Large Animal Science Technologies

Primary Career Cluster:	Agriculture, Food, & Natural Resources
Consultant:	CTE.Standards@tn.gov
Course Code(s):	C18H27
Prerequisite(s):	*Small Animal Science* Technologies (C18H20)
Credit:	1
Grade Level:	11
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 third course in the *Veterinary and Animal 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/content/tn/education/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/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/career-and-technical-education/career-clusters/cte-cluster-agriculture-food-natural-resources.html Best for All Central: https://bestforall.tnedu.gov/

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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 & 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. 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, Dairy Evaluation & Management, Dairy Cattle Handlers, Employment Skills, Extemporaneous Speaking, Horse Evaluation, Livestock Evaluation, Meats Evaluation & Technology, Parliamentary Procedure, Poultry Evaluation, Public Speaking, and Veterinary Science

Using Work-based Learning 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 1.1-2.2, 2.4 |** Invite an animal scientist to discuss the history and trends within the industry.
- **Standard 2.3 |** Have students work with an agribusiness accounting specialist to conduct a self-audit of SAE records.
- **Standards 3.1-3.4 |** Tour a veterinary hospital or clinic.
- **Standards 4.1-4.2 |** In groups, virtually collaborate with animal caretakers and scientists to prepare an educational health care presentation for a specific animal.
- **Standards 5.1-5.4 |** Invite an animal nutritionist to discuss the aspects of proper animal health.
- **Standards 6.1-6.3 |** Invite an animal geneticist to discuss the role of genomics in reducing animal disease.
- **Standards 7.1-11.1 |** Invite a breed representative to present skills associated with fundamental care and health for specific breeds of animals.

Course Description

Large Animal Science Technologies is an applied course in veterinary and animal science for students interested in learning more about becoming a veterinarian, vet tech, vet assistant, or pursuing a variety of scientific, health, or agriculture professions. This course covers the anatomy and physiological systems of different groups of large animals, as well as careers, leadership, and history of the industry. Upon completion of this course, proficient students will be prepared for success in the level-four *Veterinary Science* course and further postsecondary training.

Course Standards

1. **History of Domestication**

    1.1 History of Large Animal Domestication: Research the history of **large animal domestication** including defining and applying industry-specific terminology to classify animals in the correct taxonomy. Justify the historical uses and roles of domesticated animals, and compare historical processes of large animal domestication.

2. **Economic, Occupational, and Technological Implications**

    2.1 Economical Implications: Determine the general **economic impact of the large animal industry** by investigating both recreational and business implications of large animal domestication.

    2.2 Career Exploration: Explore and compare **local and regional career opportunities** in the large animal industry and evaluate labor data to predict the employment outlook. Describe the **knowledge, skills, and abilities necessary for a diverse range of careers** in large animal sciences.

    2.3 Business and SAE Financial Recordkeeping: Accurately maintain an active **recordkeeping system** and apply proper **accounting and financial records** as they relate to a large animal science **supervised agricultural experience (SAE) program or enterprise**. Demonstrate the ability to summarize business records such as individual enterprise budgets, profit and loss statements, inventory management, transportation cost, and other specific reports by completing SAE and related financial applications.

    2.4 Emerging Technologies: Examine **specific technologies** that have evolved within the large animal industry (such as, but not limited to equipment, housing, procedures, and healthcare) and evaluate the economic and societal implications of each.

3. **Personal and Occupational Health and Safety**

    3.1 Diseases: Identify, research, and determine the significance of **zoonotic diseases** associated with large animals. Compare and contrast findings relating to a specific disease. Justify the use of different **methods of infection control** in the prevention or management of zoonotic diseases and evaluate the efficacy of existing large animal biosecurity measures.

3.2 <u>Health Requirements and Regulations:</u> Correctly identify and summarize **laws and regulations that pertain to large animal health and safety** from state and national legislation. Describe **health requirements and necessary documentation** for large animal transportation and change of ownership.

3.3 <u>Safety and Operational Procedures:</u> Review common **laboratory safety procedures for tool and equipment operation** in the large animal 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.

3.4 <u>Personal and Animal Safety:</u> Demonstrate the ability to **follow procedures precisely**, attending to **special cases or exceptions** noted in appropriate materials, and apply them to the following areas:
   a. Animal restraint and handling
   b. Techniques for transportation
   c. Appropriate use of chemicals (such as pesticide, fungicide, disinfectants)
   d. Differentiate between effective methods for handling large animals and methods proven to be less effective.

4. **Animal Ethics**

4.1 <u>Fundamental of Animal Rights and Welfare:</u> Identify the **fundamental philosophies related to animal rights and animal welfare**. Compare the impact of specific persons, organizations, and legislation related to animal rights and welfare of large animals.

4.2 <u>Analyzing Ethical Issues:</u> Debate specific **issues** by forming and supporting claims and counterclaims with **specific data and evidence**. Issues related to animal rights and animal welfare may include, but are not limited to:
   a. Abuse and/or neglect
   b. Environmental implications
   c. Consumer product implications
   d. Exhibiting and showing
   e. Global animal ethics issues and their relation to local problems

5. **Nutrition and Digestive Systems**

5.1 <u>Digestive Systems:</u> Differentiate between **ruminant and non-ruminant animals and monogastric and polygastric animals**, comparing and contrasting their anatomical and physiological differences. Explain the relationships of **digestive system types** to the ability of an animal to digest and absorb different classes of feed.

5.2 <u>Nutritional Requirements:</u> Research **nutrient requirements of the large animal diets** and organize them into various nutrient groups. Differentiate between **roughages and concentrates and their nutritional values**.

5.3 <u>Interpreting and Recommending Feed Rations:</u> Interpret **feed labeling** and evaluate factors such as life stage and activity level to determine the **nutritional needs** and then recommend balance rations for each large animal species, justifying recommendations with evidence from the text.

5.4 <u>Nutritional Diseases:</u> Diagnose the **symptoms of nutritional diseases** relevant to large animals and recommend the appropriate control procedures.

6. **Genetics, Reproduction, and Genomics**

6.1 <u>Reproductive Systems:</u> Research the **major components of male and female reproductive systems** in large animals to distinguish the function of reproductive organs, endocrine glands, and hormones. Compare the **physiological changes that occur across different species during reproductive phases**, including the estrous cycle, fertilization, gestation, parturition, and lactation.

6.2 <u>Principles of Genetics and Genomics:</u> Explain how the role of **heritability, selection intensity, generation interval, and other advanced principles of genetics** (such as DNA testing for disorders) apply to predict gene and trait transfer in large animal species. Principles include but are not limited to:
   a. Economically important traits in production animals (i.e. artificial reproduction methods)
   b. Interpretation and utilization of animal performance records (i.e. Expected Progeny Difference [EPD])
   c. Hybrid vigor

6.3 <u>Advancements with Genomics:</u> Compare and contrast the **advances in the livestock industry** by using **genomic markers and genomic EPDS**. Explain how genomics impacts the acceleration of genetic selection, mapping of complex traits, mapping of disease structures, and improved consistency of progeny outcomes.

7. **Fundamental Care and Health of Horses**

7.1 <u>Domestication, Care, and Health:</u> Synthesize research on the **historical importance of horses**, noting major economic, social, and medical advances impacting domestication. Compare and contrast the different **horse breeds and hybrids**. Demonstrate conceptual understanding and technical skill in current practices of comprehensive health care and management for the following:
   a. Design appropriate facilities based on an assessment of needs and present plans in a visual format
   b. Compare appropriate owner/handler responses to behaviors and instincts to ensure safety of both handler and animal in a variety of situations
   c. Distinguish between clinical signs of proper health and poor health, justifying explanations with data and evidence

     d. Using quantitative reasoning and appropriate units, calculate appropriate rations based on animal characteristics (age, weight, breed, activity level) and nutritional needs

     e. Illustrate the reproductive cycle graphically, and summarize available breeding methods and current reproductive technologies

     f. Research common diseases and parasites and their effects on the health of horses, and draw evidence from the most recent medical literature to recommend the best prevention or control measures.

8. Fundamental Care and Health of Cattle

8.1 <u>Domestication, Care, and Health:</u> Synthesize research on the **historical importance of cattle**, noting **major economic, social, and medical advances impacting domestication**. Compare and contrast among different **cattle breeds**. Demonstrate conceptual understanding and technical skill in current practices of **comprehensive health care and management** for the following:

     a. Design appropriate facilities based on an assessment of needs and present plans in a visual format

     b. Compare appropriate owner/handler responses to behaviors and instincts to ensure safety of both handler and animal in a variety of situations

     c. Distinguish between clinical signs of proper health and poor health, justifying explanations with data and evidence

     d. Using quantitative reasoning and appropriate units, calculate rations based on animal characteristics (age, weight, breed, activity level) and nutritional needs by creating systems of equations that describe numerical relationships

     e. Illustrate the reproductive cycle graphically, summarize available breeding method, and current reproductive technologies

     f. Research common diseases and parasites and their effects on the health of cattle, and draw evidence from the most recent medical literature to recommend the best prevention or control measures

     g. Evaluate the economic implications of livestock management practices (such as dehorning)

9. Fundamental Care and Health of Small Ruminants (Sheep, Goats, Alpacas, and Llamas)

9.1 <u>Domestication, Care, and Health:</u> Synthesize research on the **historical importance of small ruminant breeds**, noting major economic, social, and medical advances impacting domestication. Compare and contrast among different sheep, goat. alpaca, and llama breeds. Demonstrate **conceptual understanding and technical skill in current practices of comprehensive health care and management** for the following:

     a. Design appropriate facilities based on an assessment of needs and present plans in a visual format

     b. Compare appropriate owner/handler responses to behaviors and instincts to ensure the safety of both handler and animal in a variety of situations

     c. Distinguish between clinical signs of proper health and poor health, justifying explanations with data and evidence

  d. Using quantitative reasoning and appropriate units, calculate appropriate rations based on animal characteristics (age, weight, breed, activity level) and nutritional needs by creating systems of equations that describe numerical relationships

  e. Illustrate the reproductive cycle graphically, and summarize available breeding methods and current reproductive technologies

  f. Research common diseases and parasites and their effects on the health of sheep and goats, and draw evidence from the most recent medical literature to recommend the best prevention or control measures

10. Fundamental Care and Health of Swine

10.1 <u>Domestication, Care, and Health of Swine:</u> Synthesize research on the **historical importance of swine**, noting major economic, social, and medical advances impacting domestication. Compare and contrast among different **swine breeds**. Demonstrate **conceptual understanding and technical skill in current practices of comprehensive health care and management** for the following:

  a. Design appropriate facilities based on an assessment of needs and present plans in a visual format

  b. Compare appropriate owner/handler responses to behaviors and instincts to ensure the safety of both handler and animal in a variety of situations

  c. Distinguish between clinical signs of proper health and poor health, justifying explanations with data and evidence

  d. Using quantitative reasoning and appropriate units, calculate appropriate rations based on animal characteristics (age, weight, breed, activity level) and nutritional needs by creating systems of equations that describe numerical relationships

  e. Illustrate the reproductive cycle graphically, and summarize available breeding methods and current reproductive technologies

  f. Research common diseases and parasites and their effects on the health of swine, and draw evidence from the most recent medical literature to recommend the best prevention or control measures

11. Fundamental Care and Health of Poultry

11.1 <u>Domestication, Care, and Health of Poultry:</u> Synthesize research on the **historical importance of poultry**, noting major economic, social, and medical advances impacting domestication. Compare and contrast among different **poultry breeds**. Demonstrate **conceptual understanding and technical skill in current practices of comprehensive health care and management** for the following:

  a. Design appropriate facilities based on an assessment of needs and present plans in a visual format

  b. Compare appropriate owner/handler responses to behaviors and instincts to ensure the safety of both handler and bird in a variety of situations

  c. Distinguish between clinical signs of proper health and poor health, justifying explanations with data and evidence

d. Using quantitative reasoning and appropriate units, calculate appropriate rations based on bird characteristics (age, weight, breed, activity level) and nutritional needs by creating systems of equations that describe numerical relationships
e. Illustrate the reproductive cycle graphically, and summarize available breeding methods and current reproductive technologies
f. Research common diseases and parasites and their effects on the health of poultry, and draw evidence from the most recent medical literature to recommend the best prevention or control measures

Standards Alignment Notes

References to other standards include:

- SAE: Supervised Agricultural Experience: All Agriculture students are encouraged to participate in a Supervised Agricultural Experience program to practice and demonstrate the knowledge and skills learned in their agriculture courses.
- AFNR: National Agriculture, Food, & Natural Resources (AFNR) Career Cluster Content Standards: Students engaged in activities outlined above should be able to demonstrate fluency in Standards AS and CS at the conclusion of the course.
- P21: Partnership for 21st Century Skills Framework for 21st Century Learning
    - o 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.