Wisconsin Agriculture, Food and Natural Resources

Grades 9-12

Agriculture Business Standards ABS

1 **Students will use economic principles to establish and manage an AFNR enterprise.** ABS1

- a Apply principles of capitalism in the business environment. ABS1.A
  - 3 Differentiate types of ownership and outline the structure of AFNR businesses in a capitalistic economic system. ABS1.A.3.H
  - 4 Execute supply-and-demand principles in AFNR businesses. ABS1.A.4.H
- b Apply principles of entrepreneurship in businesses. ABS1.B
  - 3 Demonstrate entrepreneurship, including idea generation, opportunity analysis and risk assessment. ABS1.B.3.H

2 **Students will use appropriate management planning principles in AFNR business enterprise.** ABS2

a Compose and analyze a business plan for an enterprise. ABS2.A

5 Identify components of business plans and demonstrate how to write such components using the SMART format. ABS2.A.5.H

6 Prepare and critique AFNR business plans. ABS2.A.6.H

7 Observe appropriate laws and regulations in planning and operating AFNR businesses. ABS2.A.7.H

8 Use methods of AFNR business enterprise analysis, such as SWOT (strengths, weaknesses, opportunities and threats). ABS2.A.8.H

b Read, interpret, evaluate and write a mission statement to guide business goals, objectives and resource allocation. ABS2.B

5 Identify approaches in creating mission statements for AFNR businesses. ABS2.B.5.H

6 Create and disseminate a mission statement for business activities in AFNR. ABS2.B.6.H

7 Prepare short-term, intermediate and long-term goals and objectives that are consistent with the mission statement for an AFNR business. ABS2.B.7.H

8 Evaluate AFNR business goals and objectives and make revisions based on observations. ABS2.B.8.H

c Apply appropriate management skills to organize a business. ABS2.C

4 Identify management types in AFNR businesses. ABS2.C.4.H

5 Implement management approaches to assure efficiency and profitability. ABS2.C.5.H

6 Prepare and deliver AFNR business presentations that include customers served, sources of inputs and how a business produces goods and services. ABS2.C.6.H

7 Create an organizational chart for an AFNR business. ABS2.C.7.H

d Recruit, train and retain appropriate and productive human resources for businesses. ABS2.D

9 Determine appropriate human resources for AFNR businesses. ABS2.D.9.H

10 Write job descriptions for specific positions in an AFNR business. ABS2.D.10.H

11 Design a career development and training plan for employees of an AFNR business. ABS2.D.11.H

12 Create a recruitment and evaluation program for employees in an AFNR business. ABS2.D.12.H

13 Establish and maintain appropriate records and reports on human resources. ABS2.D.13.H

14 Determine and follow appropriate regulations in recruiting, hiring and promoting personnel. ABS2.D.14.H

15 Design a legally compliant and competitive compensation plan for AFNR business employees. ABS2.D.15.H

16 Devise a compensation plan to equitably compensate, motivate and recognize productivity of human resources. ABS2.D.16.H

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3 Students will use record keeping to accomplish AFNR business objectives while complying with laws and regulations. ABS3

a Prepare and maintain all files needed to accomplish effective record keeping. ABS3.A

3 Analyze records to improve efficiency and profitability of an AFNR business. ABS3.A.3.H

4 Apply management information systems in AFNR business financial analysis. ABS3.A.4.H

b Implement appropriate inventory management practices. ABS3.B

3 Use computer technology in inventory management and reporting, including spreadsheets, databases, word processing, networked systems and the Internet. ABS3.B.3.H

4 Apply logistics management strategies. ABS3.B.4.H

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4 Students will apply generally accepted accounting principles and skills to manage cash budgets, credit budgets and credit for AFNR businesses. ABS4

a Use accounting fundamentals to accomplish dependable bookkeeping and fiscal management. ABS4.A

5 Manage assets, including credit, for agribusiness goal achievement. ABS4.A.5.H

6 Manage resources to minimize liabilities and maximize profit. ABS4.A.6.H

7 Use accounting information to estimate the cost of goods sold and margins on the goods. ABS4.A.7.H

8 Evaluate characteristics of lines of credit, loan terms and alternatives in sources of capital. ABS4.A.8.H

9 Analyze reporting requirements for income, property and employment taxes associated with small AFNR businesses. ABS4.A.9.H

10 Use accountants in AFNR business management. ABS4.A.10.H

5 **Students will access accomplishment of goals and objectives by an AFNR business.** ABS5

a Maintain and interpret financial information (i.e., income statements, balance sheets, inventory, purchase orders, accounts receivable and cash-flow analyses) for businesses. ABS5.A

7 Maintain accounting information needed to prepare an income statement, balance sheet and cash-flow analysis for an AFNR business. ABS5.A.7.H

8 Interpret financial information for an AFNR business to determine profitability, net worth position, financial ratios, performance measures and ability to meet cash-flow requirements. ABS5.A.8.H

9 Maintain accounting information needed to prepare an income statement, balance sheet and cash-flow analysis for an AFNR business. ABS5.A.9.H

10 Interpret financial information for an AFNR business to determine profitability, net worth position, financial ratios, performance measures and ability to meet cash-flow requirements. ABS5.A.10.H

11 Interpret business performance data. ABS5.A.11.H

12 Conduct a breakeven analysis for an AFNR business. ABS5.A.12.H

13 Summarize financial data for use in preparing various business financial statements. ABS5.A.13.H

14 Interpret and evaluate financial statements, including income statements, balance sheets and cash-flow analyses. ABS5.A.14.H

6 **Students will use industry-accepted marketing principles to accomplish AFNR business objectives.** ABS6

- a Conduct appropriate market and marketing research. ABS6.A
  - 5 Apply benefit/cost analysis to marketing in AFNR businesses. ABS6.A.5.H
  - 6 Implement and evaluate marketing strategies with agricultural commodities, products and services. ABS6.A.6.H
  - 7 Assess the presence of marketing infrastructure for agricultural commodities. ABS6.A.7.H
  - 8 Appropriate modifications to achieve AFNR business goals. ABS6.A.8.H
  - 9 Evaluate alternative marketing strategies, such as value-adding, branding and niche marketing and propose and implement ABS6.A.9.H
- b Develop a marketing plan. ABS6.B
  - 3 Perform a marketing analysis, including evaluation of the competitors, customers, international and domestic policy environment, regulations and rules, standards and AFNR business resources. ABS6.B.3.H
  - 4 Establish marketing plan goals/objectives, including monitoring, measuring and analyzing goal achievement. ABS6.B.4.H
- c Develop strategies for marketing plan implementation. ABS6.C
  - 3 Determine marketing strategies that are most likely to be effective in an AFNR business. ABS6.C.3.H
  - 4 Revise marketing strategies based on monitoring and measurement information for target customer base. ABS6.C.4.H
- d Develop specific tactics to market AFNR products and services. ABS6.D
  - 3 Use strategies to follow up sales to provide post-sales service. ABS6.D.3.H
  - 4 Intercept, interpret and process customer complaints, needs and problems with products and services. ABS6.D.4.H

7 **Students will create a production system plan.** ABS7

a Prepare a step-by-step production plan that identifies needed resources. ABS7.A

3 Identify and assess alternative production systems and ways products can be produced. ABS7.A.3.H

4 Adapt production processes based on changing product characteristics. ABS7.A.4.H

b Develop a production and operational plan. ABS7.B

4 Evaluate the components of a production and operational plan and then revise an existing plan. ABS7.B.4.H

5 Develop and implement a product supply and distribution plan that meets the goals and objectives of an AFNR business. ABS7.B.5.H

6 Examine legal and industry requirements for a production facility. ABS7.B.6.H

7 Develop a production facility plan that includes building, equipment, personnel, utilities and logistics components. ABS7.B.7.H

c Use appropriate techniques to determine the most likely strengths, weaknesses and inconsistencies in a business plan and relate these to risk management strategies. ABS7.C

2 Describe approaches to use in revising a business plan for improved consistency and realism. ABS7.C.2.H

3 Revise business plans as needed to assure internal consistency. ABS7.C.3.H

d Manage risk and uncertainty. ABS7.D

3 Describe alternative approaches to reducing risk, including the use of insurance for product liability, property, production or income loss and for personnel life and health. ABS7.D.3.H

4 Prepare a comprehensive risk management and contingency plan for an AFNR business. ABS7.D.4.H

Animal Systems AS

1 **Students will examine the components, historical development, global implications and future trends of the animal systems industry.** AS1

a Evaluate the development and implications of animal origin, domestication and distribution. AS1.A

5 Evaluate and describe characteristics of animals that developed in response to the animals' environment and led to their domestication. AS1.A.5.H

6 Outline the development of the animal industry and the resulting products, services and careers. AS1.A.6.H

7 Predict adaptations of animals to production practices and environments. AS1.A.7.H

8 Predict trends and implications of future development of the animal systems industry. AS1.A.8.H

2 **Students will classify, evaluate, select and manage animals based on anatomical and physiological characteristics.** AS2

a Classify animals according to hierarchical taxonomy and agricultural use. AS2.A

4 Explain how animals are classified using Linnaeus's taxonomical classification system. AS2.A.4.H

5 Compare and contrast the hierarchical classification of the major agricultural animal species. AS2.A.5.H

6 Classify animals according to the taxonomical classification system. AS2.A.6.H

7 Appraise and evaluate the economic value of animals for various applications in the agriculture industry. AS2.A.7.H

b Apply principles of comparative anatomy and physiology to uses within various animal systems. AS2.B

6 Compare and contrast animal cells, tissues organs and body systems and describe their functions. AS2.B.6.H

7 Detail the processes and application of meiosis and mitosis in animal growth, development, health and reproduction. AS2.B.7.H

8 Explain the relationship, importance and uses of animal tissues to growth, performance and health in the agriculture industry. AS2.B.8.H

9 Compare and contrast organ types, functions and body systems adaptations among and between animal species. AS2.B.9.H

10 Explain how the components and systems of animal anatomy and physiology relate to the production and use of animals. AS2.B.10.H

11 Describe the molecular makeup of animal cells and organs and their importance in animal growth, health, production, reproduction and management. AS2.B.11.H

12 Explain the impact of animal body systems on health, growth and reproduction. AS2.B.12.H

c Select animals for specific purposes and maximum performance based on anatomy and physiology. AS2.C

4 Compare and contrast desirable anatomical and physiological characteristics of animals within and between species. AS2.C.4.H

5 Assess an animal to determine if it has reached its optimal performance level based on anatomical and physiological characteristics. AS2.C.5.H

6 Evaluate and select animals to maximize performance based on anatomical and physiological characteristics that affect health, growth and reproduction. AS2.C.6.H

7 Develop efficient procedures to produce consistently high quality animals, well suited for their intended purposes. AS2.C.7.H

3 **Students will provide for the proper health care of animals.** AS3

a Prescribe and implement a prevention treatment program for animal diseases, parasites and other disorders. AS3.A

8 Perform simple health-check evaluations on animals. AS3.A.8.H

9 Perform diagnostic tests to detect health problems in animals. AS3.A.9.H

10 Diagnose illnesses and disorders of animals based on symptoms and problems caused by diseases, parasites and physiological disorders. AS3.A.10.H

11 Treat common diseases, parasites and physiological disorders of animals. AS3.A.11.H

12 Evaluate preventive measures for controlling and limiting the spread of diseases, parasites and disorders among animals. AS3.A.12.H

13 Design and implement a health maintenance and disease and disorder prevention plan for animals in their natural and/or confined environments. AS3.A.13.H

14 Prepare animals, facilities and equipment for surgical and nonsurgical veterinary treatments and procedures. AS3.A.14.H

15 Perform surgical and nonsurgical veterinary treatments and procedures in animal health care. AS3.A.15.H

b Identify bio-security threats and provide for the bio-security of agricultural animals and production facilities. AS3.B

4 Explain the health risk of zoonotic diseases to humans and their historical significance and future implications. AS3.B.4.H

5 Implement zoonotic disease prevention methods and procedures for the safe handling and treatment of animals. AS3.B.5.H

6 Discuss procedures at the local, state and national levels to ensure biosecurity of the animal industry. AS3.B.6.H

7 Implement a biosecurity plan for an animal production operation. AS3.B.7.H

4 **Students will apply principles of animal nutrition to ensure the proper growth, development, reproduction and economic production of animals.** AS4

a Formulate feed rations to provide for the nutritional needs of animals. AS4.A

4 Determine the relative nutritional value of feedstuffs by evaluating their general quality and condition. AS4.A.4.H

5 Appraise the adequacy of feed rations using data from the analysis of feedstuffs, animal requirements and performance. AS4.A.5.H

6 Select appropriate feedstuffs for animals based on factors such as economics, digestive system and nutritional needs. AS4.A.6.H

7 Formulate animal feeds based on nutritional requirements, using feed ingredients for maximum nutrition and optimal economic production. AS4.A.7.H

b Prescribe and administer animal feed additives and growth promotants in animal production. AS4.B

3 Discuss how feed additives and growth promotants are administered and the precautions that should be taken. AS4.B.3.H

4 Prescribe and administer feed additives and growth promotants. AS4.B.4.H

5 **Students will evaluate and select animals based on scientific principles of animal production.** AS5

a Evaluate the male and females reproductive systems in selecting animals. AS5.A

3 Describe the functions of major organs in the male and female reproductive systems. AS5.A.3.H

4 Select breeding animals based on characteristics of the reproductive organs. AS5.A.4.H

b Evaluate animals for breeding readiness and soundness. AS5.B

2 Summarize factors that lead to reproductive maturity. AS5.B.2.H

3 Evaluate and select animals for reproductive readiness. AS5.B.3.H

c Describe how selection and geographical regions impact the economic decisions of our livestock business. AS5.C

3 Evaluate reproductive problems that occur in animals. AS5.C.3.H

4 Treat or cull animals with reproductive problems. AS5.C.4.H

d Apply scientific principles in the selection and breeding of animals. AS5.D

3 Explain the advantages of using genetically superior animals in the production of animals and animal products. AS5.D.3.H

4 Select a breeding system based on the principles of genetics and reproductive/economic efficiencies. AS5.D.4.H

f Compare and contrast scientific methods associated with animal reproduction. AS5.F

6 Explain the processes of natural and artificial breeding methods. AS5.F.6.H

7 Compare and contrast quantitative breeding value differences between genetically superior animals and animals of average genetic value. AS5.F.7.H

8 Select animals based on quantitative breeding values for specific characteristics. AS5.F.8.H

9 Explain the processes of major reproductive management practices, including estrous synchronization, superovulation, flushing and embryo transfer. AS5.F.9.H

10 Perform procedures for estrous synchronization, superovulation, flushing, embryo transfer and other reproductive management practices. AS5.F.10.H

11 Explain and demonstrate the materials, methods and processes of artificial insemination. AS5.F.11.H

6 **Students will prepare and implement animal handling procedures for the safety of animals, producers and consumers of animal products.** AS6

a Demonstrate safe animal handling and management techniques. AS6.A

4 Outline safety procedures for working with animals by species. AS6.A.4.H

5 Design programs that assure the welfare of animals and prevent abuse or mistreatment. AS6.A.5.H

h. Interpret animal behaviors and execute protocols for safe handling of animals. AS6.A.6.H

7 Implement quality-assurance programs and procedures for animal production. AS6.A.7.H

b Implement procedures to ensure that animal products are safe. AS6.B

4 Discuss consumer concerns with animal production practices relative to human health. AS6.B.4.H

5 Explain why animal trace-back capability, using individual animal and farm identification systems, is important to producers and consumers. AS6.B.5.H

6 Implement a program to assure the safety of animal products. AS6.B.6.H

7 Implement an animal and/or premises identification program. AS6.B.7.H

7 **Students will select animal facilities and equipment that provide for the safe and efficient production, housing and handling of animals.** AS7

a Design animal housing, equipment and handling facilities for the major systems of animal production. AS7.A

4 Critique designs for an animal facility and prescribe alternative layouts and adjustments for the safe and efficient use of the facility. AS7.A.4.H

5 Design an animal facility, focusing on animal requirements, efficiency, safety and ease of handling. AS7.A.5.H

6 Explain how modern equipment and handling facilities enhance the safe and economic production of animals. AS7.A.6.H

7 Select equipment and implement animal handling procedures and improvements to enhance production efficiency. AS7.A.7.H

b Comply with government regulations and safety standards for facilities used in animal production. AS7.B

2 Evaluate an animal facility to determine if standards have been met. AS7.B.2.H

3 Design a facility that meets standards for the legal, safe, ethical and efficient production of animals. AS7.B.3.H

8 **Students will analyze environmental factors associated with animal production.** AS8

a Reduce the effects of animal production on the environment. AS8.A

3 Outline methods of reducing the effects of animal agriculture on the environment. AS8.A.3.H

4 Implement measures to reduce the impact of animal agriculture on the environment. AS8.A.4.H

b Evaluate the effects of environmental conditions on animals. AS8.B

2 Describe the effects of environmental conditions on animal populations and performance. AS8.B.2.H

3 Establish and maintain favorable environmental conditions for animal growth and performance. AS8.B.3.H

Biotechnology Systems BT

1 **Students will recognize the historical, social, cultural and potential applications of biotechnology.** BT1

a Distinguish major innovators, historical developments and potential applications of biotechnology in agriculture. BT1.A

5 Create a timeline and use it to explain the developmental progression of biotechnology. BT1.A.5.H

6 Research and report on current work being done in agricultural biotechnology. BT1.A.6.H

7 Research and report on emerging problems and issues associated with agricultural biotechnology. BT1.A.7.H

b Analyze the ethical, legal, social and cultural issues relating to biotechnology. BT1.B

7 Interpret the major regulatory issues related to biotechnology. BT1.B.7.H

8 Evaluate the benefits and risks associated with biotechnology. BT1.B.8.H

9 Examine an ethical dilemma associated with biotechnology by identifying its components. BT1.B.9.H

10 Examine intellectual properties associated with biotechnology by defining their components. BT1.B.10.H

2 **Students will demonstrate laboratory skills as applied to biotechnology.** BT2

a Demonstrate safe and proper laboratory procedures and record keeping using biological materials. BT2.A

13 Analyze strengths of the research based on data and procedures and propose future investigation. BT2.A.13.H

14 Operate advanced laboratory equipment and measurement devices. BT2.A.14.H

15 Demonstrate advanced aseptic techniques in the biotechnology laboratory. BT2.A.15.H

16 Select an appropriate standard operating procedure for working with biological materials. BT2.A.16.H

17 Inventory biological and chemical materials and maintain accurate records of supplies and expiration dates. BT2.A.17.H

18 Diagram the flow of waste after it leaves the laboratory. BT2.A.18.H

b Perform microbiology, molecular biology, enzymology and immunology procedures. BT2.B

12 Isolate, maintain, quantify and store cell cultures. BT2.B.12.H

13 Explain the molecular basis for heredity and the tools and techniques used in DNA and RNA manipulations. BT2.B.13.H

14 Perform electrophoresis techniques and interpret electrophoresis fragmentation patterns. BT2.B.14.H

15 Perform protein separation techniques and interpret the results. BT2.B.15.H

16 Conduct an Enzyme-Linked Immunosorbent Assay (ELISA). BT2.B.16.H

17 Research and describe the use of biotechnology to detect microbes. BT2.B.17.H

c Evaluate the application of genetic engineering to improve products of AFNR systems. BT2.C

7 Diagram the processes and describe the techniques used to produce transgenic eukaryotes. BT2.C.7.H

8 Describe processes by which enzymes are produced through biotechnology. BT2.C.8.H

9 Diagram the process by which organisms are genetically engineered for waste treatment. BT2.C.9.H

10 Investigate and report on genetic engineering procedures used in the production of aquatic species. BT2.C.10.H

d Perform biotechnology processes used in AFNR systems. BT2.D

13 Describe the processes used to produce animal hormones from transgenic organisms. BT2.D.13.H

14 Compare and contrast bioengineering and conventional pathways used in food processing. BT2.D.14.H

15 Describe the process used in producing alcohol from biomass. BT2.D.15.H

16 Diagram the process used in producing biodiesel from biomass. BT2.D.16.H

17 Assess the characteristics of biomass that make it useful for biofuels production. BT2.D.17.H

18 Illustrate the process used in producing methane from biomass. BT2.D.18.H

f Use biotechnology to monitor and evaluate procedures performed in AFNR systems. BT2.F

14 Select biotechnology tools used to monitor and direct plant breeding. BT2.F.14.H

15 Assess the benefits, risks and opportunities associated with using biotechnology to promote animal health. BT2.F.15.H

16 Describe the use of biotechnology in bioremediation. BT2.F.16.H

17 Describe the processes involved in bio treatment of biological wastes and industrial chemical wastes. BT2.F.17.H

18 Select biotechnology tools used to measure biodiversity. BT2.F.18.H

19 Explain how biotechnology tools can be used to monitor the effects of agricultural practices on wild populations. BT2.F.19.H

20 Describe the processes used in the production of molecules for use in industrial applications. BT2.F.20.H

Environmental Service Systems ESS

1 **Students will use analytical procedures to plan and evaluate environmental service systems while assessing the impact of policies and regulations on environmental service systems.** ESS1

a Analyze and interpret samples. ESS1.A

5 Determine appropriate sampling techniques, analyze and interpret samples and generate statistical analysis report(s) and prepare valid chemical laboratory samples according to instructions. ESS1.A.5.H

6 Demonstrate proper use, maintenance and calibration of lab and monitoring equipment according to standard operating procedures. ESS1.A.6.H

b Interpret laws affecting environmental service systems. ESS1.B

3 Identify purposes of Wisconsin laws associated with environmental service systems. ESS1.B.3.H

2 **Students will apply scientific principles to environmental service systems.** ESS2

a Apply meteorology principles to environmental service systems. ESS2.A

9 Differentiate the types of weather systems and patterns along with basic monitoring of meteorological conditions with accurately documented data. ESS2.A.9.H

10 Illustrate and monitor the formation of acid precipitation and explain its impact on the environment. ESS2.A.10.H

11 Report on consequences of climate change and its impact on Wisconsin and globally. ESS2.A.11.H

12 Explain the basics and contributing factors of the greenhouse effect and how it alters the earth's balance of energy including greenhouse gasses. ESS2.A.12.H

b Apply soil science and microbiology principles to environmental service systems. ESS2.B

13 Differentiate rocks relating chemical composition of mineral matter in soils to the parent material with a connection to environmental service systems. ESS2.B.13.H

14 Relate and evaluate soil microorganism activities to environmental service systems. ESS2.B.14.H

15 Identify physical soil qualities, through testing, that determine its use for environmental service systems. ESS2.B.15.H

16 Determine land capability classes for land parcels and design a land-use management plan for a given area. ESS2.B.16.H

17 Describe microbial growth in the environment and analyze the influence of environmental factors on microbial growth with an examination of microorganisms using safe practices. ESS2.B.17.H

18 Outline procedures for a bioassay test followed by a basic bioassay test related to environmental service systems and interpret results. ESS2.B.18.H

c Apply hydrology principles to environmental service systems. ESS2.C

13 Describe and research water characteristics that influence the biosphere for life and be able to identify current environmental water issues. ESS2.C.13.H

14 Describe ground and surface water interactions with emphasis on groundwater-flow equations and Darcy's Law to explain how geology and meteorology affect groundwater and its flow. ESS2.C.14.H

15 Identify differences in groundwater potential delineate groundwater potential zones. ESS2.C.15.H

16 Describe precautions taken to prevent/reduce groundwater contamination while testing and documenting results of related tests. ESS2.C.16.H

17 Explain, measure and document velocity of water as it influences channel morphology and stream processes. ESS2.C.17.H

18 Discuss design principles related to hydraulic systems and high-flow technologies related to fluid movement and create a model. ESS2.C.18.H

d Apply best management techniques associated with the properties, classifications and functions of wetlands. ESS2.D

9 Explain the criteria for classifying wetlands while applying the Hydrogeomorphic (HGM) Approach and National Wetland Inventories (NWI) to determine the classification for local wetlands. ESS2.D.9.H

10 Conduct a survey and identify of the predominant species. ESS2.D.10.H

11 Identify techniques used to evaluate a wetland, record conditions of a local wetland followed by application of proper techniques used to manage, create and restore a wetland. ESS2.D.11.H

12 Distinguish characteristics of inorganic and organic compounds and identify standard operating procedures for use of chemicals in environmental service systems. ESS2.D.12.H

3 **Students will operate environmental service systems to manage a facility environment.** ESS3

a Use pollution control measures to maintain a safe facility environment. ESS3.A

5 Provide examples of industrial and nonindustrial pollution impacts on the environment and discuss a local pollution survey. ESS3.A.5.H

6 Conduct tests determining the presence and extent of pollution and create a plan to develop a pollution, remediation, management or prevention program. ESS3.A.6.H

b Manage safe disposal of all categories of solid waste. ESS3.B

13 Evaluate and analyze environmental hazards created by different types of solid waste, solid waste accumulation and solid waste disposal. ESS3.B.13.H

14 Collect, identify and treat solid waste materials and recognize byproducts of solid waste treatments. ESS3.B.14.H

15 Explain and evaluate basic sanitary landfill operating procedures and designs. ESS3.B.15.H

16 Explain and evaluate scientific operating principles of composting and compost facilities. ESS3.B.16.H

17 Describe and evaluate methods of incineration and its environmental impact including Wisconsin's waste-to-energy plants. ESS3.B.17.H

18 Describe recycling methods and conduct a local survey analyzing for future recycling options. ESS3.B.18.H

c Apply the principles of public drinking water treatment operations to ensure safe water at a facility. ESS3.C

5 Illustrate and/or demonstrate the steps in the public drinking water treatment process with emphasis on equipment used. ESS3.C.5.H

6 Conduct and interpret source water assessment. ESS3.C.6.H

d Apply principles of wastewater treatment to manage wastewater disposal in keeping with rules and regulations. ESS3.D

5 Demonstrate use of water-testing instruments and water-treatment equipment to treat wastewater. ESS3.D.5.H

6 Describe procedures for the treatment and disposal of hazardous materials and wastes while identifying safety practices to reduce risks. ESS3.D.6.H

4 **Students will examine the relationships between energy sources and environmental service system with a basic understanding of the use of tools, equipment, machinery and technology to accomplish tasks in environmental service systems.** ESS4

a Compare and contrast the impact of conventional and alternative energy sources on the environment. ESS4.A

5 Compare and contrast the use and environmental impact of the burning of fossil fuels (conventional energy sources). ESS4.A.5.H

6 Compare and contrast the use and environmental impact of alternative energy sources. ESS4.A.6.H

b Use technological and mathematical tools to map land, facilities and infrastructure with inclusion of basic maintenance knowledge related to tools, equipment and machinery in safe working order for tasks in environmental service systems. ESS4.B

5 Explain and demonstrate surveying and mapping principles with identification/description of surveying and mapping equipment with awareness for infrastructure. ESS4.B.5.H

6 Operate equipment and machinery in accordance with manufacturers' instructions and OSHA standards, specifically addressing personal protective equipment and proper machine guarding. ESS4.B.6.H

7 Demonstrate proper preventative maintenance techniques and set up a mock preventative maintenance schedule. ESS4.B.7.H

Food Production and Processing FPP

1 **Students will examine components of the food industry and historical development of food products and processing.** FPP1

a Evaluate the significance and implications of changes and trends in the food products and processing industry. FPP1.A

5 Evaluate changes and trends in the food products and processing industry and be able to predict trends and implications in the food products and processing industry. FPP1.A.5.H

6 Determine appropriate industry response to consumer concerns to assure a safe and wholesome food supply. FPP1.A.6.H

b Work effectively with industry organizations, groups and regulatory agencies affecting the food products and processing industry. FPP1.B

5 Demonstrate how to interact effectively with organizations, groups and regulatory agencies that affect the food products and processing industry. FPP1.B.5.H

h. Prepare a plan for implementation of industry standards in food products and processing programs. FPP1.B.6.H

2 **Students will apply safety principles; recommend equipment and facility management techniques to the food products and processing industry.** FPP2

a Manage operational procedures and create equipment and facility maintenance plans. FPP2.A

6 Develop and evaluate SSOP for a food products and processing company. FPP2.A.6.H

7 Develop a plan to implement GMP for a food products and processing company. FPP2.A.7.H

8 Perform basic equipment and facility maintenance in a food products and processing operation. FPP2.A.8.H

b Implement Hazard Analysis and Critical Control Point (HACCP) procedures to establish operating parameters. FPP2.B

5 Analyze the effectiveness of a food products and processing company's Critical Control Point (CCP) procedures. FPP2.B.5.H

6 Design an HACCP program for a food products and processing facility. FPP2.B.6.H

c Apply safety and sanitation procedures in the handling, processing and storing of food products. FPP2.C

9 Demonstrate approved food product handling techniques. FPP2.C.9.H

10 Interpret quality-assurance test results and apply corrective procedures. FPP2.C.10.H

11 Conduct and interpret microbiological tests for food-borne pathogens and implement corrective procedures. FPP2.C.11.H

12 Demonstrate proper record keeping in a food products and processing system. FPP2.C.12.H

d Demonstrate worker safety procedures with food product and processing equipment and facilities. FPP2.D

3 Create a check list of industry-used safety procedures and evaluate school lab safety procedures. FPP2.D.3.H

3 **Students will apply principles of science to the food products and processing industry.** FPP3

a Apply principles of science to food processing to provide a safe, wholesome and nutritious food supply FPP3.A

15 Conduct research in food science and interpret results to improve food products. FPP3.A.15.H

16 Explain how the chemical and physical properties of foods influence nutritional value and eating quality. FPP3.A.16.H

17 Conduct a test and then compare and contrast the nutritive value of food and food groups. FPP3.A.17.H

18 Analyze food products to identify food constituents. FPP3.A.18.H

19 Formulate and explain incorporation of additives into food products. FPP3.A.19.H

20 Prepare and label foods according to the established standards of regulatory agencies. FPP3.A.20.H

21 Perform sensory-testing and marketing functions to characterize and determine consumer preference and market potential. FPP3.A.21.H

4 **Students will select and process food products for storage, distribution and consumption.** FPP4

a Use harvesting, selection and inspection techniques to obtain quality food products for processing. FPP4.A

9 Assign quality and yield grades to food products according to industry standards. FPP4.A.9.H

10 Develop and demonstrate procedures to maintain original food quality and yield. FPP4.A.10.H

11 Research and present regulatory-agency-approved or industry-approved techniques for harvesting animals. FPP4.A.11.H

12 Investigate the role and responsibilities of a USDA meat inspector. FPP4.A.12.H

b Evaluate, grade and classify processed food products. FPP4.B

7 Evaluate, grade and classify processed meat, egg, poultry, fish and dairy products. FPP4.B.7.H

8 Evaluate, grade and classify processed products from fruits and vegetables. FPP4.B.8.H

9 Evaluate, grade and classify finished products derived from grains, legumes and oilseeds. FPP4.B.9.H

c Process, preserve, package and present food and food products for sale and distribution. FPP4.C

13 Create a food package while taking into account weight and product requirements. FPP4.C.13.H

14 Evaluate foods prepared for the fresh-food market based on factors such as shelf life, shrinkage, appearance and weight. FPP4.C.14.H

15 Preserve foods using various methods and techniques. FPP4.C.15.H

16 Create and evaluate ready-to-eat food products. FPP4.C.16.H

17 Applying science principles analyze the foods stored in various packaging, to determine which materials retain desirable food qualities. FPP4.C.17.H

18 Compare and contrast foods stored under varying conditions for quality, shelf life and intended use. FPP4.C.18.H

Natural Resources NR

1 **Students will explain interrelationships between natural resources and humans necessary to conduct management activities in natural environments.** NR1

- a Apply knowledge of natural resource components to the management of natural resource systems. NR1.A
  - 5 Research and debate one or more current issues related to the conservation or preservation of natural resources. NR1.A.5.H
  - 6 Compare and contrast the interdependence of organisms within an ecosystem. NR1.A.6.H
- b Classify natural resources. NR1.B
  - 12 Compare and contrast herbaceous plants. NR1.B.12.H
  - 11 Compare and contrast trees and other woody plants. NR1.B.11.H
  - 14 Conduct an aquatic field inventory experience. NR1.B.14.H
  - 13 Compare and contrast wildlife species. NR1.B.13.H
  - 15 Identify rock, mineral and soil types. NR1.B.15.H

2 **Students will apply scientific principles to natural resource management activities.** NR2

a Use cartographic skills to aid in developing, implementing and evaluating natural resource management plans, measure and survey for natural resource status in developing related plans with interpretation of laws related to natural resource management and protection. NR2.A

7 Demonstrate safety practices. NR2.A.7.H

8 Demonstrate and use appropriate techniques and equipment when working with biohazard materials along with appropriate responses. NR2.A.8.H

9 Locate natural resources using a land survey and employ a Global Positioning System and/or Geographic Information Systems technologies to inventory features in natural resource management. NR2.A.9.H

b Apply ecological concepts and principles to natural resource systems. NR2.B

7 Discuss procedures used to conduct resource inventories and population studies. NR2.B.7.H

8 Identify purposes of laws associated with natural resource systems and abide by specific laws pertaining to natural resource systems. NR2.B.8.H

9 Identify and evaluate issues involving mitigation of natural resources. NR2.B.9.H

c Demonstrate natural resource enhancement techniques. NR2.C

13 Identify indicators of the biological health of a stream. NR2.C.13.H

14 Develop and conduct a timber stand improvement (TSI) plan. NR2.C.14.H

15 Design a blueprint and/or survey of a wildlife habitat. NR2.C.15.H

16 Summarize methods of rangeland improvement. NR2.C.16.H

17 Explain natural resource management techniques for improving recreation opportunities. NR2.C.17.H

18 Identify methods to improve marine and coastal natural resources. NR2.C.18.H

d Apply ecological concepts and principles to natural resource systems. NR2.D

15 Diagram biogeochemical cycles and explain the processes. NR2.D.15.H

16 Relate the function of watersheds to natural resources. NR2.D.16.H

17 Explain stream hydrology and structure and determine different classes of streams. NR2.D.17.H

18 Identify techniques used in the creation, enhancement and management of riparian zones and riparian buffers. NR2.D.18.H

19 Give examples of primary-succession and secondary-succession species in a community of organisms. NR2.D.19.H

20 Evaluate and create a management plan based on a population study for a community of organisms. NR2.D.20.H

21 Discuss factors that influence the establishment and spread of invasive species. NR2.D.21.H

3 Students will apply knowledge of natural resources to production and processing industries. NR3

a Produce, harvest, process and use natural resource products. NR3.A

15 List and describe uses of trees species and determine when to harvest forest products. NR3.A.15.H

16 Describe techniques used in the harvesting of wildlife and aquatic species. NR3.A.16.H

17 Explain and use techniques to process wildlife and aquatic species. NR3.A.17.H

18 Summarize economically important minerals and ores that are extracted and processed. NR3.A.18.H

19 Describe sources of fossil fuels and products made from fossil fuels. NR3.A.19.H

20 Describe characteristics of sites that lend themselves to hydroelectric generation and green energy saving system and designs. NR3.A.20.H

21 Debate an issue related to the creational use of natural resources. NR3.A.21.H

4 Students will demonstrate techniques used to protect natural resources. NR4

a Manage fires in natural resource systems. NR4.A

3 Describe techniques used to suppress wildfires and manage prescribed fires. NR4.A.3.H

b Diagnose plant and wildlife diseases and follow protocol to prevent their spread while acquiring management protocol of insect infestations of natural resources. NR4.B

7 Report the observance of diseases affecting plants to the appropriate authorities. NR4.B.7.H

8 Report observance of insect pests to the appropriate authorities and describe techniques used to manage pests of natural resources. NR4.B.8.H

5 Students will use effective methods and venues to communicate natural resource processes to the public. NR5

a Communicate natural resource information to the public. NR5.A

3 Design and/or construct a display communicating a natural resource message for a media type. NR5.A.3.H

Plant Systems PS

1 Students will apply knowledge of plant classification, anatomy and physiology to the production and management of plants. PS1

a Classify agricultural plants according to taxonomy systems. PS1.A

7 Classify agricultural plants according to the hierarchical classification system, life cycles, plant use and as monocotyledons or dicotyledons. PS1.A.7.H

8 Describe the morphological characteristics used to identify agricultural plants. PS1.A.8.H

9 Identify agriculturally important plants by scientific names. PS1.A.9.H

b Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems. PS1.B

9 Compare and contrast mitosis and meiosis and apply the knowledge of cell differentiation and the functions of the major types of cells to plant systems. PS1.B.9.H

10 Identify root tissues and explain the pathway of water and nutrients into and through the root tissues. PS1.B.10.H

11 Relate the active and passive transport of minerals into and through the vascular system to plant nutrition. PS1.B.11.H

12 Describe and apply the processes of translocation to the management of plants. PS1.B.12.H

13 Explain how leaves capture light energy and allow for the exchange of gases. PS1.B.13.H

14 Identify the different types of flowers and flower forms and apply the knowledge of flower structures to plant breeding, production and use. PS1.B.14.H

15 Apply the knowledge of seed and fruit structures to plant culture and use. PS1.B.15.H

c Apply energy conversion to plant systems. PS1.C

5 Explain the light-dependent and light-independent reactions that occur during photosynthesis and apply the knowledge to plant management. PS1.C.5.H

6 Explain cellular respiration and its importance to plant life. PS1.C.6.H

7 Explain factors that affect cellular respiration and identify the products and byproducts of cellular respiration. PS1.C.7.H

8 Explain the four stages of aerobic respiration and relate cellular respiration to plant growth, crop management and post-harvest handling. PS1.C.8.H

d Apply knowledge of plant physiology to plant systems. PS1.D

5 Define primary growth and the role of the apical meristem. PS1.D.5.H

6 Explain the process of secondary plant growth. PS1.D.6.H

7 Relate the principles of primary and secondary growth to plant systems. PS1.D.7.H

8 Identify the five groups of naturally occurring plant hormones and synthetic plant growth regulators. PS1.D.8.H

9 Identify the plant responses to plant growth regulators and different forms of tropism. PS1.D.9.H

10 Select plant growth regulators to produce desired responses from plants. PS1.D.10.H

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2 Students will prepare and implement a plant management plan that addresses the influence of environmental factors, nutrients and soil on plant growth. PS2

a Determine the influence of environmental factors on plant growth. PS2.A

6 Describe plant responses to light color, intensity and duration. PS2.A.6.H

7 Evaluate plant responses to varied light color, intensity and duration. PS2.A.7.H

8 Design, implement and evaluate a plan to maintain optimal conditions for plant growth. PS2.A.8.H

b Prepare growing media for use in plant systems. PS2.B

5 Describe the physical characteristics of growing media and explain the influence they have on plant growth. PS2.B.5.H

6 Formulate and prepare growing media for specific plants or crops. PS2.B.6.H

7 Identify the categories of soil water. PS2.B.7.H

8 Discuss how soil drainage and water-holding capacity can be improved. PS2.B.8.H

9 Determine the hydraulic conductivity for soil and how the results influence irrigation practices. PS2.B.9.H

c Develop and implement a fertilization plan for specific plants, field crops and/or greenhouse crops. PS2.C

7 Describe nutrient deficiency symptoms, recognize environmental causes of nutrient deficiencies and prepare a scouting report. PS2.C.7.H

8 Discuss the influence of pH and cation exchange capacity on the availability of nutrients. PS2.C.8.H

9 Contrast pH and cation exchange capacity between mineral soil and soilless growing media. PS2.C.9.H

10 Determine the nutrient content of soil using appropriate laboratory procedures and prescribe fertilization based on results. PS2.C.10.H

11 Determine the nutrient content of plant tissue samples using appropriate laboratory procedures and prescribe fertilization based on results. PS2.C.11.H

12 Calculate the amount of fertilizer to be applied and calibrate equipment to apply the prescribed amount of fertilizer. PS2.C.12.H

13 Use variable-rate technology to apply fertilizers to meet crop nutrient needs. PS2.C.13.H

3 **Students will propagate, culture and harvest plants.** PS3

a Demonstrate plant propagation techniques. PS3.A

9 Demonstrate proper procedures in budding or grafting selected materials. PS3.A.9.H

10 Evaluate asexual propagation practices based on productivity and efficiency. PS3.A.10.H

11 Define micropropagation, discuss advantages associated with the practice and outline the four main stages of the process. PS3.A.11.H

12 Propagate plants by micropropagation using aseptic techniques. PS3.A.12.H

13 Explain the principles behind recombinant DNA technology and the basic steps in the process. PS3.A.13.H

14 Evaluate the performance of genetically modified crops. PS3.A.14.H

b Develop and implement a plant management plan for crop production. PS3.B

10 Inspect propagation material for evidence of pests or disease. PS3.B.10.H

11 Produce pest- and disease-free propagation material. PS3.B.11.H

12 Operate mechanized planting equipment. PS3.B.12.H

13 Prepare and implement a plant production schedule based on predicted environmental conditions. PS3.B.13.H

14 Explain the reasons for controlling plant growth. PS3.B.14.H

15 Demonstrate proper techniques to control and manage plant growth through mechanical, cultural or chemical means. PS3.B.15.H

16 Create and implement a plan to control and manage plant growth. PS3.B.16.H

c Develop and implement a plan for integrated pest management. PS3.C

8 Predict pest and disease problems based on environmental conditions and life cycles. PS3.C.8.H

9 Describe pest control strategies associated with integrated pest management. PS3.C.9.H

10 Describe types of pesticide controls and formulations. PS3.C.10.H

11 Employ pest management strategies to manage pest populations, assess the effectiveness of the plan and adjust the plan as needed. PS3.C.11.H

12 Explain risks and benefits associated with the materials and methods used in plant pest management. PS3.C.12.H

13 Explain procedures for the safe handling, use and storage of pesticides. PS3.C.13.H

14 Evaluate environmental and consumer concerns regarding pest management strategies. PS3.C.14.H

d Apply principles and practices of sustainable agriculture to plant production. PS3.D

3 Prepare and implement a plan for an agricultural enterprise that involves practices in support of sustainable agriculture. PS3.D.3.H

e Harvest, handle and store crops. PS3.E

8 Operate mechanized harvesting equipment. PS3.E.8.H

9 Explain reasons for calculating crop yield and loss. PS3.E.9.H

10 Evaluate crop yield and loss data. PS3.E.10.H

11 Implement plans to reduce crop loss. PS3.E.11.H

12 Explain the proper conditions to maintain the quality of plants and plant products held in storage. PS3.E.12.H

13 Monitor environmental conditions in storage facilities for plants and plant products. PS3.E.13.H

14 Evaluate techniques for grading, handling and packaging plants and plant products. PS3.E.14.H

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4 Students will employ elements of design to enhance an environment. PS4

a Create designs using plants. PS4.A

5 Explain design elements of line, form, texture and color and express the visual effect each has on the viewer. PS4.A.5.H

6 Select plants, hard goods, supplies and other materials for use in a design based on a range of criteria. PS4.A.6.H

7 Discuss principles of design that form the basis of artistic impression. PS4.A.7.H

8 Create and implement designs by following established principles of art. PS4.A.8.H

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5 Students will recognize different systems in which plants grow. PS5

a Investigate various means to grow plants. PS5.A

3 Compare and contrast various plant growing systems including, but not limited to greenhouse, hydroponics, and aquaponics. PS5.A.3.H

Power, Structural and Technical Systems PST

1 **Students will demonstrate competence in the application of principles and techniques for the development and management of power, structural and technical systems.** PST1

a Select energy sources in power generation appropriate to the situation. PST1.A

3 Compare the efficiency of energy production from various sources. PST1.A.3.H

b Apply physical science laws and principles to identify, classify and use lubricants. PST1.B

3 Select, use and dispose of lubricants. PST1.B.3.H

c Identify and use hand and power tools and equipment for service, construction and fabrication. PST1.C

3 Assess the performance of employees in use of hand and power tools to safely and efficiently service, construct and fabricate quality products. PST1.C.3.H

d Perform service routines to maintain power units and equipment. PST1.D

9 Test and service mechanical systems. PST1.D.9.H

10 Adjust and troubleshoot equipment, including belts and drives, chains and sprockets and maintain fluid conveyance components, such as hoses, lines and nozzles, using computer and on-board diagnostics. PST1.D.10.H

11 Maintain and calibrate metering, monitoring and sensing devices on equipment. PST1.D.11.H

12 Perform start-up and shut-down procedures on power units and equipment as specified in technical manuals. PST1.D.12.H

13 Adjust equipment for safe and efficient operation. PST1.D.13.H

e Identify the principles of operation and the systems of small engines. PST1.E

5 Safely operate small engine equipment. PST1.E.5.H

6 Demonstrate the operation of two and four stroke engines. PST1.E.6.H

7 Explain how various mechanical systems interrelate in small engine operation. PST1.E.7.H

f Troubleshoot and repair internal combustion engines. PST1.F

6 Performance test internal combustion engines to determine service and repair needs. PST1.F.6.H

7 Analyze and troubleshoot internal combustion engines. PST1.F.7.H

8 Overhaul spark-and-compression internal combustion engines. PST1.F.8.H

9 Use the proper tools to repair and maintain an internal combustion engine. PST1.F.9.H

g Use manufacturers' guidelines to service and repair the power transmission systems of equipment. PST1.G

4 Describe features, benefits and applications of mechanical transmission components, including belts, chains, gears, bearings, seals, universals and drive shafts. PST1.G.4.H

5 Identify and compare operation principles and features, benefits and applications of various power transmission systems. PST1.G.5.H

6 Use speed, torque and power measurements to improve efficiency in power transmission systems. PST1.G.6.H

7 Inspect, analyze and repair drive trains. PST1.G.7.H

8 Inspect, analyze and repair clutches and brakes. PST1.G.8.H

h Service and repair hydraulic and pneumatic systems. PST1.H

5 Use symbols and schematic drawings in the maintenance of hydraulic and pneumatic systems. PST1.H.5.H

6 Inspect, analyze and repair hydraulic and pneumatic system components, including fluid and compressed-air conveyance components. PST1.H.6.H

7 Use a pressure-and-flow tester in diagnosing malfunctions and repairing hydraulic and pneumatic systems. PST1.H.7.H

i Troubleshoot and service electrical systems. PST1.I

3 Assess and install electrical circuits, including conductors, insulators and controls. PST1.I.3.H

4 Interpret electrical system symbols and diagrams. PST1.I.4.H

j Create sketches and plans of agricultural structures. PST1.J

4 Apply principles of design, fabrication and installation of agricultural structures. PST1.J.4.H

5 Design functional and efficient facilities for agricultural use. PST1.J.5.H

k Apply structural plans, specifications and building codes. PST1.K

3 Locate, explain and apply elements of a construction drawing. PST1.K.3.H

4 Follow local construction and safety codes in agricultural construction. PST1.K.4.H

l Examine structural requirements for materials and procedures and estimate construction cost. PST1.L

3 Prepare a project cost estimate, including materials, labor and management. PST1.L.3.H

m Follow architectural and mechanical plans to construct and/or repair equipment, buildings and facilities. PST1.M

9 Evaluate work products or samples for quality and efficiency of workmanship following architectural and mechanical plans. PST1.M.9.H

10 Install and/or repair electrical wiring components and fixtures following appropriate codes and standards. PST1.M.10.H

11 Identify electricity measurements and make measurement calculations. PST1.M.11.H

12 Construct and/or repair fencing, including wood, static wire, electrical wire and other fencing materials. PST1.M.12.H

13 Insulate a structure. Calculate BTU Loss. PST1.M.13.H

14 Construct and/or repair with concrete, brick, stone or masonry units. PST1.M.14.H

n Use arc, MIG/TIG welders, equipment and materials needed to weld. PST1.N

9 Select suitable supplies and equipment for shielded metal arc welding. PST1.N.9.H

10 Select Electrodes for use in various arc welding applications. PST1.N.10.H

11 Use safety equipment and protective clothing for welding. PST1.N.11.H

12 Demonstrate through use of welding equipment welding operations (beads, butt, t, lap, fillet vertical, horizontal and pipe welding. PST1.N.12.H

o Use gas welding equipment and materials to weld. PST1.O

6 Use heating, cutting and gas welding equipment safely. PST1.O.6.H

7 Change, adjust, shut down and check for leaks in oxygen and acetylene equipment and controls. PST1.O.7.H

8 Braze and weld safely with oxyacetylene equipment. PST1.O.8.H

9 Use oxyfuels and other gases to cut steel with a flame touch. PST1.O.9.H

p Apply the use of welding to agricultural related industries. PST1.P

3 Construct and/or repair metal structures and equipment using welding fabrication procedures, including those associated with SMAW, GMAW, GTAW, fuel-oxygen and plasma arc torch methods. PST1.P.3.H

q Apply electrical wiring principles in agricultural applications. PST1.Q

6 Locate and use electrical codes and regulations. PST1.Q.6.H

7 Use volt and amp meters and continuity testers to demonstrate electricity principles. PST1.Q.7.H

8 Troubleshoot electrical control system performance problems (Thermostat, light sensors etc.). PST1.Q.8.H

9 Identify hazards and safety when using electricity while installing electrical control circuits. PST1.Q.9.H

r Apply technology principles in the use of agricultural technical systems. PST1.R

3 Assess database summaries to draw conclusions and propose plans of action. PST1.R.3.H

s Use geospatial technologies in agricultural applications. PST1.S

6 Assess and install instrumentation and data acquisition systems, including Global Positioning System (GPS) receivers. PST1.S.6.H

7 Output and apply maps using GIS/GPS systems. PST1.S.7.H

9 Identify sensor, control and actuator system components on power units and equipment. PST1.S.9.H

8 Describe principles of precision agriculture for map-and sensor-based systems. PST1.S.8.H