Meat Science I

Primary Career Cluster:	Agriculture, Food, & Natural Resources
Consultant:	CTE.Standards@tn.gov
Course Code(s):	C18HB3
Prerequisite(s):	*Agriscience* (C18H19)
Credit:	1 Credit
Grade Level:	10
Elective Focus - Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Agriculture, Food, & Natural Resources courses
POS Concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition, when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the second course in the *Meat Science* program of study.
Aligned Student Organization(s):	FFA: http://www.tnffa.org
Coordinating Work-Based Learning:	All Agriculture students are encouraged to participate in a Supervised Agricultural Experience (SAE) program. In addition, teachers who hold an active WBL certificate may offer placement for credit when the requirements of the state board's WBL Framework and the Department's WBL Policy Guide are met. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.
Promoted Tennessee Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/education/educators/career-and-technical-education/student-industry-certification.html.
Teacher Endorsement(s):	048, 150, 448, and 950
Required Teacher Certifications/Training:	None
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-agriculture-food-natural-resources.html Best for All Central: https://bestforall.tnedu.gov/

Course at a Glance

CTE courses provide students with an opportunity to develop specific academic, technical, and 21st century skills necessary to be successful in career and in life. In pursuit of ensuring every student in Tennessee achieves this level of success, we begin with rigorous course standards which feed into intentionally designed programs of study.

Students engage in industry relevant content through general education integration and experiences such as career and technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry standard content and technology, solve industry-based problems, meaningfully interact with industry professionals and use/produce industry specific, informational texts.

Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for your students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course, note this is not an exhaustive list.

- Participate in CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry specific skills that involve teamwork and project management.
- Participate in FFA career and leadership events (CDE/LDE) that align with this course including Agriscience Fair, Agricultural Communications, Agricultural Issues, Agricultural Sales, Extemporaneous Speaking, Floriculture, and Prepared Public Speaking.

Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.1-2.3** | Invite an industry representative to talk about career opportunities, and skills and training required for employment.
- **Standards 3.1** | Visit a local or regional processing plant and have the plant manager discuss food safety protocols and regulations.
- **Standards 4.1- 4.5** | Invite an animal scientist or farmer to discuss the aspects of proper animal health and breed selection.
- **Standards 5.1 – 5.3 |** In groups, virtually collaborate with an agricultural extension agent or agribusiness representative to prepare a presentation on factors impacting meat protein production.
- **Standards 6.1-6.2** | Invite an animal geneticist to discuss the role of genomics in producing safe high quality meat proteins.

Course Description

Meat Science I is an applied course for students interested in pursuing careers in meat or food science industries. Students will study principles related to animal structural anatomy, and a broad range of skills to become butchers, meat processors or meat processor managers in commercial or private meat processing facilities. This course will focus on the principles related to animal structural anatomy, systems physiology, the economics of production, genetics and biotechnology, and other management approaches associated with animal production. Standards in this course are aligned with National Agriculture, Food, and Natural Resources Career Cluster Content Standards.

Course Standards

1. **Introduction to Animal Agriculture and Safety**

    1.1. Safety: Review **common laboratory safety procedures for tool and equipment operation** in the food science laboratories, including but not limited to **accident prevention and control procedures**. Demonstrate the ability to follow safety and operational procedures in a lab setting and complete a safety test with 100 percent accuracy.

2. **Introduction to Meat Science Industry and Careers**

    2.1. Economic Impact: Investigate current food science applications and describe the **scope and economic importance of the food industry in the United States, including imports and exports**. Describe how the study of food science and related sciences impacts the quality of life and enhances a Supervised Agricultural Experience (SAE) program.

    2.2. Careers: Investigate occupations within food science and related industries. Compare and contrast the **knowledge, skills, and abilities necessary for employment**, as well as the typical level of education required.

    2.3. Supply and Safety Trends: Illustrate significant **trends, with regard to supply and demand of food products across the world population**. Identify and summarize common **environmental and safety** concerns regarding food production and the food supply.

3. **Meat Science Rules and Regulations**

    3.1. Rules and Regulations**:** Analyze **state and federal laws and regulations governing food inspection standards**. Define the roles of state and government agencies responsible for the establishment and enforcement of food safety regulations. Interpret the regulations governing the "Local Foods for Local Schools" program in Tennessee.

4. Principles of Animal Science for Agricultural Production

4.1. <u>Meat Production</u>: Identify the **major breeds of production animals** (such as cattle, sheep, swine, and venison) and **their associated food and fiber products**. Explore the basic principles of animal science needed to produce healthy livestock for high quality food and fiber products (such as nutrition, reproduction, and breed selection).

4.2. <u>Anatomy and Development</u>: Identify and describe the general **growth and development processes** of production animals used for food and fiber production. Analyze animal anatomy, physiology, genetics, and reproduction in the context of **animal growth and productivity**, including the following:
   a. Describe different animal types based on their anatomy and physiology.
   b. Examine the components of the animal reproduction system and identify specific anatomical features on different species and varieties of production animals.
   c. Demonstrate understanding of crossbreeding techniques to enhance identified traits and characteristics.

4.3. <u>Health</u>: Research principles of **disease and parasite control related to livestock health, growth, and maintenance**. Recommend safe methods for disease and parasite prevention and treatment, citing established scientific and industry guidelines.

4.4. <u>Nutrition</u>: Research and document connections between **proper nutrition and animal health**. Apply principles of proper nutrition to maximize livestock gains and cost efficiency, by:
   a. making specific diet recommendations, based on animal breed, available resources, costs, and nutritional requirements, and justify recommendations with specific textual evidence; and
   b. differentiating between various diet alternatives to determine which ration is most cost effective to obtain maximum production.

4.5. <u>Genetics</u>: Summarize how **heritability, selection intensity, and generation interval are important to genetic change in production animals**, including:
   a. explaining how each concept impacts genetic change,
   b. comparing and contrasting characteristics of each as a tool for animal producers, and
   c. determining how long it will take to get specific traits, using each method.

5. Principles of Agribusiness for Animal Production

5.1. <u>Cost Factors</u>: Identify and critique **factors that influence the livestock production** in the United States and the world. Interpret production costs for various types of plant and animal operations that impact the wholesale cost of food.

5.2. <u>Marketing</u>: Explore and compare **marketing methods and strategies** to develop opportunities for specialty plant and animal products in niche markets.

5.3. <u>Global Markets</u>: Identify and describe the **American factors impacting global commodity markets**. Compare and contrast different **factors that impact food prices** in

specific scenarios (such as the impact of war, economic sanctions, or weather on local food prices).

6. **Animal Biotechnology**

6.1. <u>Impact of Biotechnology</u>: Examine the **role and importance of genetic principles in improving plant and animal production**. Summarize the **important historical achievements in plant and animal biotechnology**. Research current and emerging plant and animal biotechnologies and craft an argumentative essay to debate the use of biotechnology in production agriculture. Justify claims surrounding the ethical, legal, practical, and economic issues related to food production and biotechnology with evidence drawn from scientific and professional resources.

6.2. <u>Genomics</u>: Compare and contrast the advances in using **genomic markers and genomic EPDS** in the livestock industry. Discuss the acceleration of genetic selection, mapping of complex traits, mapping of disease structures, and improved consistency of progeny outcomes.

Standards Alignment Notes

References to other standards include:

- SAE for All: <u>Evolving the Essentials</u>: All Agriculture students are encouraged to participate in a Supervised Agricultural Experience (SAE) program to practice and demonstrate the knowledge and skills learned in their agriculture courses.
- AFNR: <u>National Agriculture, Food, & Natural Resources (AFNR) Career Cluster Content Standards</u>: Students who are engaging in activities outlined above should be able to demonstrate fluency in Standards CR, FPP, and PS at the conclusion of the course.
- P21: Partnership for 21st Century Skills <u>Framework for 21st Century Learning</u>
  - Note: While not all standards are specifically aligned, teachers will find the framework helpful for setting expectations for student behavior in their classroom and practicing specific career readiness skills.