

Ag Operations and Related Sciences – 01.9999/CIP				
Content Area	Standard	Standard Title	Benchmark	Description
Animal Science	1	Impacts of Animal Science	1.1	Identify cultural and societal uses of animals locally and globally
Animal Science	2	Safety	2.3	Safely handle animal products (health products, meat, milk, wastes)
Animal Science	3	Careers in Animal Science	3.1	Identify career opportunities in animal science
Animal Science	4	Economics of Animal Science	4.1	Compare and contrast local and global marketing and distribution of animal use, products and related services
Animal Science	5	Technological Advances	5.1	Describe current biotechnology techniques in animal science
Animal Science	6	Industry Standards, Breed Improvement and Selection	6.3	Analyze trends and the effect of industry standards on consumer preferences and vice versa
Animal Science	7	Reproduction	7.1	Explain the physiology of animal reproduction
Animal Science	8	Genetics	8.3	Explain the principles of animal genetics
Animal Science	9	Nutrition	9.1	Identify the essential nutrients for animal growth, performance, maintenance and reproduction
Animal Science	10	Behavior and Psychology	10.1	Describe normal animal behavior by species, along with causes and potential results of abnormal behavior (social, sexual and ingestive)
Animal Science	10	Behavior and Psychology	10.3	Demonstrate proper handling techniques, and describe the related psychological/behavioral principles
Animal Science	12	Housing and Sanitation	12.3	Research the various water and waste management systems and analyze their limitations
Animal Science	13	Health Management	13.4	Explain local, state, federal and international laws and regulations which govern animal health
Animal Science	14	Animal Products and Processing (also see Food Science)	14.1	Identify by-products of animals and their uses
Animal Science	14	Animal Products and Processing (also see Food Science)	14.2	Explain animal product labeling and packaging
Animal Science	14	Animal Products and Processing (also see Food Science)	14.3	Describe the uses of animal products for human and animal consumption
Animal Science	15	Consumer Safety and Concerns	15.2	Identify the various animal welfare groups and describe their purposes
Animal Science	15	Consumer Safety and Concerns	15.3	Research the state and federal legislation which governs animal issues

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Biotechnology	1	Impacts of Biotechnology	1.1	Analyze the public benefits and risks of biotechnology from the environmental, health and ethical aspects
Biotechnology	1	Impacts of Biotechnology	1.2	Analyze and research the social, political and economic impact of the use of biotechnology in agricultural production
Biotechnology	1	Impacts of Biotechnology	1.3	List the regulatory agencies, and describe the laws and attitudes about foods produced through biotechnology
Biotechnology	1	Impacts of Biotechnology	1.4	Survey and assess consumers knowledge and attitudes about foods produced through biotechnology
Biotechnology	2	Safety	2.1	Explain human safety issues related to genetically engineered foods and their impact on agricultural production
Biotechnology	2	Safety	2.2	Understand the laws and regulations regarding the use of bioengineered products
Biotechnology	2	Safety	2.3	Demonstrate proper lab procedures, including aseptic technique and use of all laboratory equipment
Biotechnology	3	Careers in Biotechnology	3.1	Examine career pathways in biotechnology
Biotechnology	4	Basic Biotechnology Concepts	4.2	Demonstrate the steps in the scientific method
Biotechnology	4	Basic Biotechnology Concepts	4.3	Understand product modifications via biotechnology and their origins (i.e., wool, cotton, peanuts, mushrooms, etc.)
Biotechnology	5	Genetics and Genetic Engineering	5.2	Identify basic cell structures
Biotechnology	5	Genetics and Genetic Engineering	5.3	Recognize the types of cell reproduction
Biotechnology	5	Genetics and Genetic Engineering	5.4	Describe the structure of genetic material
Biotechnology	5	Genetics and Genetic Engineering	5.6	Define genetic engineering
Biotechnology	6	Biotechnology in Plant Science	6.1	Describe the purposes of plant biotechnology
Biotechnology	6	Biotechnology in Plant Science	6.2	Analyze the differences between traditional plant breeding and genetic engineering of plants
Biotechnology	6	Biotechnology in Plant Science	6.4	Describe animal applications of plant culture
Biotechnology	7	Biotechnology in Animal Science	7.1	Identify the purposes of biotechnology in animal science
Biotechnology	7	Biotechnology in Animal Science	7.2	Compare the differences between traditional animal breeding and genetic engineering of animals
Biotechnology	7	Biotechnology in Animal Science	7.3	Describe the uses of biotechnology in the genetic engineering of animals and animal products

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Biotechnology	8	Microbial Biotechnology in Agriculture	8.1	Describe the types of microorganisms used in biotechnology
Biotechnology	8	Microbial Biotechnology in Agriculture	8.2	Describe the purposes and steps of the fermentation process
Biotechnology	9	Biotechnology and the Environment	9.1	Identify and describe techniques used for detecting environmental pollutants
Biotechnology	9	Biotechnology and the Environment	9.2	Identify biotechnology techniques used for bioremediation
Biotechnology	9	Biotechnology and the Environment	9.3	Describe how natural and genetically engineered plants clean up toxic wastes
Biotechnology	9	Biotechnology and the Environment	9.4	Describe how microbes can be used to clean up the environment
Biotechnology	10	Resource Recovery	10.2	Identify regulations that affect the management of agricultural waste
Biotechnology	10	Resource Recovery	10.3	Explain how biotechnological changes of agricultural products may change waste management options
Biotechnology	10	Resource Recovery	10.4	Describe the use of genetically altered bacteria in human and animal waste management
Food Science	1	Trends in Food Science	1.1	Identify emerging technologies and their impact on food products and processing
Food Science	1	Trends in Food Science	1.2	Define trends in food production, world population and supply and demand for food products
Food Science	1	Trends in Food Science	1.3	Describe the historical development of food processing and preservation
Food Science	1	Trends in Food Science	1.6	Identify food safety issues and consumer concerns affecting food science
Food Science	2	Safety	2.1	Explain federal and state regulations and guidelines for food safety and inspection
Food Science	2	Safety	2.2	Analyze and demonstrate food handling safety
Food Science	2	Safety	2.3	Identify food borne diseases, their symptoms and effect
Food Science	2	Safety	2.4	Demonstrate safe food production, food processing and preservation techniques
Food Science	3	Careers in Food Science	3.1	Examine career pathways in food science
Food Science	4	Food Economics	4.1	Describe the global economic and political implications of food science technology
Food Science	4	Food Economics	4.5	Describe the process that an agricultural product takes from producer to consumer
Food Science	5	Food Chemistry, Biology and Nutrition	5.4	Describe the biochemistry of digestion and assimilation of food
Food Science	5	Food Chemistry, Biology and Nutrition	5.5	Explain the physical and chemical processes involved in various food production and food processing techniques

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Food Science	6	Food Processing Technology	6.1	Identify various food products common in the agriculture industry
Food Science	6	Food Processing Technology	6.2	Identify and explain equipment and procedures utilized for food processing
Food Science	6	Food Processing Technology	6.3	Explain the impact customer demand has on food production, processing and presentation
Food Science	6	Food Processing Technology	6.4	Describe the use of biotechnology in food processing
Food Science	7	Quality and Assurance	7.2	Identify food industry standards and grades
Forestry	1	Introduction to Forestry	1.2	Describe the varied and multiple uses of forests
Forestry	2	Safety	2.1	Identify and demonstrate the use of personal safety equipment
Forestry	3	Careers in Forestry	3.1	Examine career pathways in forestry
Forestry	4	Economics of Forestry	4.1	Describe the role of forestry in the local, state, national and international economy
Forestry	5	Forest Ecology and Conservation	5.1	Describe basic concepts of forest ecology and conservation
Forestry	6	Dendrology	6.2	Identify trees and shrubs
Forestry	7	Forest Measurement	7.2	Measure tree diameter and height
Forestry	7	Forest Measurement	7.6	Calculate elevation, slope and acreage
Forestry	7	Forest Measurement	7.7	Interpret map scales and symbols
Forestry	8	Silviculture	8.1	Describe methods of planting trees
Forestry	8	Silviculture	8.4	Describe the methods used for natural and planted forest regeneration
Forestry	8	Silviculture	8.6	Identify forest pests, diseases and their management
Forestry	11	Forest Products	11.1	Recognize, name and describe the processing of the major forest products
Forestry	12	Urban Forestry	12.1	Describe the benefits and roles of urban forestry
Management, Economics and Marketing	1	Impact of Agribusiness on the Economy	1.2	Identify and describe agribusiness in the community and its importance/role in the local economy
Management, Economics and Marketing	2	Safety	2.1	Identify and describe state and federal agencies that regulate business safety issues
Management, Economics and Marketing	3	Careers in Agribusiness	3.1	Examine agribusiness career pathways
Management, Economics and Marketing	4	Business Organizations	4.1	Discuss and describe the four types of operational organization of businesses
Management, Economics and Marketing	4	Business Organizations	4.3	Examine entrepreneurship principles for agribusiness
Management, Economics and Marketing	5	Establishing a Business	5.1	Demonstrate techniques for goal setting and production planning
Management, Economics and Marketing	6	Agricultural Business Management Procedures	6.1	Identify functions, role and purpose of management in a business
Management, Economics and Marketing	6	Agricultural Business Management Procedures	6.8	Describe the role of the decision-making process in effective management

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Management, Economics and Marketing	7	Accounting and Financial Systems	7.5	Utilize budgets and conduct budget analysis
Management, Economics and Marketing	8	Savings and Investments	8.1	List the reasons for savings and investments
Management, Economics and Marketing	8	Savings and Investments	8.3	Explain the concept of interest costs and interest income
Management, Economics and Marketing	9	Credit	9.1	Discuss the reasons people have for obtaining credit
Management, Economics and Marketing	9	Credit	9.2	Discuss the importance of the ability to obtain credit
Management, Economics and Marketing	10	Inventory Control and Warehousing	10.5	Describe how storage affects quality
Management, Economics and Marketing	11	Marketing	11.8	Explain the role customer relations has in marketing
Management, Economics and Marketing	13	Agribusiness Support Services	13.2	Collect, calculate and analyze agricultural information
Management, Economics and Marketing	13	Agribusiness Support Services	13.3	Formulate agricultural issue and policy statements and ideas
Management, Economics and Marketing	14	Agricultural Law and Regulation	14.2	Describe how laws, rules and regulations are made
Management, Economics and Marketing	15	International Agribusiness	15.3	Describe the impact global markets have on agricultural production and pricing
Natural Resource Management	1	Natural Resource Conservation and Preservation	1.6	Describe current issues and public concerns in natural resource conservation
Natural Resource Management	3	Careers in Natural Resource Management	3.1	Examine career pathways in natural resource management
Natural Resource Management	4	Environmental Protection	4.3	Know the roles of conservation, protection and preservation organizations
Natural Resource Management	7	Soils and Soil Conservation	7.2	Describe the major soil characteristics and how they affect soil usage
Natural Resource Management	8	Water	8.2	Investigate water pollution and ways to control and prevent it
Natural Resource Management	8	Water	8.3	Explain the importance of water use planning
Natural Resource Management	9	Air	9.2	Identify sources of air pollution
Plant and Soil Science	1	Impacts of Plant and Soil Science	1.4	Describe the role plant science plays in the economy of the state and nation
Plant and Soil Science	2	Safety	2.1	Identify dangerous plants
Plant and Soil Science	2	Safety	2.5	Demonstrate workplace safety, including proper use of protective clothing, equipment and first aid

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Plant and Soil Science	3	Careers in Plant and Soil Science	3.1	Examine career opportunities in plant science
Plant and Soil Science	4	Botany and Physiology	4.6	Identify elements essential for germination
Plant and Soil Science	6	Plant Nutrition	6.2	Select appropriate nutrient supplements to correct a specific plant nutrient deficiency
Plant and Soil Science	7	Managing Agricultural Soils	7.1	Identify and describe soil characteristics
Plant and Soil Science	8	Environmental Factors	8.5	Determine plant populations and area calculations
Plant and Soil Science	8	Environmental Factors	8.6	Describe how weather and climate impact growing conditions and crop selection
Plant and Soil Science	9	Plant Identification	9.1	Classify plants and use appropriate taxonomic terminology
Plant and Soil Science	11	Integrated Pest Management	11.4	Describe the use of agricultural chemicals
Plant and Soil Science	11	Integrated Pest Management	11.5	Determine pesticide toxicity and formulations
Plant and Soil Science	12	Plant Science Equipment	12.1	Identify equipment, tools and materials and their hazards
Plant and Soil Science	12	Plant Science Equipment	12.5	Correctly measure and determine area, perimeter and volume
Plant and Soil Science	15	Greenhouse Management	15.9	Identify and describe the use of greenhouse tools and equipment, including the calibration of sprayers and spreaders
Power Systems Technology	1	Historical Applications and Future Implications of Agricultural Power and Systems Technologies	1.1	Describe and discuss the historical development of agricultural power and systems technologies
Power Systems Technology	1	Historical Applications and Future Implications of Agricultural Power and Systems Technologies	1.2	Identify global applications of agricultural power and systems technologies
Power Systems Technology	1	Historical Applications and Future Implications of Agricultural Power and Systems Technologies	1.3	Identify emerging technologies and their potential impact
Power Systems Technology	1	Historical Applications and Future Implications of Agricultural Power and Systems Technologies	1.4	Identify methods of changing appropriate technology for various applications (size, social and cultural)
Power Systems Technology	2	Safety	2.2	Recognized and demonstrate safety rules and regulations
Power Systems Technology	2	Safety	2.3	Describe safety regulations and consumer safety protection opportunities
Power Systems Technology	3	Careers in Agricultural Power and Systems Technology	3.1	Examine career opportunities in agricultural power and systems technologies

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Power Systems Technology	5	Material Fabrication and Welding	5.2	Select, adjust and operate oxy-fuel and plastic equipment with and without appropriate filler rods
Power Systems Technology	5	Material Fabrication and Welding	5.4	Demonstrate and identify the various types of quality welds and cuts and their components to insure quality products
Power Systems Technology	6	Engine Systems	6.2	Demonstrate the use of measuring devices for small engines
Power Systems Technology	6	Engine Systems	6.5	Troubleshoot an engine and adjust to industry specifications
Power Systems Technology	6	Engine Systems	6.7	Select engine coolants, lubricants, fuels, engine additives, electrical components and drive systems needed for various applications
Power Systems Technology	7	Machinery and Equipment Systems	7.2	Select, measure, use and calibrate testing devices for agricultural machines
Power Systems Technology	7	Machinery and Equipment Systems	7.3	Perform disassembly and assembly procedures
Power Systems Technology	7	Machinery and Equipment Systems	7.4	Select and safely connect, engage and operate machinery and power units
Power Systems Technology	7	Machinery and Equipment Systems	7.5	Demonstrate the correct selection and safe use of agricultural machinery and equipment systems
Power Systems Technology	7	Machinery and Equipment Systems	7.6	Demonstrate the use of auxiliary systems, including hydraulics, pneumatics and electronics
Power Systems Technology	7	Machinery and Equipment Systems	7.7	Conduct troubleshooting procedures
Power Systems Technology	9	Structural Systems	9.3	Develop an itemized bill of materials, determine costs, delivery, storage requirements and construction time
Power Systems Technology	9	Structural Systems	9.4	Layout a structure foundation, erect batter boards, frames or forms
Power Systems Technology	9	Structural Systems	9.5	Identify and evaluate building construction materials, methods and styles
Power Systems Technology	10	Plumbing, Irrigation and Water Systems	10.2	Cut, assemble and pressure test components within various types of water supply systems