INTEGRATED FOOD SCIENCE AND PRODUCTION CURRICULUM

Grade Level(s): 11-12

Curriculum Author(s): Kathleen Gorman

Course Description:
This course integrates key concepts of livestock science and food science, focusing on producing, processing, and marketing livestock-derived food products. Students will gain comprehensive knowledge of livestock management, meat and dairy science, food safety, and sustainable practices, preparing them for careers in the livestock and food industries. After completion of this course, students will be able to understand the principles of livestock production and management, apply knowledge of meat and dairy science to improve product quality and safety, develop effective marketing strategies for livestock products, implement sustainable practices, and utilize innovative technologies in livestock and food production and analyze and respond to trends and challenges in the livestock and food industries. This course aims to provide students with a holistic understanding of the intersection between livestock science and food science, equipping them with the skills needed to address contemporary issues in the field. Every student must maintain and document an approved supervised agriculture experience (SAE) project and actively participate in the Woodbury FFA Chapter to develop premier leadership, personal growth, and career success through attending FFA meetings and participating in chapter events and planning.

Year At A Glance			
Unit Title	**Overarching Essential Question**	**Overarching Enduring Understanding**	**Vision of A Learner "I Can" Statements**
Food Safety Investigation	How can we ensure the safety and quality of food from producer to consumer to protect public health and prevent foodborne illnesses?	Ensuring food safety requires a comprehensive understanding of the biological, chemical, and physical hazards that can contaminate food and implementing effective practices and regulations to mitigate these risks. Maintaining rigorous safety standards from production to consumption can protect public health and prevent foodborne illness, ensuring a safe and reliable food supply.	TI2(9-12), CCE1(9-12), CCE4(9-12), DE1(9-12), AA3(9-12)
Dairy Herd Management	How can we apply specialized knowledge and best practices in the care and management of dairy cattle to ensure their health, productivity, and welfare throughout their lifecycle/?	Proper care and management of dairy cattle require a deep understanding of their nutritional, health, and welfare needs. By implementing best practices and evidence-based strategies, we can enhance the well-being and productivity of dairy cattle, leading to a sustainable and efficient dairy production system.	TI3(9-12), TCC2(9-12), CCE2(9-12), CCE3(9-12), P3(9-12)
Milk Quality and Products	How do we transform raw milk into safe, high-quality dairy products, and what processes ensure their safety, nutritional value, and appeal to consumers?	The transformation of raw milk into various dairy products involves a series of complex processes that ensure safety, quality, and nutritional value. Understanding these processes, from milking and pasteurization to fermentation and packaging, is essential for producing dairy products that meet consumer expectations and regulatory standards.	TI3(9-12), TCC1(9-12), CCE1(9-12), CCE3(9-12), P4(9-12), AA3(9-12)
Animal Proteins	How do we sustainably produce and process animal proteins to meet	Producing and processing animal proteins sustainably involves understanding animal	TI3(9-12), CCE3(9-12), DE1(9-12), DE2(9-12),

	global nutritional needs while considering health, ethical, and environmental impacts?	agriculture's biological, nutritional, and environmental aspects. By balancing the need for high-quality protein sources with considerations for animal welfare, human health, and environmental sustainability, we can develop practices that ensure a reliable and ethical supply of animal proteins to meet global nutritional demands.	DE3(9-12), P2(9-12), AA1(9-12), AA2(9-12)
Poultry Flock Management	How can we apply specialized knowledge and best practices in the care and management of poultry to ensure their health, productivity, and welfare throughout their lifecycle?	Effective poultry care and management require a comprehensive understanding of their nutritional, health, and welfare needs. By implementing evidence-based practices and maintaining optimal living conditions, we can enhance poultry well-being and productivity, contributing to a sustainable and efficient poultry production system.	TCC2(9-12), CCE1(9-12), P2(9-12), AA1(9-12), AA3(9-12)
Food Product Development	How can we design and develop innovative food products that meet consumer taste, nutrition, and sustainability demands?	Developing new food products requires a blend of creativity, scientific knowledge, and an understanding of consumer preferences. By integrating principles of food science, nutrition, and sustainable practices, we can create food products that are appealing, nutritious, environmentally responsible, and aligned with current market trends.	TCC3(9-12), CCE4(9-12)

Unit 1 - FOOD SAFETY INVESTIGATION

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Agriculture, Food and Natural Resource Standards

FPP.01.01 Distinguish between various food safety programs and management systems in food products and processing facilities.
FPP.01.02 Apply food safety and quality assurance procedures in the harvesting, handling and processing of food products.
FPP.01.03 Apply food safety procedures during storage and distribution to ensure food quality.
FPP.03.01 Implement selection, evaluation, and inspection techniques to ensure safe and quality food products.
FPP.04.01 Examine the scope of the food industry by evaluating local and global policies, trends, and customs for food production.
FPP.04.02 Evaluate the significance and implications of changes and trends in the food products and processing industry in the local and global food systems.
FPP.04.03 Identify the purpose of industry organizations, groups, and regulatory agencies that influence the local and global food systems.
CRP.02.01 Use strategic thinking to connect and apply academic learning, technical knowledge, and skills to solve problems in the workplace and community.
CRP.04.01 Communicate using strategies that ensure clarity, logic, purpose and professionalism in formal and informal settings.
CRP.04.02 Produce clear, reasoned, and coherent written and visual communication in formal and informal settings.
CRP.04.03 Model active listening strategies with interacting with others in formal and informal settings.
CRP.05.01 Assess, identify, and synthesize the information and resources needed to make decisions that positively impact the workplace and community.
CRP.07.01 Select and implement reliable research processes and methods to generate data for decision-making in the workplace and community.
CRP.10.01 Identify career opportunities within a career cluster that match personal interests, talents, goals and preferences.
CRP.12.01 Contribute to team-oriented projects and builds consensus to accomplish results using cultural global competence in the workplace and community.
BS.01.02 Evaluate the roles, scope, and implications of regulatory agencies in applications of biotechnology in agriculture and protection of public interests (e.g., health, safety, environmental issues, etc.).
BS.02.01 Read, document, evaluate, and secure accurate laboratory records of experimental protocols, observations, and results.
BS.02.02 Identify and apply standard laboratory procedures and equipment maintenance to create and maintain reliable data.
BS.02.05 Examine and perform scientific procedures using microbes, DNA, RNA and proteins in a laboratory.
BS.03.02 Apply biotechnology principles, techniques, and processes to enhance the production of food through the use of microorganisms and enzymes.

Common Core State Standards

ELA-LITERACY.RI.11-12.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as

inferences drawn from the text, including determining where the text leaves matters uncertain.
ELA-LITERACY.RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on the explanations in the text.
ELA-LITERACY.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
ELA-LITERACY.W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
ELA-LITERACY.W11-12.9 Draw evidence from literary or information texts to support analysis, reflections and research.
ELA-LITERACY.WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
ELA-LITERACY.WHST.11-12.9 Draw evidence from informational texts to support analysis, reflection, and research.

Next Generation Science Standards

HS-LS3-1 Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
HS-LS3-3 Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

TI2(9-12): I can evaluate my objectives and a variety of credible resources to find the best solutions for any challenge.
CCE1(9-12): I can ask purposeful, insightful questions to find a variety of innovative solutions.
CCE4(9-12): I can communicate and express my understanding in an authentic, respectful and relevant way, using the most effective mode of expression.
DE1(9-12): I can acknowledge, process and respond appropriately to others' comments and perspectives.
AA3(9-12): I can adjust my expectations and behaviors to succeed in a changing and unpredictable environment.

Understandings: Students will understand that...

- By exploring aspects of safe food handling in a retail situation individuals can become informed consumers and industry professionals.
- The safety of our food supply is dependent on a complex system involving agriculture processing, transportation and regulation.
- Effective food safety practices involve identifying potential risks,

Essential Questions:

- Why is food safety important?
- What are the three categories of food safety standards?
- What is foodborne illness?
- What segments of the population are most susceptible to foodborne illness?
- What conditions increase microbial growth in food?
- How do agricultural commodities move from farm to table?

implementing preventative measures, and responding to emergencies. ● Food safety is governed by a range of regulations and standards designed to protect public health. Awareness of these regulations help us understand how they contribute to the safety and quality of the food we consume. ● Individuals play a crucial role in ensuring food safety through proper handling, storage, and preparation of food. ● Food safety issues have both local and global implications. ● Recognizing how global practices, trade, and environmental factors affect our local food supply helps us understand the broader context of food safety challenges. ● Advances in technology and science contribute to improving food safety but also introduce new challenges. ● Ensuring food safety involves ethical considerations, including fair treatment of workers, sustainable practices and minimizing environmental impact.	● What are some ways that food producers and consumers can minimize food safety hazards? ● How are food safety issues relevant to students' lives as consumers and potential future producers? ● How can students reduce microbial risks during food handling and prevent foodborne illness?
Students will know... ● The relationship between food safety hazards and foodborne illness. ● Characteristics of bacteria, viruses, parasites, yeasts, and molds associated with foods. ● The uses of bacteria, yeasts, and molds in the food industry. ● Three causes of food spoilage: microbial factors, natural food enzymes, and other factors. ● The definition of the acronym "FATTOM" and factors affecting microbial growth. ● The difference between infection, intoxication, and toxin-mediated infection. ● The twelve most common or dangerous foodborne pathogens. ● The definition of Good Agricultural Practices (GAPs) in food science and technology. ● The definition of the 4 C's of safe food handling.	**Students will be able to...** ● Distinguish between three types of food safety hazards associated with food contamination. ● Identify some common microorganisms that cause foodborne illnesses and recognize symptoms common to each. ● Identify five types of microorganisms. ● Record observations of five microorganisms using microscope slides. ● Examine samples of different foods and determine factors that caused the changes. ● Work in a team to create a research presentation. ● Identify several paths food could take as it moves from farm to table. ● Determine where physical, chemical, and biological hazards could contaminate food. ● Identify methods used in developing a traceback system. ● Read and analyze a foodborne illness outbreak report. ● Determine ways contamination risks could be reduced during product movement. ● Write a professional letter evaluating the strengths and

	weaknesses of a farm operation. ● Demonstrate minimizing food safety hazards through proper handling, preparation, and storage techniques.

Key Vocabulary:
antibiotics, bacteria, beneficial microorganisms, chlorine, compost, contamination, cross-contamination, drip irrigation, enzyme, fecal coliform bacteria, flume, food additive, food spoilage, foodborne illness, food safety, fungi, good agricultural practices (GAPs), hazards, hygiene, infection, intoxication, lot, microbial spoilage, microorganism, parasites, pathogen, potable, sanitize, standard operating procedures (SOPs), sanitation standard operating procedures (SSOPs), toxin, toxin-mediated infection, traceback, vacuum cooling, viruses

Assessment Evidence

Performance Tasks:	**Other Evidence:**
Summative: Investigate a foodborne illness outbreak to understand its causes and impacts on public health. **DE1** *Interim*: Design a public awareness campaign to educate the community about a common foodborne pathogen that puts the food system at risk. **CCE4** *Classwork:* Conduct a workshop on safe food handling practices applying food preservation techniques, such as canning, to prevent foodborne pathogen growth. **AA3** *Classwork:* Conduct a mock food safety audit to assess the safety practices of a food processing facility. **CCE4**	*Classwork:* Conduct a literary analysis of the text *The Jungle* by Upton Sinclair. **CCE1** *Classwork*: Perform a risk assessment on a food production process and propose a risk management plan. **CCE4**

Learning Plan

- Research the twelve most common foodborne pathogens in the food system. **TI2**
- Investigate a foodborne illness outbreak to understand its causes and impacts on public health. **DE1**
- Evaluate food safety practices to maintain a safe and healthy environment. **AA3**

Teacher Resources:
Teacher Created Resources

Unit 2 - DAIRY HERD MANAGEMENT

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Agriculture, Food and Natural Resources Standards

AS.01.01 Evaluate the development and implications of animal origin, domestication, and distribution on production practices and the environment.
AS.01.02 Assess and select animal production, marketing, and management methods based upon effectiveness and potential social and environmental impacts.
AS.01.03 Analyze laws and sustainable practices that impact animal agriculture from a local, tribal, state, national, and global perspective.
AS.02.01 Explain management techniques that ensure animal welfare.
AS.02.02 Analyze procedures to ensure that animal products are safe for consumption.
AS.05.01 Design and evaluate animal housing, equipment, and handling facilities for the major systems of animal production.
AS.05.02 Comply with government regulations and safety standards for facilities used in animal production.
AS.06.01 Classify animals according to taxonomic classification systems and use (e.g., agricultural, companion, etc.).
AS.06.02 Apply principles of comparative anatomy and physiology to uses within various animal systems.
AS.06.03 Select animals for specific purposes and maximum performance based on anatomy and physiology.
AS.07.01 Design programs to prevent animal disease, parasites, and other disorders and ensure animal welfare.
CRP.02.01 Use strategic thinking to connect and apply academic learning, technical knowledge, and skills to solve problems in the workplace and community.
CRP.04.01 Communicate using strategies that ensure clarity, logic, purpose and professionalism in formal and informal settings.
CRP.04.02 Produce clear, reasoned, and coherent written and visual communication in formal and informal settings.
CRP.04.03 Model active listening strategies with interacting with others in formal and informal settings.
CRP.05.01 Assess, identify, and synthesize the information and resources needed to make decisions that positively impact the workplace and community.
CRP.07.01 Select and implement reliable research processes and methods to generate data for decision-making in the workplace and community.
CRP.10.01 Identify career opportunities within a career cluster that match personal interests, talents, goals and preferences.
CRP.12.01 Contribute to team-oriented projects and builds consensus to accomplish results using cultural global competence in the workplace and community.
ABS.02.02 Assemble, interpret, and analyze financial information and reports to monitor AFNR business performance and support decision-making (e.g., income statements, balance sheets, cash-flow analysis, inventory reports, break-even analysis, return on investments, taxes, etc.).
ABS.04.01 Analyze characteristics and planning requirements associated with development business plans for different types of AFNR businesses.
ABS.05.01 Determine the role of markets, trade, competition, and price in relations to an AFNR business sales and marketing

plans.
BS.03.01 Apply biotechnology principles, techniques, and processes to modify a species.
PST.04.01 Create plans for AFNR structures.
PST.04.02 Determine structural requirements, specifications, customer needs, and estimate costs for AFNR structures.

Common Core State Standards

ELA-LITERACY.L.11-12.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
ELA-LITERACY.RI.11-12.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining what the text leaves matters uncertain.
ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific science or technical context relevant to grades 11-12 texts and topics.
ELA-LITERACY.W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts,a nd information clearly and accurately through the effective selection, organization and analysis of content.
ELA-LITERACY.W.11-12.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.
ELA-LITERACY.RH.11-12.7 Integrate and evaluate multiple sources of information presented in diverse media formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.
MATH.CONTENT.HSS.ID.C.7 Interpret slope (rate of change) and intercept (constant term) of a linear model in context of the data.
MATH.CONTENT.HSS.IC.B.6 Evaluate reports based on data.
MATH.CONTENT.HSN.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and origin of graphs and data displays.
MATH.CONTENT.HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.
MATH.CONTENT.HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
MATH.CONTENT.IF.B.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
MATH.CONTENT.IF.B.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
MATH.CONTENT.IF.B.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
MATH.CONTENT.IC.B.6 Evaluate reports based on data.

Next Generation Science Standards

HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
HS-LS3-2

HS-LS4-3 Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.
HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

TI3(9-12): I can formulate and investigate probing questions to further my learning.
TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.
CCE2(9-12): I can give and receive actionable and relevant feedback with openness to be able to determine meaningful revisions.
CCE3(9-12): I can show initiative in prompting group discourse and fostering collaboration among others, providing actionable feedback,and working with others to solve problems and/or design products.
P3(9-12): I can accept constructive feedback and use setbacks to adjust my learning journey in order to reach my goals.

Understandings: Students will understand that...

- Unique characteristics, strengths, and purposes of different dairy cattle breeds are essential for effective management and production in the dairy industry.
- Effective dairy cattle management involves a comprehensive approach that integrates animal health, nutrition, genetics, and environmental stewardship.
- There is a strong relationship between the welfare of dairy cattle and their productivity. Proper care, including adequate housing, nutrition and veterinary care, is essential for maintaining high levels of milk production and overall health.
- Dairy cattle have specific nutritional requirements that must be met to optimize milk production and health. Balancing their diet with the right nutrients and feed types is crucial for maintaining a productive and healthy herd.
- Genetic selection and breeding practices play a significant role in improving dairy cattle traits such as milk yield, disease resistance, and overall health.
- Dairy cattle management practices have environmental implications, including waste management, water usage, and greenhouse gas emissions. Implementing sustainable practices

Essential Questions:

- What differences exist between the major breeds of dairy cattle?
- How do various aspects of dairy cattle management (health, nutrition, genetics) interrelate to influence the overall productivity and welfare of the herd?
- What are the key factors in designing a balanced and effective nutritional program for dairy cattle, and how do these factors impact milk production and health?
- How do breeding and genetic selection impact the performance and health of dairy cattle, and what are the ethical considerations involved?
- In what ways do dairy cattle management practices affect the environment, and what strategies can be implemented to minimize negative environmental impacts?
- How can dairy farmers balance the economic aspects of production with the need to maintain high standards of animal welfare and sustainability?
- What role does technology play in modern dairy cattle management, and how can it be utilized to improve animal care and farm efficiency?

helps mitigate these impacts and supports environmental stewardship. ● Managing a dairy operation involves understanding economic principles such as cost of production, market prices, and financial planning. ● Effective management strategies help ensure the financial viability of dairy farming.	
Students will know... ● Advantages and disadvantages of different cattle breeds in various dairy production systems. ● Historical development and geographic distribution of dairy cattle breeds and their significance in the global dairy industry. ● Key parts of a dairy business that must be managed to ensure a profitable business. ● Types of barns and environments that dairy cattle are housed in. ● Methodology to manage a milking parlor including, but not limited to, procedures for detecting, testing, and treating mastitis. ● The major dairy regions of the United States. ● Dairy cattle housing that demonstrates best management practices (BMPs) ● Common diseases and ailments of dairy cattle animals. ● The basics of reproduction include, but not limited to, the length of pregnancy, reproductive anatomy, hormones involved in reproduction and the artificial insemination process. ● Environmental stewardship techniques dairy producers implement to protect the productivity of their land.	**Students will be able to...** ● Identify and describe the major breeds of dairy cattle, including their physical characteristics, milk production qualities, and temperament. ● Utilize industry “benchmarks” to determine how efficiently and profitably a farm is functioning. ● Design a dairy facility to the specifications of a hypothetical client. ● Perform a California Mastitis Test to determine possible mastitis infections in dairy animals. ● Analyze economic data to explain the economic impact the dairy industry has on the United States economy. ● Perform animal treatment techniques safely and confidently. ● Create a preliminary diagnosis given signs, symptoms and observations of a dairy cattle animal. ● Perform the artificial insemination technique on a model animal. ● Interpret information on DHIA reports to determine how a dairy herd is performing and make education recommendations regarding management decisions.
Key Vocabulary: artificial insemination, Ayrshire, benchmark, best management practice, breed, Brown Swiss, bunk space, calf hutch, California Mastitis Test, claw, composting, conservation, contagious mastitis, dairy farm, dairy products, economy, environmental mastitis, estrous cycle, estrus, estrus synchronization, export, freestall barn, free stall barn, gestation, group pen, Guernsey, head, Holstein, import, Jersey, mastitis, maternity pen, milk, Milking Shorthorn, milking stall, milking unit, milk line, pack barn, protocol, recordkeeping, recycling, regions, reproductive tract, robotic milking unit, rotational grazing, somatic cell count, teat cup, teat dip, tie stall barn, vacuum line, wean	
Assessment Evidence	

Performance Tasks: *Classwork:* Analyze the performance of a dairy herd based on production, health, and reproductive metrics. **CCE3** *Classwork:* Design a dairy cattle facility that includes pens, feeding areas, water sources, and handling systems that consider animal welfare biosecurity, and efficient management practices. **TCC2** *Classwork:* Perform a California Mastitis Test on a milk sample to determine the level of infection in an animal. **TI3**	**Other Evidence:** *Interim:* Written interim (quiz) assessment. *Summative:* Written summative (test) assessment.

Learning Plan

- Explore and identify the six dairy cattle breeds. **P3**
- Design and evaluate dairy cattle facilities according to best management practices. **TCC2**
- Perform a California Mastitis Test on milk samples. **TI3**
- Interpret production data to evaluate the productivity of a dairy cattle herd. **CCE2**

Teacher Resources:
Teacher Created Resources
Dairy Leaders of Tomorrow Online Platform

Unit 3 - MILK QUALITY AND PRODUCTS

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Agriculture, Food and Natural Resource Standards

FPP.01.01 Distinguish between various food safety programs and management systems in food products and processing facilities.
FPP.01.02 Apply food safety and quality assurance procedures in the harvesting, handling and processing of food products.
FPP.01.03 Appy food safety procedures during storage and distribution to ensure food quality.
FPP.02.02 Apply principles of microbiology and chemistry to develop food products to provide a safe, wholesome, and nutritious food supply for local and global food systems.
FPP.03.01 Implement selection, evaluation, and inspection techniques to ensure safe and quality food products.
FPP.03.02 Design and apply techniques of food processing, preservation, packaging, and presentation for distribution and consumption of food products.
FPP.04.02 Evaluate the significance and implications of changes and trends in the food products and processing industry in the local and global food systems.
FPP.04.03 Identify the purpose of industry organizations, groups and regulatory agencies that influence the local and global food systems.
CRP.02.01 Use strategic thinking to connect and apply academic learning, technical knowledge, and skills to solve problems in the workplace and community.
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CRP.05.01 Assess, identify, and synthesize the information and resources needed to make decisions that positively impact the workplace and community.
CRP.07.01 Select and implement reliable research processes and methods to generate data for decision-making in the workplace and community.
CRP.10.01 Identify career opportunities within a career cluster that match personal interests, talents, goals and preferences.
CRP.12.01 Contribute to team-oriented projects and builds consensus to accomplish results using cultural global competence in the workplace and community.
ABS.04.01 Analyze characteristics and planning requirements associated with developing business plans for different types of AFNR businesses.
BS.01.01 Investigate and explain the relationships in the timeline of developing biotechnology applications and techniques in agriculture (e.g., major innovators, historical developments, potential applications of biotechnology, etc.).
BS.01.03 Analyze the relationship and implications of bioethics, laws, and public perceptions on applications of biotechnology in

agriculture (e.g., ethical, legal, social, cultural issues).
BS..03.02 Apply biotechnology principles, techniques, and processes to enhance the production of food through the use of microorganisms and enzymes.
BS.03.05 Apply biotechnology principles, techniques, and processes to produce bioproducts (e.g., fermentation, transesterification, methanogenesis, etc.).
BS.02.05 Examine and perform scientific procedures using microbes, DNA, RNA, and proteins in a laboratory.

Common Core State Standards

ELA-LITERACY.L.11-12.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
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ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific science or technical context relevant to grades 11-12 texts and topics.
ELA-LITERACY.W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
ELA-LITERACY.W.11-12.9 Draw evidence from literary or information texts to support analysis, reflection, and research.
ELA-LITERACY.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
ELA-LITERACY.WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
ELA-LITERACY.WHST.11-12.9 Draw evidence from informational texts to support analysis, reflection, and research.
MATH.CONTENT.HSN.Q.A.1 Use units as ways to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

Next Generation Science Standards

HS-LS3-1 Ask questions to clarify relationships about the role of DNA and chromosomes in coding instructions for characteristic traits passed from parents to offspring.
HS-LS3-3 Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

TI3(9-12): I can formulate and investigate probing questions to further my learning.

TCC1(9-12): I can ask purposeful, insightful questions to find a variety of innovative solutions.
CCE1(9-12): I can initiate discussions with my peers and teachers about a variety of topics, respecting differing viewpoints, actively listening to others and responding thoughtfully with peer-reviewed evidence that is free of bias.
CCE3(9-12): I can show initiative in prompting group discourse and fostering collaboration among others, providing actionable feedback, and working with others to solve problems and/or design products.
P4(9-12): I can take-on challenges and continuously engage in my own long-term strategies to overcome them to demonstrate through personal experience that failures are more instructive.
AA3(9-12): I can adjust my expectations and behaviors to succeed in a changing and unpredictable environment.

Understandings: Students will understand that...	**Essential Questions:**
• Milk quality is crucial in determining the safety, taste, and shelf life of dairy products, and is influenced by factors such as somatic cell count, bacterial contamination, and handling practices. • Proper handling and storage of milk are essential to maintaining its quality, preventing spoilage, and ensuring it is safe for consumption. • Dairy product production involves various processes that transform raw milk into consumable products like cheese, butter, and yogurt, each with unique sensory characteristics and potential defects. • Sensory evaluation is a critical tool in the dairy industry for assessing the quality of milk and dairy products, identifying defects, and maintaining consumer satisfaction. • Processing milk into dairy products involves a series of steps that transform raw milk into consumable goods like cheese, butter, and yogurt, with each step critically affecting the quality, flavor, and texture of the final product. • Milk testing and evaluation are necessary for monitoring and ensuring the quality of milk which directly impacts the overall quality of dairy products.	• How do milk quality, handling practices, and product evaluation processes ensure the production of safe, high-quality dairy products? • What are the key factors that influence the quality of milk, and why is milk quality crucial in the dairy industry? • In what ways do milk handling and storage practices affect milk quality and shelf life? • How do different processing methods transform raw milk into various dairy products, and how do these methods impact the quality of the final product? • How can sensory evaluation be used to assess the quality of dairy products and identify potential defects? • How are milk quality tests conducted, and what do the results reveal about the safety and suitability of milk for dairy product production. • How do the various processes used to convert raw milk into dairy products influence the quality, taste, and texture of the final products? • How can knowledge of milk quality and dairy product evaluation be applied in real-world dairy production and processing to ensure high standards?
Students will know...	**Students will be able to…**
• Factors that affect milk quality, including somatic cell count, bacterial contamination, and temperature control. • Proper handling and storage practices required to maintain milk quality. • Basic processes involved in producing dairy products like	• Identify and describe the key factors that affect milk quality, including somatic cell count, bacterial contamination, and temperature control. • Evaluate milk samples for quality indicators using laboratory techniques such as pH testing, somatic cell count, and bacterial

cheese, butter, and yogurt. • Sensory characteristics of various dairy products and how to identify common defects. • Methods used to test and evaluate milk quality and interpret the results. • The importance of milk quality and sensory evaluation in ensuring the safety and quality of dairy products in the marketplace. • Key steps involved in processing milk into dairy products such as cheese, butter, and yogurt. • The role of ingredients, temperature control, and timing in the quality and characteristics of dairy products. • Common challenges and defects that can occur during dairy product processing.	culture. • Analyze the impact of milk handling and storage practices on milk quality and shelf life. • Compare and contrast different types of dairy products, including milk, cheese, butter, and yogurt, based on production processes and sensory characteristics. • Conduct sensory evaluations of dairy products, identifying defects and assessing product quality. • Apply knowledge of milk quality and product evaluation to make informed decisions in dairy production and processing. • Apply proper techniques to produce different dairy products such as cheese, yogurt, butter and other products. • Demonstrate the process of making cheese, butter, and yogurt from raw milk. • Apply temperature control and ingredient management techniques to produce high quality dairy products. • Identify and troubleshoot defects in the production process that may affect the quality of the final product.
Key Vocabulary: bacterial contamination, butterfat, cheddaring, coagulation, creaming, curdling, dairy starter culture, emulsification, fermentation, homogenization, ice cream overrun, lactase, lactose, microbial spoilage, milk fat, milk solids-not-fat (MSNF), pasteurization, pasteurization temperature, pH level, probiotics, rennet, ripening, sensory evaluation, shelf life, Somatic Cell Count (SCC), starter culture, ultrafiltration, whey, yield, yogurt incubation	
Assessment Evidence	
Performance Tasks: *Classwork:* Determine the fat content of various dairy products using the Babcock test or other appropriate methods. **TI3** *Classwork:* Test milk samples for bacterial contamination using standard microbiological techniques. **TCC1** *Interim:* Identify various dairy products based on taste, texture and other sensory characteristics. **P4** *Summative:* Evaluate the quality of milk samples using sensory analysis, chemical tests, and temperature checks. **AA3**	**Other Evidence:** *Classwork:* Identify common defects in milk and other dairy products and propose solutions to prevent these defects. **AA3** *Classwork:* Analyze the factors influencing milk pricing and develop a marketing strategy for a dairy product. **CCE1** *Interim:* Create and deliver a presentation on a current issue or trend in the dairy industry that affects milk quality. **CCE3**

Learning Plan
• Participate in a mock Milk Quality and Products career development event contest. **CCE3** • Test milk samples for quality and bacterial contamination. **TCC1** • Identify various dairy products based on taste, texture and other sensory characteristics. **P4**
Teacher Resources: Teacher Created Resources National FFA Milk Quality and Products CDE Resources

Unit 4 - ANIMAL PROTEINS

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Agriculture, Food and Natural Resource Standards

FPP.01.01 Distinguish between various food safety programs and management systems in food products and processing facilities.
FPP.01.02 Apply food safety and quality assurance procedures in the harvesting, handling and processing of food products.
FPP.01.03 Appy food safety procedures during storage and distribution to ensure food quality.
FPP.02.02 Apply principles of microbiology and chemistry to develop food products to provide a safe, wholesome, and nutritious food supply for local and global food systems.
FPP.03.01 Implement selection, evaluation, and inspection techniques to ensure safe and quality food products.
FPP.03.02 Design and apply techniques of food processing, preservation, packaging, and presentation for distribution and consumption of food products.
FPP.04.02 Evaluate the significance and implications of changes and trends in the food products and processing industry in the local and global food systems.
FPP.04.03 Identify the purpose of industry organizations, groups and regulatory agencies that influence the local and global food systems.
CRP.02.01 Use strategic thinking to connect and apply academic learning, technical knowledge, and skills to solve problems in the workplace and community.
CRP.04.01 Communicate using strategies that ensure clarity, logic, purpose and professionalism in formal and informal settings.
CRP.04.02 Produce clear, reasoned, and coherent written and visual communication in formal and informal settings.
CRP.04.03 Model active listening strategies with interacting with others in formal and informal settings.
CRP.05.01 Assess, identify, and synthesize the information and resources needed to make decisions that positively impact the workplace and community.
CRP.07.01 Select and implement reliable research processes and methods to generate data for decision-making in the workplace and community.
CRP.10.01 Identify career opportunities within a career cluster that match personal interests, talents, goals and preferences.
CRP.12.01 Contribute to team-oriented projects and builds consensus to accomplish results using cultural global competence in the workplace and community.
ABS.04.01 Analyze characteristics and planning requirements associated with developing business plans for different types of AFNR businesses.
BS.01.01 Investigate and explain the relationships in the timeline of developing biotechnology applications and techniques in agriculture (e.g., major innovators, historical developments, potential applications of biotechnology, etc.).
BS.01.03 Analyze the relationship and implications of bioethics, laws, and public perceptions on applications of biotechnology in agriculture (e.g., ethical, legal, social, cultural issues).
BS..03.02 Apply biotechnology principles, techniques, and processes to enhance the production of food through the use of

microorganisms and enzymes.
BS.03.05 Apply biotechnology principles, techniques, and processes to produce bioproducts (e.g., fermentation, transesterification, methanogenesis, etc.).
BS.02.05 Examine and perform scientific procedures using microbes, DNA, RNA, and proteins in a laboratory.

Common Core State Standards

ELA-LITERACY.L.11-12.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
ELA-LITERACY.RI.11-12.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matter uncertain.
ELA-LITERACY.RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific science or technical context relevant to grades 11-12 texts and topics.
ELA-LITERACY.W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
ELA-LITERACY.W.11-12.9 Draw evidence from literary or information texts to support analysis, reflection, and research.
ELA-LITERACY.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
ELA-LITERACY.WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
ELA-LITERACY.WHST.11-12.9 Draw evidence from informational texts to support analysis, reflection, and research.
MATH.CONTENT.HSN.Q.A.1 Use units as ways to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

Next Generation Science Standards

HS-LS3-1 Ask questions to clarify relationships about the role of DNA and chromosomes in coding instructions for characteristic traits passed from parents to offspring.
HS-LS3-3 Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

TI3(9-12): I can formulate and investigate probing questions to further my learning.
CCE3(9-12): I can show initiative in prompting group discourse and fostering collaboration among others, providing actionable feedback, and working with others to solve problems and/or design products.

DE1(9-12): I can acknowledge, process, and respond appropriately to others' comments and perspectives.
DE2(9-12): I can honor my own feelings and show empathy toward others through my actions.
DE3(9-12): I can recognize my triggers, use appropriate coping strategies, and access relevant resources to help regulate my emotional response.
P2(9-12): I can strengthen my weakness by identifying, initiating, and practicing appropriate strategies to become confident in my ability to overcome my challenges.
AA1(9-12): I can evaluate different approaches and justify the best pathway to success.
AA2(9-12): I can assess my past successful strategies and apply them independently.

Understandings: Students will understand that...

- The ethical considerations and humane practices in meat processing are essential for ensuring animal welfare, maintaining food safety, and upholding industry standards.
- Proper handling and storage of knives are crucial for maintaining safety, preventing injuries, and ensuring the efficiency of meat processing operations.
- Understanding the anatomy of knives is fundamental for selecting the appropriate tool for various tasks, maintaining knife safety, and ensuring precision in cutting and processing activities.
- Knowledge of carcass anatomy is essential for accurately assessing meat quality, making informed decisions in meat processing, and maximizing the value of meat products.
- Niche markets in the United States include mutton and chevon; these animal products are important staples for ethnic and religious groups.
- The components of the muscle that a primal and retail cut originate from dictate the type of cooking methods applied to the product.
- A quality grade is determined by the United States Department of agriculture and is an assessment of the palatability of a cut of meat.
- A yield grade is a voluntary assessment of the marbling and meat quality of a cut of meat that dictates the value and overall economic returns from an animal.
- The consumption of meat plays a major role in the majority of religions - what can be consumed, what cannot and how an animal is processed to meet religious law.

Essential Questions:

- How do humane practices in meat processing facilities impact animal welfare, food safety and public perception of the meat industry?
- Why is the safe handling and storage of knives essential in a meat processing facility, and how do these practices contribute to overall workplace safety and productivity?
- How does knowledge of knife anatomy enhance safety, precision, and efficiency in cutting and processing tasks?
- How does knowledge of carcass anatomy influence the quality assessment, processing techniques, and economic value of meat products?
- Is there a market for mutton and chevon in the United States agricultural industry?
- How do you provide rationale as to why a particular cut of meat is selected for a recipe as opposed to another cut?
- What is the value of a carcass grading?
- What is the relationship between food and culture?

Students will know...	Students will be able to...
• Key principles of humane handling and slaughter practices in meat processing facilities. • The impact of ethical treatment of animals on the quality and safety of meat products. • The role of regulatory standards and guidelines in ensuring humane practices in meat processing. • Correct handling of knives to minimize the risk of injury. • Protocols for safely storing knives when not in use. • The importance of maintaining sharp and well-maintained knives for efficient processing and safety. • Potential hazards associated with improper knife use and storage in a meat processing environment. • The different parts of the knife include the blade, handle, tang, edge, point, spine, and bolster. • The functions of each part of the knife and how they contribute to overall performance and safety of the tool. • The types of knives used in meat processing and their specific applications. • The major anatomical parts of a carcass, including primal and subprimal cuts. • The relationship between different cuts of meat and their market value. • How muscle structure and fat distribution affect meat quality, tenderness, and flavor. • The demographic change in the United States has created a niche market for chevon and mutton. • The four primal cuts of pork, and the retail cuts associated with each primal cut. • The types of cooking to use based on the muscle group. • The eight primal cuts of beef, and the retail cuts associated with each primal cut. • Positive and negative characteristics of a carcass. • The relationship between food and culture. • How different aspects of religion affect food choice, and meat consumption in different cultures.	• Identify and explain the humane practices used in meat processing facilities. • Analyze the importance of ethical considerations in the meat processing industry. • Demonstrate proper knife handling techniques that reduce the risk of cuts and other injuries. • Assess the risks of improper knife use and develop strategies to promote safe practices. • Identify and label the parts of a knife and explain the function of each part. • Choose the appropriate knife for various cutting tasks in meat processing based on its anatomy and intended use. • Demonstrate proper handling techniques based on an understanding of knife anatomy. • Evaluate the condition of a knife and determine when it needs maintenance or replacement to ensure optimal performance and safety. • Identify and label the major anatomical parts of a carcass, including primal and subprimal cuts. • Analyze market data to determine economic characteristics of a niche market. • Differentiate between suspension and locomotion muscles on a carcass. • Categorize moist and dry heat methods - roast, broil, grill, pan-broil, pan-fry, braise and cook in liquid. • Identify chevon and mutton retail cuts by pictures of live examples. • Identify pork retail cuts by pictures of live examples. • Identify beef retail cuts by pictures or live examples. • Evaluate retail cuts of meat using the USDA quality grading system. • Calculate yield grades using the characteristics of a carcass. • Measure ribeye/loin eye area and fat thickness of a carcass to assist in calculating a yield grade.

Key Vocabulary:
aging, antemortem inspection, blade, bolster, bovine spongiform encephalopathy, brining, butt, byproducts, carcass, chopping board, cold chain, cross-contamination, curing, cutability, cut-resistant gloves, dry-aging, edge, finger guard, foodborne pathogens, food safety modernization act, grading, ground meat, HACCP, handle, heel, knife block, knife safety, knife sharpening, lean-to-fat ratio, marbling, muscle fiber, offal, point, postmortem inspection, primal cuts, quality grade, rendering, rigor mortis, sanitization, sharpening steel, sheath, spine, subprimal cuts, tang, tenderization, traceability, USDA inspection, wet-aging, whetstone, yield grade

Assessment Evidence

Performance Tasks:
Classwork: Demonstrate understanding of carcass fabrication through participation in laboratories. **P2**

Classwork: Evaluate the quality of different cuts of meat based on industry standards. **CCE3**

Classwork: Investigate how different cooking methods affect meat quality, including texture, flavor, and nutrient retention. **CCE3**

Classwork: Calculate the quality and yield grades of cuts of meat based on established industry standards. **AA1**

Other Evidence:
Interim: Written interim (quiz) assessment.

Summative: Written summative (test) assessment.

Learning Plan

- Students will review the humane and ethical guidelines of the meat harvesting industry. **DE1, DE3**
- Students will identify the primal, subprimal and retail cuts of chevon, mutton, lamb, pork and beef. **P2**
- Students will assess the quality and yield grades of cuts of meat. **AA1**
- Students will participate in laboratories fabricating a carcass. **TI3, DE2**

Teacher Resources:
Teacher Created Resources

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Unit 5 - POULTRY FLOCK MANAGEMENT

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Agriculture, Food and Natural Resources Standards

AS.01.01 Evaluate the development and implications of animal origin, domestication, and distribution on production practices and the environment.
AS.01.02 Assess and select animal production, marketing, and management methods based upon effectiveness and potential social and environmental impacts.
AS.01.03 Analyze laws and sustainable practices that impact animal agriculture from a local, tribal, state, national, and global perspective.
AS.02.01 Explain management techniques that ensure animal welfare.
AS.02.02 Analyze procedures to ensure that animal products are safe for consumption.
AS.05.01 Design and evaluate animal housing, equipment, and handling facilities for the major systems of animal production.
AS.05.02 Comply with government regulations and safety standards for facilities used in animal production.
AS.06.01 Classify animals according to taxonomic classification systems and use (e.g., agricultural, companion, etc.).
AS.06.02 Apply principles of comparative anatomy and physiology to uses within various animal systems.
AS.06.03 Select animals for specific purposes and maximum performance based on anatomy and physiology.
AS.07.01 Design programs to prevent animal disease, parasites, and other disorders and ensure animal welfare.
CRP.02.01 Use strategic thinking to connect and apply academic learning, technical knowledge, and skills to solve problems in the workplace and community.
CRP.04.01 Communicate using strategies that ensure clarity, logic, purpose and professionalism in formal and informal settings.
CRP.04.02 Produce clear, reasoned, and coherent written and visual communication in formal and informal settings.
CRP.04.03 Model active listening strategies with interacting with others in formal and informal settings.
CRP.05.01 Assess, identify, and synthesize the information and resources needed to make decisions that positively impact the workplace and community.
CRP.07.01 Select and implement reliable research processes and methods to generate data for decision-making in the workplace and community.
CRP.10.01 Identify career opportunities within a career cluster that match personal interests, talents, goals and preferences.
CRP.12.01 Contribute to team-oriented projects and builds consensus to accomplish results using cultural global competence in the workplace and community.
ABS.02.02 Assemble, interpret, and analyze financial information and reports to monitor AFNR business performance and support decision-making (e.g., income statements, balance sheets, cash-flow analysis, inventory reports, break-even analysis, return on investments, taxes, etc.).
ABS.04.01 Analyze characteristics and planning requirements associated with development business plans for different types of AFNR businesses.
ABS.05.01 Determine the role of markets, trade, competition, and price in relation to an AFNR business sales and marketing

plans.
BS.03.01 Apply biotechnology principles, techniques, and processes to modify a species.
PST.04.01 Create plans for AFNR structures.
PST.04.02 Determine structural requirements, specifications, customer needs, and estimate costs for AFNR structures.

Common Core State Standards

ELA-LITERACY.L.11-12.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
ELA-LITERACY.RI.11-12.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining what the text leaves matters uncertain.
ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific science or technical context relevant to grades 11-12 texts and topics.
ELA-LITERACY.W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts,a nd information clearly and accurately through the effective selection, organization and analysis of content.
ELA-LITERACY.W.11-12.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.
ELA-LITERACY.RH.11-12.7 Integrate and evaluate multiple sources of information presented in diverse media formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.
MATH.CONTENT.HSS.ID.C.7 Interpret slope (rate of change) and intercept (constant term) of a linear model in context of the data.
MATH.CONTENT.HSS.IC.B.6 Evaluate reports based on data.
MATH.CONTENT.HSN.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and origin of graphs and data displays.
MATH.CONTENT.HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.
MATH.CONTENT.HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
MATH.CONTENT.IF.B.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
MATH.CONTENT.IF.B.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
MATH.CONTENT.IF.B.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
MATH.CONTENT.IC.B.6 Evaluate reports based on data.

Next Generation Science Standards

HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
HS-LS3-2

HS-LS4-3 Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.
HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.
CCE1(9-12): I can initiate discussions with my peers and teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.
P2(9-12): I can strengthen my weaknesses by identifying, initiating, and practicing appropriate strategies to become confident in my ability to overcome my challenges.
AA1(9-12): I can evaluate different approaches and justify the best pathway to success.
AA3(9-12): I can adjust my expectations and behaviors to succeed in a changing and unpredictable environment.

Understandings: Students will understand that...

- Poultry breeds have unique characteristics that influence their suitability for various purposes, such as egg production, meat production, and ornamental use, which is crucial for selecting the right breed for specific farming goals.
- Poultry science encompasses the study of the biology, production, management and processing of poultry, providing essential knowledge for sustainable and efficient poultry production.
- Understanding the life cycle, anatomy, and physiology of poultry is critical for optimizing their health, welfare, and productivity.
- The design and engineering of hen houses play a critical role in ensuring the health, productivity, and welfare of poultry by providing a controlled environment that meets their physical and behavioral needs.
- Effective poultry management practices including nutrition, housing, disease prevention, and biosecurity, are essential for the success of the poultry industry.
- The poultry industry plays a vital role in global food security, providing a significant source of animal protein through meat

Essential Questions:

- How do different poultry breeds' characteristics and traits influence their use in egg and meat production?
- What factors influence the growth, development, and productivity of poultry?
- What key factors must be considered in the design and engineering of hen houses to optimize poultry welfare and production efficiency?
- How can effective management practices improve the health and welfare of poultry?
- In what ways does the poultry industry contribute to global food security and sustainability?
- How do anatomy and physiology affect the health and production efficiency of poultry?
- What role does biosecurity play in preventing disease outbreaks in poultry production?

and eggs.	
Students will know... ● Major breeds of poultry used in commercial egg and meat production, including their physical characteristics, production capabilities, and suitability for different environments. ● The difference between dual-purpose, meat-type, and egg-type poultry breeds. ● Basic anatomy and physiology of poultry species, including the digestive, respiratory, and reproductive systems. ● Essential components of hen house design, including ventilation, lighting, space requirements, and temperature control. ● The impact of environmental factors, such as air quality, lighting, and space, on the health and productivity of poultry. ● Different housing systems for poultry, such as cage-free, conventional cages, and free-range systems, and their respective benefits and challenges. ● Key factors influencing poultry growth, health, and productivity, including genetics, nutrition, and environmental conditions. ● Common poultry diseases and their prevention strategies, including vaccination and biosecurity measures. ● Stages of the poultry production cycle, from hatching to processing. ● The importance of proper housing, ventilation, and environmental control in poultry management. ● The role of the poultry industry in providing food, economic value, and contributing to global food security.	**Students will be able to…** ● Identify and describe key traits of various poultry breeds and explain their advantages and disadvantages for specific production purposes. ● Select appropriate poultry breeds for a given production goal based on their characteristics and needs. ● Compare and contrast the production capabilities for different poultry breeds in terms of growth rate, egg production, and feed efficiency. ● Identify and describe the major anatomical structures of poultry and their functions. ● Design a basic hen house layout that incorporates proper ventilation, lighting, and space for optimal poultry health and productivity. ● Evaluate the advantages and disadvantages of various hen housing systems and propose improvements based on animal welfare and production goals. ● Analyze how changes in housing design or management practices can affect the welfare and productivity of the poultry flock. ● Develop a basic nutrition plan for poultry at different stages of growth. ● Implement and evaluate biosecurity measures in a poultry production facility. ● Recognize symptoms of common poultry diseases and suggest appropriate preventative and management strategies. ● Analyze the impact of housing, environmental conditions, and management practices on poultry welfare and productivity. ● Discuss the significance of the poultry industry in the context of global food security and sustainability.
Key Vocabulary: acute stress, aerosol transmission, avian, biosecurity, breaker egg, broiler, chalazae, chick, chronic stress, corticosterone, farm animal welfare council, feed conversion rate, flock, genotype, hen, heritability, infundibulum, isthmus, layer, light intensity, litter, magnum, manure pasteurization, molting, mortality rate, novel object test, oocyte, oviposition, ovulation, phenotypes, photoperiod, pullet, rooster, selective breedings, stigma, The Brambell Committee, the five freedoms, thermoneutral zone, thermoregulation, the three circles model, tonic immobility tests, welfare quality	

framework

Assessment Evidence	
Performance Tasks: *Classwork:* Identify different poultry breeds and select appropriate breeds for specific production goals. **P2, AA3** *Classwork:* Evaluate and grade eggs based on industry standards. **CCE1** *Interim:* Design a hen house that incorporates proper ventilation, lighting, and space for optimal poultry health and productivity. **TCC2** *Summative:* Analyze a case study of a poultry facility transitioning between two types of facility designs that will alter poultry production statistics to provide informed recommendations to flock producers. **AA1**	**Other Evidence:** *Interim:* Written interim (quiz) assessment.

Learning Plan

- Students will review the most influential poultry breeds currently being raised in the poultry industry. **P2**
- Students will evaluate table eggs using industry standards for quality control. **CCE1**
- Students will design a hen house that incorporates proper ventilation, lighting, and space for optimal poultry health and productivity. **TCC2**
- Students will analyze a case study to make informed recommendations regarding beneficial design components to apply to a hen house production facility. **AA1**

Teacher Resources:
Teacher Created Resources
Purdue University High School E.G.G. Curriculum

Unit 6 - FOOD PRODUCT DEVELOPMENT

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Agriculture, Food and Natural Resource Standards

FPP.01.02 Apply food safety and quality assurance procedures in the harvesting, handling and processing of food products.
FPP.01.03 Apply food safety procedures during storage and distribution to ensure food quality.
FPP.02.01 Apply principles of nutrition and biology to develop food products that provide a safe, wholesome, and nutritious food supply for local and global food systems.
FPP.02.02 Apply principles of microbiology and chemistry to develop food products to provide a safe, wholesome, and nutritious food supply for local and global food systems.
FPP.02.03 Apply principles of human behavior to develop food products to provide a safe, wholesome and nutritious food supply for local and global food systems.
FPP.03.01 Implement selection, evaluation, and inspection techniques to ensure safe and quality food products.
FPP.03.02 Design and apply techniques of food processing, preservation, packaging, and presentation for distribution and consumption of food products.
FPP.04.01 Examine the scope of the food industry by evaluating local and global policies, trends, and customs for food production.
FPP.04.02 Evaluate the significance and implication of changes and trends in the food products and processing industry in the local and global food systems.
FPP.04.03 Identify the purpose of the industry organizations, groups and regulatory agencies that influence the local and global food systems.
CRP.02.01 Use strategic thinking to connect and apply academic learning, technical knowledge, and skills to solve problems in the workplace and community.
CRP.04.01 Communicate using strategies that ensure clarity, logic, purpose and professionalism in formal and informal settings.
CRP.04.02 Produce clear, reasoned, and coherent written and visual communication in formal and informal settings.
CRP.04.03 Model active listening strategies with interacting with others in formal and informal settings.
CRP.05.01 Assess, identify, and synthesize the information and resources needed to make decisions that positively impact the workplace and community.
CRP.07.01 Select and implement reliable research processes and methods to generate data for decision-making in the workplace and community.
CRP.10.01 Identify career opportunities within a career cluster that match personal interests, talents, goals and preferences.
CRP.12.01 Contribute to team-oriented projects and builds consensus to accomplish results using cultural global competence in the workplace and community.
ABS.01.01 Apply economic principles to plan and manage inputs and outputs in an AFNR business.
ABS.01.02 Evaluate and create statements of purpose and business goals for AFNR businesses.
ABS.04.01 Analyze characteristics and planning requirements associated with developing business plans for different types of

AFNR businesses.
ABS.06.01 Determine the role of markets, trade, competition, and price in relation to an AFNR business sales and marketing plans.
ABS..05.03 Assess marketing principles and develop marketing plans to accomplish AFNR business objectives.

Common Core State Standards

ELA-LITERACY.L.11-12.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific science or technical context relevant to grades 11-12 texts and topics.
ELA-LITERACY.W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization and analysis of content.
ELA-LITERACY.W.11-12.9 Draw evidence from literary or information texts to support analysis, reflection, and research.
ELA-LITERACY.RI.11-12.4 Determine the meaning of words and phrases as they are used in text, including figurative, connotative, and technical meanings; analyze how an author uses and refines the meaning of a key term or terms over the course of a text.
ELA-LITERACY.RH.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.
ELA-LITERACY.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflict information when possible.
ELA-LITERACY.WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
ELA-LITERACY.WHST.11-12.9 Draw evidence from informational texts to support analysis, reflection and research.
ELA-LITERACY.SL.11-12.6
MATH.CONTENT.HSN.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
MATH.CONTENT.HSS.ID.C.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in context of the data.
MATH.CONTENT.HSS.IC.B.6 Evaluate reports based on data.
MATH.CONTENT.HSF.IF.B.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
MATH.CONTENT.HSF.IF.B.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
MATH.CONTENT.HSF.IF.B.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

Next Generation Science Standards

HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

TCC3(9-12): I can integrate relevant information to produce multiple valid solutions.
CCE4(9-12): I can communicate and express my understanding in an authentic, respectful and relevant way, using the most effective mode of expression.

Understandings: Students will understand that...

- The process of food product development involves creativity, scientific knowledge, and market analysis to create products that meet consumer needs and preferences.
- The steps of food product development, from concept to market is crucial for creating safe, nutritious, and appealing food products.
- Successful food product development requires collaboration, problem-solving, and attention to regulatory standards and food safety protocols.

Essential Questions:

- What are the key steps in developing a new food product, and how do they contribute to the final product's success in the market?
- How do consumer preferences, nutritional requirements, and food safety regulations shape the development of new food products?
- In what ways does innovation and problem-solving play a role in the food product development process?
- How can market analysis and consumer testing inform the successful launch of a new food product.

Students will know...

- The stages of food product development, including concept generation, formulation, testing, packaging, and marketing.
- The importance of sensory evaluation and consumer feedback in refining food products.
- The role of food safety and regulatory requirements in product development.
- How to balance nutritional content, taste, cost, and marketability in creating a food product.
- Techniques for conducting market research and analyzing consumer trends.

Students will be able to...

- Identify and explain the stages of food product development from concept to market.
- Develop a food product concept, including formulating a recipe and designing packaging.
- Conduct sensory evaluations and use feedback to refine a food product.
- Apply knowledge of food safety and regulatory standards to ensure the product meets industry requirements.
- Analyze market trends and consumer preferences to inform the development and marketing strategy of a food product.
- Collaborate with peers to solve problems and make decisions during the food product development process.

Key Vocabulary:
allergen management, consumer testing, cost analysis, emulsifier, flavor profile, food safety, formulation, functional food, ingredient sourcing, innovation, market research, nutritional labeling, packaging, preservatives, product differentiation, product iteration, product launch, prototype, quality control, recipe standardization, regulatory compliance, sensory evaluation, shelf life, sustainability, texture

Assessment Evidence	
Performance Tasks: *Summative:* Create a unique food product to be marketed to peers. **TCC3** *Classwork:* Create marketing material to advertise a unique food product. **CCE4** *Classwork:* Design a recipe for a new food product. **CCE4** *Interim:* Present a business pitch to peers to gain peer approval for a created food product. **CCE4**	**Other Evidence:** *Interim:* Develop a nutrition label based on governmental regulations. **CCE4**

Learning Plan
● Students will design, develop and present a food product of their own making. **CCE4** ● Students will complete marketing activities to advertise for their created food product. **CCE4** ● Students will analyze the nutritional components of their created food product to develop a food nutrition label. **CCE4**

Teacher Resources: Teacher Created Resources