**Tennessee Specific Industry Certification for Animal Science**

**Content Areas and Learning Outcomes**

**Content Areas**

1. Anatomy and Physiology

2. Animal Ethics

3. Animal Nursing

4. Breeds of Livestock and Companion Animals

5. Business

6. Clinical Lab Procedures

7. Communications

8. Digestion and Nutrition

9. Fundamental Care and Animal Health

10. Genetics

11. Overview and Technology

12. Reproduction

13. Safety - Personal, Animal, and Public Perception

**Content Area: Anatomy and Physiology (9%)**

**Learning Outcome**

1. Develop and utilize a vocabulary of appropriate terminology to effectively communicate information related to anatomy and physiology.
2. Detail the anatomy and physiology of cells, tissues, organs, and systems.
3. Describe all functions of each organ system within the animal’s body.
4. Identify various organs, muscles, and structures within the animal’s body using anatomical models, diagrams, and specimens.
5. Identify the basic bone structure of companion and food animals.
6. Compare and organize the gastrointestinal anatomy of companion and food animals.
7. Identify major muscle groups and list their associated functions.
8. Identify the primal cuts of the beef, swine, lamb, chicken, and turkey carcasses.
9. Compare and contrast the reproductive anatomy of cattle, swine, small ruminants, equine, and poultry.
10. Describe each phase of reproduction, and note key indicators in farm animals.
11. Evaluate structural soundness/correctness of all classes of livestock.

**Content Area: Animal Ethics (6%)**

**Learning Outcome**

1. Identify pro-agriculture and anti-agriculture organizations/movements and discuss their effects on production agriculture.
2. Compare and contrast the principles of animal rights and animal welfare.
3. Identify acceptable and unacceptable practices with regard to animal welfare.
4. Describe the concept of the human and animal relationships and how it differs between production and companion animals.
5. Explain the impact that niche and personal emotion based animal welfare legislation can have on production agriculture.
6. Explain the difference in emotion versus science based decision making in terms of public perception of animal agriculture.
7. Describe the benefits of common animal husbandry procedures for production and companion animals. Explain their necessity in terms of public perception and acceptance.
8. Describe how the ethical use of animals improves human life as a source of food, clothing, defense, transportation, logistics, entertainment, and biomedical research. Justify continued use of animals if non-animal alternatives exist.
9. Assess alternative consumer choices and identify the niche market opportunities for agriculture in the 21st century.
10. Outline state and federal animal care legislation/statutes, their ramifications on consumers and producers, and how they are enforced.
11. Recognize the beneficial values and costs of responsible agriculture and animal welfare to the agriculture industry.

**Content Area: Animal/Veterinary Nursing (5%)**

**Learning Outcome**

1. Describe the concept of animal nursing using common veterinary terminology.
2. Employ math applications including conversions and dose calculations for veterinary medical care.
3. Explain how to work correctly with regard to disease control, occupational safety and animal welfare in animal nursing.
4. Demonstrate proper techniques for administering medicines to companion and food animals.
5. Understand concepts of animal behavior as they relate to appropriate handling and restraint techniques and behavior modifications to companion and food animals.
6. Understand the use and maintenance of various instruments, equipment and supplies utilized in the diagnosis and treatment of small animals.
7. Explain the importance of using different nursing practices during different developmental stages.
8. Identify common nursing practices used with different domesticated animal species.

**Content Area: Breeds of Livestock and Companion Animals (6%)**

**Learning Outcome**

1. Identify the major breeds of livestock and their origins of beef cattle, dairy cattle, swine, sheep, goats, and horses in the United States.
2. Differentiate between “broilers” and “layers” in poultry production.
3. List physical characteristics of major breeds/crossbreeds of poultry in the United States.
4. Distinguish between “Purebred” and “Commercial” livestock.
5. Name and identify the most influential breeds of livestock in each production area in the United States.
6. Utilize common breed terminology with regards to describing livestock breeds.
7. Utilize binomial nomenclature to identify each livestock species.
8. Identify major breeds of different companion animals.

**Content Area: Business (9%)**

**Learning Outcome**

1. Outline the key components of a financially sound business.
2. Describe basic principles of livestock markets.
3. Describe the marketing tools available to livestock producers.
4. Demonstrate an understanding of commonly accepted accounting principles.
5. Demonstrate the ability to utilize accounting records in managing a financially sound livestock enterprise.
6. Contrast basic sales, marketing and customer service skills and principles that result in customer satisfaction and retention.
7. Demonstrate an understanding of inventory management and transportation costs.
8. Identify and separate the fixed costs versus variable costs of a business enterprise, including assets.
9. Understand the major costs of production and profitability/income drivers within and between different livestock segments.
10. Contrast different profitability scenarios through case studies based on variable market.
11. Recognize the impact of positive and negative social media within animal agriculture.
12. Discuss the economic impact of animal agriculture on a domestic and international scale.

**Content Area: Clinical Lab Procedures (3%)**

**Learning Outcome**

1. Describe proper techniques to package, handle, and store specimens for laboratory analysis.
2. Identify common parasite ova and larvae of domestic animals in fecal and blood samples.
3. Identify commonly used equipment in the laboratory setting.
4. Develop and demonstrate safety and hygiene skills used when working in a laboratory setting.
5. Describe and demonstrate proper techniques for sample collection for common veterinary diagnostic tests.
6. Identify and understand new technologies and tools that are being introduced or available for lab use.

**Content Area: Communications (5%)**

**Learning Outcome**

1. Identify and demonstrate the most effective way to communicate or market a thought or message given different scenarios.
2. Demonstrate the ability to write a speech, blog, editorial or informational piece that will effectively appeal to a specific audience.
3. Evaluate and use social media for effective grassroots communication or marketing.
4. Compose and practice effective written and verbal communication methods in ongoing pro-agriculture campaigns.
5. Analyze and interpret basic human behavior (verbal and nonverbal) for enhanced communication.
6. Compose communication materials using correct oral/written grammar.
7. Effectively edit written communication.
8. Recognize key issues and concerns that consumers have about the agriculture industry and effectively respond in a proactive manner.
9. Summarize lengthy communication.
10. Demonstrate the ability to choose words/phrases to convey ideas precisely.
11. Identify keys words, phrases or acronyms that are used in the agriculture industry that do not relate to consumers.
12. Compose and present a set of written and oral reasons for livestock, dairy, poultry, or meats evaluation classes.
13. Defend your position on specific animal issues using social media in both a professional and grammatically correct manner.

**Content Area: Digestion and Nutrition (11%)**

**Learning Outcome**

1. Identify major anatomical components of ruminant and monogastric, including poultry digestive systems and the general function of each component.
2. Explain the digestive processes in different domesticated animal species.
3. Compare and contrast how ruminant and monogastric digestive systems utilize, digest, and absorb different classes of feedstuffs.
4. Explain the mechanical digestion process in birds and how it is different from digestion in mammals.
5. Identify the six major classes of nutrients and their role in nutrition.
6. Identify basic feedstuffs and describe their nutritional qualities.
7. Describe nutrient requirements during different stages of growth and development for mammals and birds.
8. Explain the primary sources of energy and protein in animal feeds.
9. Formulate a simple ration.
10. Understand how to read and interpret a feed label.
11. Define micronutrients and explain their role in the overall health of an animal.

**Content Area: Fundamental Care and Animal Health (12%)**

**Learning Outcome**

1. Create a vaccination plan for horses, cattle, swine, sheep, poultry, and goats.
2. Identify and describe different anthelmintics used in horses, poultry, cattle, sheep, swine and goats.
3. Differentiate between healthy and unhealthy livestock.
4. Develop and utilize a vocabulary of appropriate terminology to effectively communicate information related to animal health.
5. Identify “Zoonotic Diseases” that might affect a person working with livestock and companion animals.
6. Identify diseases that commonly affect livestock and companion animals.
7. Calculate the cost of disease prevention versus treatment as it relates to livestock productivity.
8. Identify common farm animal parasites.
9. Distinguish between intradermal, subcutaneous, intramuscular, and intravenous injections.
10. Identify common tools used in animal health.
11. Understand the importance of proper animal restraint.
12. Explain why withdrawal times are important to follow in livestock production.
13. Describe environmental effects on livestock.
14. Understand the components of and the importance of bio-security programs to livestock operations.
15. Describe the state and federal laws and regulations for herd health and consumer safety and the value to each.

**Content Area: Genetics (9%)**

**Learning Outcome**

1. Describe the role of gametes, DNA, and chromosomes.
2. Develop and utilize a vocabulary of appropriate terminology to effectively communicate information related to animal genetics.
3. Calculate genotypic and phenotypic outcomes.
4. Explain the concepts of genetic variation, qualitative, and quantitative traits.
5. Understand the concepts of heritability and heterosis.
6. Understand how animal records are used to evaluate breeding values of livestock or companion animals.
7. Understand the use of adjustment factors for production records in evaluating livestock for breeding.
8. Describe different selection methods and their measurability.
9. Explain the primary factors that affect rate of improvement through selection.

**Content Area: Overview & Technology (6%)**

**Learning Outcome**

1. Explain trends of consumer demands in the meat industry.
2. Identify the areas of the carcass that produce the more valuable cuts of meat.
3. Identify issues associated with animal biotechnology.
4. Identify and explain the importance of different technologies used in livestock production and companion animals.
5. Discuss advantages and disadvantages of different dairy technologies.
6. Explain how the use of EPDs can improve a livestock operation.
7. Describe beneficial reproductive technologies.

**Content Area: Reproduction (10%)**

**Learning Outcome**

1. Identify the anatomy and primary function of the male and female reproductive tract components in livestock and companion animals.
2. Develop and utilize a vocabulary of appropriate terminology to effectively communicate information related to reproductive cycles.
3. Identify the major reproductive hormones and define their role in reproductive processes and the development of secondary sex characteristics in different livestock species.
4. Trace the route of a sperm cell from formation in the testes to implantation into the egg correctly naming all of the structures that the sperm passes through on its journey to the egg.
5. Give the length/duration of the estrous cycle, estrus cycle, and gestation period for the following animals: horse, cow, sow, ewe, doe, queen and bitch.
6. Identify the critical period within the estrus cycle of cattle and the visual actions that signify ideal timing of insemination.
7. Describe different signs of estrus in different female livestock and companion animal species.
8. Explain the impact of a controlled breeding season on the productivity of a cow/calf herd in Tennessee. Contrast this management system with an uncontrolled breeding season.
9. Know the current value of artificial insemination and embryo transfer of livestock in the United States.
10. Understand the primary methods of artificial insemination of different species of livestock and companion animals.
11. Explain the process of estrus synchronization.
12. Explain how embryo transfer perpetuates outstanding female progeny.

**Content Area: Safety–Personal, Animal, and Public Perception (9%)**

**Learning Outcome**

1. Understand the basics of animal behavior as it pertains to safe animal handling for the major livestock species and companion animals.
2. Discuss the major sources of food borne illness and the impact of food borne illness on public health.
3. Understand proper animal restraint techniques and equipment functions to ensure safety for both animal and handler.
4. Identify common human and animal hazards in typical livestock facilities and veterinary clinics.
5. Explain the components of a quality assurance program as it pertains to safety.
6. Understand state and federal regulations for animal and consumer safety.