting
- comparing balances.

### **Process/Skill Questions**

- How is a checkbook balanced?
- What is the purpose of bank reconciliation? How can accounting software simplify this process?

## **Task Number 111**

### **Analyze a paystub.**

#### **Definition**

Analysis should include definitions of terms used on paycheck stubs, such as

- *income taxes (state and federal)*
- *Medicare insurance*
- *Social Security*
- *Federal Insurance Contributions Act (FICA).*

### **Process/Skill Questions**

- What is FICA?
- What is the purpose of the Social Security deduction?
- How would a business owner determine deductions that should come out of an employee paycheck?

## **Task Number 112**

### **Complete a sample state and federal income tax form.**

#### **Definition**

Completion should include

- the most common state and federal tax forms related to an agricultural enterprise, an explanation of each, and basic differences among them
- terms used on agriculture, business, and employer tax forms
- common software tools to assist with accounting and taxes.

### **Process/Skill Questions**

- What is Form 1040, and when would it be used?
- What is Form 1040EZ, and when would it be used?

- How would a farm owner develop a tax management plan?
- How would one differentiate tax forms used in agriculture from standard tax forms?

## Task Number 113

### Construct a complete income statement using cost and accrual basis.

#### Definition

Construction should include

- defining terminology used in income statements
  - *revenues (operating and non-operating)*
  - *expenses (operating and non-operating)*
  - *net income*
  - *gross profit*
  - *loss*
  - *statement of cash flows*
- differentiating between cost and accrual methods of accounting
- applying the four basic generally accepted accounting principles (GAAP) for preparing financial statements (e.g., historical cost principle, revenue recognition principle, matching principle, and full disclosure principle)
- determining revenue
- determining expenses
- determining net profit (earnings before interest and taxes [EBIT]).

#### Process/Skill Questions

- How would one construct an income statement on a cash basis and then account for accrual adjustments?
- How would one compute management income?
- Why might a farm business use cost vs. accrual accounting?
- Why is the income statement referred to as a profit and loss statement?

## Task Number 114

### Identify the difference between real depreciation and income tax depreciation.

#### Definition

Identification should include

- the concept of depreciation and asset valuation (e.g., when deciding to buy new vs. used farm equipment)
- differentiation between depreciation of assets for value and tax purposes.

## Process/Skill Questions

- How would a farm owner construct a plan to depreciate farm assets for tax purposes?
- Why would a farm owner depreciate farm assets?
- What types of property can be depreciated for tax purposes?

## Task Number 115

### Calculate the financial health of a farm business.

#### Definition

Calculation should include

- using data from the balance sheet, income statement, and cash flow statement to determine
  - net worth
  - profitability
    - profit margin
      - net profit margin
      - gross profit margin
      - operating profit margin
  - financial ratios, financial metrics, and other measures of performance (e.g., liquidity, operating efficiency, solvency)
    - return on equity (ROE)
    - return on assets (ROA)
    - internal rate of return (IRR)
    - cash flow yield
    - net present value (NPV)
- appraisal value of farm assets
- computation of farm liabilities.

## Process/Skill Questions

- How would one construct a balance sheet?
- How would one analyze a balance sheet for liquidity and solvency?
- How is an income statement used to determine net profit margin?

## Exploring Technology Used in AFNR Enterprises

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## Task Number 116

### Research monitoring and sensing technologies used in agricultural enterprises.

## Definition

Research should include technology such as

- UAS
  - monitoring plant growth
  - monitoring animal operations
  - monitoring soil conditions
  - detecting diseases
  - identifying pests
  - identifying nutrient deficiencies
- satellites
- sensors
- weather stations.

## Process/Skill Questions

- What is the Network for Environment and Weather Applications (NEWA), and how is it used in conjunction with weather stations as an agricultural decision support tool?
- How are plant disease, insect pest development, and crop production models helpful when making production decisions?

## Task Number 117

### Identify apps used in agricultural businesses.

#### Definition

Identification should include apps used for

- sensing technologies
- agricultural markets
  - commodities market
  - current pricing
- GIS
- soil mapping (e.g., web soil survey)
- IPM
- scouting
- precision tracking
- identification (e.g., weeds, pests, diseases).

#### Process/Skill Questions

- How are remote sensing technologies used in agriculture prone to cyber-attacks?
- How are field monitoring systems changing agricultural business management strategies?
- How does a field monitoring system increase efficiency?

## Task Number 118

# Explore careers related to agricultural technology.

## Definition

Exploration includes resources such as

- [MyCareerShines](#)
- [O\\*NET OnLine](#)
- [AgExplorer](#).

## Process/Skill Questions

- What are examples of careers related to agricultural technology?
- What careers are emerging as a result of technological innovation?

# SOL Correlation by Task

39	Identify the role of supervised agricultural experiences (SAEs) in agricultural education.	English: 12.3, 12.5
40	Participate in an SAE.	English: 12.5, 12.8
41	Identify the benefits and responsibilities of FFA membership.	English: 12.5, 12.6, 12.7, 12.8
42	Describe leadership characteristics and opportunities as they relate to agriculture and FFA.	English: 12.5  History and Social Science: VUS.8, VUS.9, VUS.10, VUS.11, WHIL.8, WHIL.10, WHIL.11
43	Apply for an FFA degree and/or an agricultural proficiency award.	English: 12.5
44	Apply supply and demand analysis to a product, commodity, or service for an agriculture, food, and natural resources (AFNR) business.	English: 12.5  History and Social Science: GOVT.14, GOVT.15
45	Explain opportunity cost in production agriculture.	English: 12.3, 12.5  History and Social Science: GOVT.14, GOVT.15
46	Explain the relationships between inputs and outputs.	English: 12.3, 12.5  History and Social Science: GOVT.14, GOVT.15
47	Identify ethical standards and best management practices (BMP) for an agricultural business.	English: 12.3, 12.5
48	Identify the procedures, licenses, permits, regulations, and laws related to starting a business.	English: 12.5  History and Social Science: GOVT.7, GOVT.8, GOVT.14, GOVT.15

49	Develop a business plan for an agricultural production enterprise.	English: 12.5 History and Social Science: GOVT.14, GOVT.15
50	Evaluate how to recruit, train, and retain employees.	English: 12.5
51	Discuss an expansion plan.	English: 12.1, 12.5
52	Describe the need for estate planning.	English: 12.5
53	Identify the elements required to form a legally binding contract for services.	English: 12.5
54	Develop a risk-management plan for an agricultural production enterprise.	English: 12.5
55	Identify the components of a farm rent/lease agreement.	English: 12.5 History and Social Science: GOVT.14, GOVT.15
56	Develop a sample nutrient management plan (NMP).	English: 12.3, 12.5
57	Determine the inputs needed to grow a crop.	English: 12.5 Mathematics: AFDA.4, AFDA.5
58	Describe how an AFNR business can minimize waste, maximize efficiency, and increase profits.	English: 12.5
59	Develop a crop rotation plan.	English: 12.5
60	Analyze the use of conservation tillage practices and erosion control systems.	English: 12.5
61	Interpret various agencies' soil conservation program requirements.	English: 12.5 History and Social Science: GOVT.7, GOVT.8, GOVT.14, GOVT.15
62	Explain the importance of the U.S. Food and Drug Administration's (FDA) Food Safety Modernization Act (FSMA).	English: 12.5, 12.8 History and Social Science: GOVT.7, GOVT.8, GOVT.14, GOVT.15
63	Explain Good Agricultural Practices (GAP) and Good Handling Practices (GHP).	English: 12.5, 12.8
64	Describe veterinary practices performed by a livestock owner/manager.	English: 12.5
65	Develop a healthcare plan for a livestock production enterprise.	English: 12.5
66	Develop a biosecurity plan.	English: 12.5
67	Describe livestock waste management systems.	English: 12.5
68	Develop a conservation plan.	English: 12.5
69	Identify elements for maintenance of a wildlife habitat.	English: 12.5 Science: BIO.8
70	Develop plans for a hunting/fishing enterprise.	English: 12.5
71	Explain multiple functions of farm ponds.	English: 12.5
72	Identify agroforestry management practices to create environmental, economic, and social benefits.	English: 12.5
73	Identify silviculture practices for forest crop improvement.	English: 12.5

74	Identify planting and harvesting techniques.	English: 12.5
75	Identify regeneration methods necessary for the continuous growth of trees.	English: 12.3, 12.5
76	Design plans to establish forest roads.	English: 12.1, 12.8
77	Identify conditions needed to harvest trees for optimal profit.	English: 12.3, 12.5
78	Develop a forest fire prevention plan.	English: 12.5, 12.8
79	Describe use of pesticides. (Students should not use any pesticides)	English: 12.5, 12.8
80	Identify technologies used in pesticide application.	English: 12.5  History and Social Science: GOVT.12, VUS.14, WG.17, WHII.14
81	Obtain pesticide applicator certification.	English: 12.5, 12.8  History and Social Science: GOVT.7, GOVT.8, GOVT.14, GOVT.15
82	Calibrate a sprayer.	English: 12.5  Mathematics: AII.3
83	Identify marked safety areas.	English: 12.5
84	Identify the location and use of eye wash stations.	English: 12.5  Science: CH.1
85	Identify the location of the posted evacuation routes.	English: 12.5
86	Demonstrate knowledge of safety data sheets (SDS).	English: 12.5  Science: CH.1
87	Demonstrate the use of chemicals.	English: 12.5
88	Demonstrate the use of standard and metric hand tools.	English: 12.5
89	Demonstrate the use of power tools.	English: 12.5
90	Demonstrate the use of precision standard and metric measuring tools.	English: 12.5
91	Demonstrate the use of protective clothing and equipment.	English: 12.5
92	Demonstrate the use of fire protection equipment.	English: 12.5
93	Demonstrate the use of equipment.	
94	Demonstrate safety in the agricultural mechanics lab/workshop.	English: 12.5, 12.6, 12.7, 12.8  History and Social Science: GOVT.7, GOVT.8, GOVT.14, GOVT.15
95	Identify general safety procedures for the operation of farm equipment.	English: 12.5, 12.6, 12.7
96	Select farm machinery and equipment.	
97	Identify farm structures and uses.	English: 12.8
98	Identify steps in constructing a farm building.	English: 12.1, 12.5  History and Social Science: GOVT.7, GOVT.8, GOVT.14, GOVT.15

99	Construct a farm building using carpentry tools and equipment.	
100	Use metal fabrication tools and/or equipment.	English: 12.5
101	Research agricultural diversification practices that generate additional sources of farm income.	English: 12.3, 12.5, 12.8
102	Research marketing opportunities.	English: 12.8
103	Examine alternative or niche market opportunities.	English: 12.3, 12.5, 12.8
104	Develop a plan for an agritourism operation.	English: 12.5
105	Identify AFNR business structures.	English: 12.3, 12.5, 12.8
106	Explain agricultural literacy and its relationship to public perceptions.	English: 12.5  History and Social Science: GOVT.12, VUS.14, WG.17, WHII.14
107	Develop financial, marketing, and risk management plans for the farm business.	English: 12.5  History and Social Science: GOVT.7, GOVT.8, GOVT.14, GOVT.15
108	Develop an enterprise budget for an agricultural production business.	English: 12.5  Mathematics: AII.3
109	Examine strategies for tracking, reporting, and managing inventory.	English: 12.5  Mathematics: COM.1, COM.4, COM.7, COM.9, COM.10, COM.11
110	Reconcile a bank statement.	English: 12.5
111	Analyze a paystub.	English: 12.3, 12.5  History and Social Science: GOVT.14, GOVT.15
112	Complete a sample state and federal income tax form.	English: 12.3, 12.5, 12.6, 12.7  History and Social Science: GOVT.7, GOVT.8, GOVT.14, GOVT.15
113	Construct a complete income statement using cost and accrual basis.	English: 12.3, 12.5  History and Social Science: GOVT.14, GOVT.15
114	Identify the difference between real depreciation and income tax depreciation.	English: 12.5
115	Calculate the financial health of a farm business.	English: 12.2, 12.5
116	Research monitoring and sensing technologies used in agricultural enterprises.	English: 12.8
117	Identify apps used in agricultural businesses.	English: 12.2, 12.5
118	Explore careers related to agricultural technology.	English: 12.5, 12.8

# 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](#).

## 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

- Animal Systems Assessment
- Beef Quality Assurance Examination
- College and Work Readiness Assessment (CWRA+)
- Customer Service Specialist (CSS) Examination
- Forest Products and Processing Assessment
- Microsoft 365 Fundamentals Examination
- Microsoft Certified Azure Fundamentals Examination
- Microsoft Dynamics 365 Fundamentals Examination
- Microsoft Office Specialist (MOS) Examinations
- National Career Readiness Certificate Assessment
- Natural Resources Systems Assessment
- Production Agriculture Assessment
- 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)
- Forestry Management (8042/36 weeks)
- Forestry Management, Advanced (8044/36 weeks)
- Greenhouse Plant Production and Management (8035/36 weeks)
- Horticulture Sciences (8034/36 weeks)
- Introduction to Animal Systems (8008/36 weeks)
- Introduction to Natural Resources and Ecology Systems (8040/36 weeks)
- Introduction to Plant Systems (8007/36 weeks)
- Introduction to Power, Structural, and Technical Systems (8016/36 weeks)
- Livestock Production Management (8012/36 weeks)

Career Cluster: Agriculture, Food and Natural Resources	
Pathway	Occupations
Agribusiness Systems	Farm, Ranch Manager Farmer/Rancher Feed, Farm Supply Store Sales Manager
Animal Systems	Animal Breeder, Husbandry Animal Geneticist Animal Nutritionist

<b>Career Cluster: Agriculture, Food and Natural Resources</b>	
<b>Pathway</b>	<b>Occupations</b>
	<b>Animal Scientist</b> <b>Aquacultural Manager</b> <b>Poultry Manager</b>
<b>Environmental Service Systems</b>	<b>Toxicologist</b> <b>Turf Farmer</b>
<b>Food Products and Processing Systems</b>	<b>Food Scientist</b>
<b>Natural Resources Systems</b>	<b>Fisheries Technician</b> <b>Forest Manager, Forester</b> <b>Forest Technician</b>
<b>Plant Systems</b>	<b>Certified Crop Advisor</b> <b>Crop Grower</b> <b>Custom Harvester</b> <b>Farm, Ranch Manager</b> <b>Farmer/Rancher</b> <b>Nursery and Greenhouse Manager</b> <b>Soil and Plant Scientist</b> <b>Turf Farmer</b>