

Week	Standards	Learning Objective	Key Vocabulary	Instructional Resources
Agriculture Everyday				
1	Agriculture: Research, examine, and discuss issues and trends that impact AFNR systems on local, state, national, and global levels. STEELS: 3.4.9-12.B Apply research and analytical skills to evaluate the conditions and motivations that lead to conflict, cooperation, and change among individuals, groups, and nations.	Define Agriculture. Explain how agriculture helped develop civilization Describe the advancements made by American agriculture	Agriculture Economic Systems Food Preservation Mechanisms Cooperatives	<i>A Biological Approach: The Science of Agriculture</i>
What is Science?				
2	Agriculture: Research, examine, and discuss issues and trends that impact AFNR systems on local, state, national, and global levels. STEELS: BIO.B.3.3.1: Distinguish between scientific terms: hypothesis, inference, law, theory, principle, fact, and observation.	Define Science. Explain the concept of the science method Distinguish between basic and applied science	Science Scientific Method Basic Research Applied Research Hypothesis Inference Law Theory Principle Observation	<i>A Biological Approach: The Science of Agriculture</i>

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Starting from the ground up?				
3	Agriculture: Identify and describe physical characteristics of soil (sand, silt and clay). Test soil for pH, texture, and macronutrients. Interpret soil test reports. Describe the interdependence on organisms within an ecosystem. STEELS: BIO.B.4.1.1: Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, and biosphere).	Explain why agriculture and all of life depends on the soil Analyze how soils are formed Name and list the characteristics of the soil classes Explain the concept of an ecosystem	Soil Food Chain Organic Soil Inorganic Soil Till Sediment Texture Cation Exchange pH Soil Horizon Ecosystems Plant Material	<i>A Biological Approach: The Science of Agriculture</i> Penn State Extension
Totally Cellular				
4	Agriculture: Identify plant and animal cell structures and functions. STEELS: BIO.A.1.1.1: Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms. BIO.A.1.2.1: Compare cellular structures and their functions in prokaryotic and eukaryotic cells. BIO.B.1.1.1: Describe the events that occur during the cell cycle: interphase, nuclear division (i.e., mitosis or meiosis), cytokinesis.	Analyze the difference between plant and animal cells Describe the parts and functions of the structures of the cells Explain the process of mitosis Describe relationships between structure and function at biological levels of organization.	Cellulose Semipermeable Diffusion Osmosis Cytoplasm Mitosis Prokaryotic Eukaryotic	<i>A Biological Approach: The Science of Agriculture</i>

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Genetics				
5	Agriculture: Utilize a Punnett square to determine the potential phenotypes and genotypes of animals. STEELS: BIO.B.2.1.1: Describe and/or predict observed patterns of inheritance (i.e., dominant recessive, codominance, incomplete dominance, sex-linked, polygenic, and multiple alleles). BIO.B.2.3.1: Describe how genetic mutations alter the DNA sequence and may or may not affect phenotype (e.g., silent, nonsense, frame-shift).	Analyze a Punnett square Discuss the process of DNA transfer Explain how Mendel developed the theories of genetics Determine how the principles of genetics are used in plant and animal breeding	Dominant Recessive Alleles Homozygous Heterozygous Genetics Genotype DNA Hybrid Mutations	<i>A Biological Approach: The Science of Agriculture</i>
Genetic Engineering				
6	Agriculture: Differentiate between applications of biotechnology in agriculture, e.g., GMOs, artificial insemination, embryo transfer, genetic engineering. STEELS: BIO.B.2.4.1: Explain how genetic engineering has impacted the fields of medicine, forensics, and agriculture (e.g., selective breeding, gene splicing, cloning, genetically modified organisms, gene therapy).	Define genetic engineering Define GMO Explain the process of gene mapping Assess societal concerns about the uses of genetic engineering	Mutations Genetic Engineering Fermentation Tissue Culture Genome APHIS	<i>A Biological Approach: The Science of Agriculture</i> Food Evolution

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Classifying Organisms				
7	Agriculture: Classify plants and animals according to taxonomy and agricultural use. STEELS: BIO.A.1.1: Explain the characteristics common to all organisms.	Explain the importance of scientific classification List all seven kingdoms that are used to classify organisms	Taxonomy Genus Specie Scientific Classification DNA Mapping Breed	<i>A Biological Approach: The Science of Agriculture</i>
Dissecting a Salad				
8	Agriculture: Identify plant structures and functions. Describe the processes of photosynthesis, respiration, translocation, and transpiration STEELS: BIO.A.3.2.1: Compare the basic transformation of energy during photosynthesis and cellular respiration.	Explain the parts and functions of a plant Discuss the process of photosynthesis and respiration List various crops grown for a specific plant part	Stoma Chlorophyll Photosynthesis Vascular Bundles Xylem Phloem Respiration Node Tap Root	<i>A Biological Approach: The Science of Agriculture</i>

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Plant Reproduction				
9-10	Agriculture: Distinguish between sexual and asexual plant reproduction. STEELS: BIO.A.3.2: Identify and describe how organisms obtain and transform energy for their life processes.	Discuss the differences between sexual and asexual reproduction Explain the importance of plant reproduction Describe the role that air, water and insect play in plant reproduction	Asexual Sexual Zygote Meiosis Endosperm	<i>A Biological Approach: The Science of Agriculture</i> Penn State Extension
Plant Growth				
11	Agriculture: Identify plant structures and functions. STEELS: BIO.A.3.2: Identify and describe how organisms obtain and transform energy for their life processes.	Explain the process of seed germination Describe the life cycle of a plant List the essential nutrients for plants	Dicot Monocot Endosperm Germination Meristem Nutrients	<i>A Biological Approach: The Science of Agriculture</i> Plant tissue lab kits
Animal Systems				
12-13	Agriculture: Compare ruminant and monogastric digestive systems. STEELS: BIO.A1.2: Describe relationships between structure and function at biological levels of organization.	List the major animal systems Discuss the major parts and functions of the skeletal system, muscular system, digestive system, respiratory system, circulatory system, nervous system and endocrine system	Cartilage Periosteum Vertebrate Myofibrils Monogastric Ruminant Hormones Plasma	<i>A Biological Approach: The Science of Agriculture</i> Cornell Vet Science Curriculum

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Animal Systems				
14	Agriculture: Identify the common parts of the reproductive systems of small and large animals. STEELS: BIO.B.1.1.2: Compare the processes and outcomes of mitotic and meiotic nuclear division.	Discuss the parts and functions of the male and female reproductive system Describe hormone that control reproduction in a female system Explain artificial insemination, embryo transfer, cloning and estrus synchronization	Zygote Meiosis Spermatogenesis Chromatids Synapsis Oogenesis Testosterone Follicle Copulation A.I Cloning	<i>A Biological Approach: The Science of Agriculture</i> Cornell Vet Science Curriculum Select Sires Inc.,
Animal Reproduction				
15	Agriculture: Select appropriate feedstuffs for animals based on factors such as economics, digestive system, and nutritional needs. STEELS: BIO.A1.2: Describe relationships between structure and function at biological levels of organization. BIO.B.1.1.2: Compare the processes and outcomes of mitotic and meiotic nuclear division. BIO.A.3.2: Identify and describe how organisms obtain and transform energy for their life processes.	Example the importance of animal growth for agriculture producers Analyze the factors that influence growth Distinguish between prenatal and postnatal growth	Heredity Hypertrophy Hyperplasia Prenatal Postnatal Differentiation Morphogenesis Ossification	<i>A Biological Approach: The Science of Agriculture</i> Penn State Extension

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Plant & Animal Diseases				
16	Agriculture: Identify disease causing agents. Implement disease prevention methods (biosecurity). STEELS: BIO.B.4.2.2: Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis). BIO.B.42.5: Describe the effects of limiting factors on population dynamics and potential species extinction.	Define disease Explain the agriculture problems that are caused by plant and animal disease Describe how disease can be prevented	Pathogens Bacteria Antibiotics Viruses Protozoa Antibodies Active immunity Passive immunity Vaccination	<i>A Biological Approach: The Science of Agriculture</i>
Careers in Agriculture				
17	Agriculture: Research and participate in career opportunities in agriculture. Create a career objective and develop a plan of experiences and academics to meet the objective. STEELS: 3.4.9-12.B Apply research and analytical skills to evaluate the conditions and motivations that lead to conflict, cooperation, and change among individuals, groups, and nations.	Analyze the career opportunities in agriculture Explain some of the characteristics of various jobs in agriculture Explain the different levels of education in agriculture	Agriscience Fair Scientific Method Abstract	<i>A Biological Approach: The Science of Agriculture</i>