Tennessee Specific Industry Certification

Animal Science Exam Crosswalk

**Directions:** Use this crosswalk tool to aid in the development of a crosswalk between the Tennessee Specific Industry Certification (TSIC) Learning Outcomes and the Veterinary and Animal Science Program of Study (POS) course standards. Once you have identified theses crosswalks, use this tool to help plan a program of study pacing guide to ensure all TSIC Learning Objectives are covered with the student as they progress through the Veterinary and Animal Science POS.

**Content Area: Anatomy and Physiology**

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Develop and utilize a vocabulary of appropriate terminology to effectively communicate information related to anatomy and physiology.
 | 1, 4, 5, 11, 12, 13, and 20 | 1, 4, 5, 7, 8, 12, 13, 14, 16, 17, 18, 19, and 20 | 1, 6, 8, 9, 12, 16, 17, 18, 19, 20, 21, and 22 | 3, 5, 8, 9, 10, 11, 15, 16, 19, 25, and 27 |
| 1. Detail the anatomy and physiology of cells, tissues, organs, and systems.
 | 9, 10, and 12 | 13, 15, 16, 18, 19, and 20 | 16, 19, 20, 21, and 22 | 9, 10, and 11 |
| 1. Describe all functions of each organ system within the animal’s body.
 | 12 | 13, 15, 16, 18, 19, and 20 | 12, 16, 19, 20, 21, and 22 | 8, 10, and 11 |
| 1. Identify various organs, muscles, and structures within the animal’s body using anatomical models, diagrams, and specimens.
 | 12 and 13 | 13, 15, and 16 | 12, 16, 19, 20, 21, and 22 | 8, 10, and 11 |
| 1. Identify the basic bone structure of companion and food animals.
 | 12 and 13 | 18, 19, and 20 | 19, 20, 21, and 22 | 11 |
| 1. Compare and organize the gastrointestinal anatomy of companion and food animals.
 | 12 and 13 | 13 and 18 | 12, 13, 19, 20, 21, and 22 | 8, 10, 11, and 12 |
| 1. Identify major muscle groups and list their associated functions.
 | 12 and 13 | 18, 19, and 20 | 12, 19, 20, 21, and 22 | 8, 10, and 11 |
| Learning Outcome | **Agriscience** | **Small Animal Science** | **Large Animal Science** | **Veterinary Science** |
| 1. Identify the primal cuts of the beef, swine, lamb, chicken, and turkey carcasses.
 | 12 |  | 12, 19, 20, 21, and 22 |  |
| 1. Compare and contrast the reproductive anatomy of cattle, swine, small ruminants, equine, and poultry.
 | 20 | 16 and 17 | 16 and 17 | 11 |
| 1. Describe each phase of reproduction and note key indicators in farm animals.
 |  | 16 | 16 and 17 | 11 |
| 1. Evaluate structural soundness/correctness of all classes of livestock.
 |  | 16 | 17, 18, 19, 20, 21, and 22 | 11, 15 a, 15c, and 15f |

**Content Area: Animal Ethics**

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Identify pro-agriculture and anti-agriculture organizations/movements and discuss their effects on production agriculture.
 | 1 | 11 | 10 and 11 | 6 and 7 |
| 1. Compare and contrast the principles of animal rights and animal welfare.
 | 5 | 11 and 12 | 10 and 11 | 6 and 7 |
| 1. Identify acceptable and unacceptable practices with regard to animal welfare.
 |  | 11 and 12 | 10 and 11 | 2, 6, and 7 |
| 1. Describe the concept of the human and animal relationships and how it differs between production and companion animals.
 | 5 | 1, 9, 10, 11, and 12 | 1, 10, and 11 | 1, 6, and 28 |
| 1. Explain the impact that niche and personal emotion based animal welfare legislation can have on production agriculture.
 | 1 and 5 | 1, 9, 11, and 12 | 10 and 11 | 6, 7, and 28 |
| 1. Explain the difference in emotion versus science based decision making in terms of public perception of animal agriculture.
 | 5 | 11 and 12 | 10 and 11 | 6 and 7 |
| 1. Describe the benefits of common animal husbandry procedures for production and companion animals. Explain their necessity in terms of public perception and acceptance.
 | 1, 4, and 5 | 7, 9, 10, and 12 | 5, 10, 11, 18 A & B, 19 A & B, 20 A & B, 21 A & B, and 22 A &B  | 8 and 28 |

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. 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.
 | 4 and 5 | 2, 4 11, and 12 | 1, 5, 10, and 11 | 1, 2, 6, and 7 |
| 1. Assess alternative consumer choices and identify the niche market opportunities for agriculture in the 21st century.
 | 4 |  | 10 and 11 | 6 |
| 1. Outline state and federal animal care legislation/statutes, their ramifications on consumers and producers, and how they are enforced.
 | 5 | 11 and 12 | 7, 10, and 11 | 7 D, 7 E, 7 F,and 20 |
| 1. Recognize the beneficial values and costs of responsible agriculture and animal welfare to the agriculture industry.
 | 1 and 5 | 2, 4, and 12 | 10 and 11 | 6, 7, and 28 |

**Content Area: Animal/Veterinary Nursing**

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Describe the concept of animal nursing using common veterinary terminology.
 | 1 and 5 | 4, 5, 6, 7, 8, 18, 19, and 20 | 8, 16, 18, 19, 20, 21, and 22 | 2, 8, 18, and 19 |
| 1. Employ math applications including conversions and dose calculations for veterinary medical care.
 | 4 | 7, 18, 19, and 20 | 15, 18, 19, 20, 21, and 22 | 16 and 20 |
| 1. Explain how to work correctly with regard to disease control, occupational safety and animal welfare in animal nursing.
 | 2 | 5, 6, 7, 18, 19, and 20 | 6, 15, 18, 20, 21, and 22 | 3, 4, and 5 |
| 1. Demonstrate proper techniques for administering medicines to companion and food animals.
 |  | 18, 19, and 20 | 6, 15, 19, 20, 21, and 22 | 3, 4, 5, and 20 |
| 1. Understand concepts of animal behavior as they relate to appropriate handling and restraint techniques and behavior modifications to companion and food animals.
 | 2 and 4 | 8, 18, 19, and 20 | 9, 18, 19, 20, 21, and 22 | 5 |
| 1. Understand the use and maintenance of various instruments, equipment and supplies utilized in the diagnosis and treatment of small animals.
 | 2 and 4 | 4, 10, 18, 19, and 20 |  | 14, 21, and 22 |
| 1. Explain the importance of using different nursing practices during different developmental stages.
 | 4 | 4 | 9,16, 18, 19, 20, 21, and 22 | 15, 16, and 19 |
| 1. Identify common nursing practices used with different domesticated animal species.
 | 3 and 4 | 4, 10, 18, 19, and 20 |  | 18, 19, and 20 |

**Content Area: Breeds of Livestock**

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Identify the major breeds of livestock and their origins of beef cattle, dairy cattle, swine, sheep, goats, and horses in the United States.
 | 1, 12, and 20 |  | 1, 18, 19, 20, 21, and 22 |  |
| 1. Differentiate between “broilers” and “layers” in poultry production.
 | 1, 5, and 20 |  | 11, 16, 17, 19, 20, 21, and 22 |  |
| 1. List physical characteristics of major breeds/crossbreeds of poultry in the United States.
 | 11 and 12 |  | 1, 2, 11, 16, 17, 19, 20, 21, and 22 |  |
| 1. Distinguish between “Purebred” and “Commercial” livestock.
 | 1, 5, and 20 |  | 1, 2, 11, 16, 17, 18, 19, 20, 21, and 22 |  |
| 1. Name and identify the most influential breeds of livestock in each production area in the United States.
 | 1 |  | 1, 2, 3, 11, 18, 19, 20, 21, and 22 |  |
| 1. Utilize common breed terminology with regards to describing livestock breeds.
 | 1, 4, 5, 11, 12, 13, 14, and 15 |  | 1, 3, 11, 18, 19, 20, 21, and 22 | 8, 9, 10, 11, and 13 |
| 1. Utilize binomial nomenclature to identify each livestock species.
 | 11 and 14 |  | 1, 5, 11, 19, 20, 21, and 22 |  |
| 1. Identify major breeds of different companion animals.
 | 1, 4, and 11 | 1, 2, 8, 9, 10, 13, 18, 19, and 20 | 1, 11, 19, 20, 21, and 22 | 8, 9, 10, 11, and 13 |

**Content Area: Business**

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Outline the key components of a financially sound business.
 | 3 | 2 | 2 and 4 | 7 and 28 |
| 1. Describe basic principles of livestock markets.
 | 1 and 4 |  | 4 |  |
| 1. Describe the marketing tools available to livestock producers.
 | 5 |  | 3, 4, and 5 |  |
| 1. Demonstrate an understanding of commonly accepted accounting principles.
 | 4 | 4 | 3, 4, and 5 | 29 |
| 1. Demonstrate the ability to utilize accounting records in managing a financially sound livestock enterprise.
 | 4 |  | 3, and 4 | 18 and 29 |
| 1. Contrast basic sales, marketing and customer service skills and principles that result in customer satisfaction and retention.
 |  | 2 | 2 and 3 | 15 and 28 |
| 1. Demonstrate an understanding of inventory management and transportation costs.
 |  | 2, 3, 8, and 10 | 4 | 28 and 29 |
| 1. Identify and separate the fixed costs versus variable costs of a business enterprise, including assets.
 |  | 2 and 4 | 4 | 28 and 29 |
| 1. Understand the major costs of production and profitability/income drivers within and between different livestock segments.
 |  |  | 2 and 5 |  |
| 1. Contrast different profitability scenarios through case studies based on variable market.
 |  | 2 and 3 | 2 | 28 and 29 |

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Recognize the impact of positive and negative social media within animal agriculture.
 | 1 and 3 | 1, 11, 12 and 13 | 10 and 11 | 2, 6 and 7 |
| 1. Discuss the economic impact of animal agriculture on a domestic and international scale.
 | 3 and 5 | 1 and 2 | 1, 2, and 5 | 1 and 2 |

**Content Area: Clinical Lab Procedures**

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Describe proper techniques to package, handle, and store specimens for laboratory analysis.
 | 2 | 7 and 8 | 3, 8, and 9 | 2, 4, 17, 21, 22, and 23 |
| 1. Identify common parasite ova and larvae of domestic animals in fecal and blood samples.
 |  | 18, 19, and 20 | 8, 18, 19, 20, 21, and 22 | 2, 3, 23, 22, and 27 |
| 1. Identify commonly used equipment in the laboratory setting.
 | 2 | 4, 7, 8, 18, 19, and 20 | 5 and 8 | 2, 5a,14, 17, 19, 22, and 23 |
| 1. Develop and demonstrate safety and hygiene skills used when working in a laboratory setting.
 | 2 | 5, 6, 7, 8, 18, 19, and 20 | 6, 7, 8, and 9 | 3, 4, 5, 7, 14, and 17 |
| 1. Describe and demonstrate proper techniques for sample collection for common veterinary diagnostic tests.
 | 4 | 7 and 8 | 8, 18, 19, 20, 21, and 22 | 21, 22,and 23 |
| 1. Identify and understand new technologies and tools that are being introduced or available for lab use.
 | 2 | 4 and 7 | 5 | 2 and 14 |

**Content Area: Communications**

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Identify and demonstrate the most effective way to communicate or market a thought or message given different scenarios.
 | 4 | 2 | 3, 9, and 11 | 7, 20, 24, 28, and 29 |
| 1. Demonstrate the ability to write a speech, blog, editorial or informational piece that will effectively appeal to a specific audience.
 | 3 and 5 | 1, 2, 3, 8, 9, and 10 | 1, 3, 9, 11, and 16 | 1, 2, 3, 7, 18, 20, 21, 24, 28, and 29 |
| 1. Evaluate and use social media for effective grassroots communication or marketing.
 |  | 2, 10, and 12 | 10 | 7 and 28 |
| 1. Compose and practice effective written and verbal communication methods in ongoing pro-agriculture campaigns.
 | 3 and 5 | 1, 2, 8, 9 10, and 12 | 1, 3, 9, and 11 | 7 and 28 |
| 1. Analyze and interpret basic human behavior (verbal and nonverbal) for enhanced communication.
 |  | 5, 8, and 12 | 6, 10, and 11 | 28 |
| 1. Compose communication materials using correct oral/written grammar.
 | 3 and 5 | 1, 8, 9, 10, and 12 | 1, 3, 9, and 11 | 28 |
| 1. Effectively edit written communication.
 | 1, 3, 5, 12, and 15 | 1, 3, 6, 8, 9, 10, 17, 18, 19, and 20 | 1, 2, 3, 7, 9, 13, 15, 17, 18, 19, 20, 21, and 22 | 28 |

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
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| 1. Recognize key issues and concerns that consumers have about the agriculture industry and effectively respond in a proactive manner.
 | 3 and 5 | 8, 10, and 12 | 11, 18, 19, 20, 21, and 22 | 6, 7, 12, 13, and 28 |
| 1. Summarize lengthy communication.
 | 1, 3, and 5 | 1, 6, 9, 10, 12, 14, 16, 18, 19, and 20 | 1, 2, 6, 7, 11, 13, 16, 18, 19, 20, 21, and 22 | 13, 20, 22, 24, and 28 |
| 1. Demonstrate the ability to choose words/phrases to convey ideas precisely.
 | 1, 3, 5, 10, 12, 13, 15, and 20 | 1, 8, 9, 10, 18, 19, and 20 | 1, 3, 6, 9, 11, 12, 18, 19, 20, 21, and 22 | 1, 2, 3, 4, 5, 6, 8, 12, and 28 |
| 1. Identify key words, phrases or acronyms that are used in the agriculture industry that do not relate to consumers.
 | 1, 3, 5, 10, 12, 13, 15, and 20 | 1, 4, 5, and 7 | 1, 2, 3, 5, 6, 7, 9, 11, 12, 13, 15, 16, 18, 19, 20, 21, and 22 | 1, 2, 3, 4, 5, 6, 8, 12, 17, 20, and 28 |
| 1. Compose and present a set of written and oral reasons for livestock, dairy, poultry, or meats evaluation classes.
 |  |  | 18, 19, 20, 21, and 22 | 12 and 28 |
| 1. Defend your position on specific animal issues using social media in both a professional and grammatically correct manner.
 | 5 | 10 and 12 | 11 | 7, 20, and 28 |

**Content Area: Digestion and Nutrition**

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Identify major anatomical components of ruminant and monogastric, including poultry digestive systems and the general function of each component.
 | 12, 13, and 15 | 13 and 14 | 12 | 12 and 11 |
| 1. Explain the digestive processes in different domesticated animal species.
 | 12 and 13 | 13, 14, 15, 18, 19, and 20 | 12, 18, 19, 20, 21, and 22 | 11 and 13 |
| 1. Compare and contrast how ruminant and monogastric digestive systems utilize, digest, and absorb different classes of feedstuffs.
 | 3, 12, 13, 14, and 15 | 13 and 14 | 12 | 11 and 12 |
| 1. Explain the mechanical digestion process in birds and how it is different from digestion in mammals.
 | 12, 13, and 14 | 13, 14, and 20 E | 22 D | 11 |
| 1. Identify the six major classes of nutrients and their role in nutrition.
 | 10, 13, and 15 | 13 and 14 | 13 and 14 | 12 |
| 1. Identify basic feedstuffs and describe their nutritional qualities.
 | 13 | 13 and 14 | 13 and 14 | 12 |
| 1. Describe nutrient requirements during different stages of growth and development for mammals and birds.
 | 13, 14, and 15 | 10 D, 13, 14, 18 E, 19 E, and 20 E | 13, 14, 18 D & E, 19 D & E, 20 D& E, 21 D & E, and 22 D & E | 12 and 13 |
| 1. Explain the primary sources of energy and protein in animal feeds.
 | 13 and 15 | 13, 14, and 18 | 1 and 13 | 12 |
| 1. Formulate a simple ration.
 | 15 | 13, 14, 18 E, 19 E, and 20 E | 14, 18 D, 19 D, 20 D, 21 D, and 22 D | 12 and 13 |

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Understand how to read and interpret a feed label.
 | 15 | 13 and 14 | 14 | 12 |
| 1. Define micronutrients and explain their role in the overall health of an animal.
 | 14 and 15 | 13 and 14 | 13, 14, and 15 | 12 |

**Content Area: Fundamental Care and Animal Health**

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Create a vaccination plan for horses, cattle, swine, sheep, poultry, and goats.
 |  |  | 18 F, 19 F, 20 F, 21 F, and 22 F | 16, 18, and 26 |
| 1. Identify and describe different anthelmintics used in horses, poultry, cattle, sheep, swine and goats.
 |  |  | 18 F, 19 F, 20 F, 21 F, and 22 F | 20 A and 27 |
| 1. Differentiate between healthy and unhealthy livestock.
 | 15 | 10D & E 18 D, 19D, and 20D | 18 C, 19 C, 20 C, 21 C, and 22 C | 13, 15, 22, 23, 25, 26, and 27 |
| 1. Develop and utilize a vocabulary of appropriate terminology to effectively communicate information related to animal health.
 | 1, 5, 12, 13, 14, 15, and 20 | 1, 5, 6, 7, 8, 18 D &G,19 D & G,and 20 D & G | 18 C, 19 C, 20 C, 21 C, and 22 C | 8 and 28 |
| 1. Identify “Zoonotic Diseases” that might affect a person working with livestock and companion animals.
 |  | 5 | 6 | 3, 5 B, and 26 |
| 1. Identify diseases that commonly affect livestock and companion animals.
 | 12 and 15 | 5, 18 D & G,19 D & G,and 20 D & G | 18 F, 19 F, 20 F, 21 F, and 22 F | 22 and 26 |
| 1. Calculate the cost of disease prevention versus treatment as it relates to livestock productivity.
 |  |  | 18 F, 19 F, 20 F, 21 F, and 22 F | 17 and 26 |
| 1. Identify common farm animal parasites.
 | 12 and 13 |  | 18 F, 19 F, 20 F, 21 F, and 22 F | 27 |

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Distinguish between intradermal, subcutaneous, intramuscular, and intravenous injections.
 |  | 8, 10 | 18 F & G, 19 F & G, 20 F & G, 21 F & G, and 22 F & G | 16 |
| 1. Identify common tools used in animal health.
 | 1 | 1, 4, 7, and 10 | 18 A, 19 A, 20 A, 21 A, and 22 A | 4 and 14 |
| 1. Understand the importance of proper animal restraint.
 |  | 6, 7, and 8 | 8, 9, 18 A & B, 19 A & B, 20 A & B, 21 A & B, and 22 A & B | 3, 4, and 5 A |
| 1. Explain why withdrawal times are important to follow in livestock production.
 |  |  | 18, 19, 20, 21, and 22 | 6 and 7 |
| 1. Describe environmental effects on livestock.
 | 1, 5, 7, 8, and 15 |  | 9, 18, 19, 20, 21, and 22 | 7 D |
| 1. Understand the components of and the importance of bio-security programs to livestock operations.
 |  |  | 5, 6, 7, 8, 9, 18, 19, 20, 21, and 22 | 7, 17, and 24 |
| 1. Describe the state and federal laws and regulations for herd health and consumer safety and the value to each.
 | 5 | 5 and 6 | 6, 7, and 8 | 7D and 7E |

**Content Area: Genetics**

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Describe the role of gametes, DNA, and chromosomes.
 | 11 | 16 and 17 | 3, 5, 6, 8, 9, 10, 11, 16, 17, 19, 20, 21, and 22 | 8, 9, and 11 |
| 1. Develop and utilize a vocabulary of appropriate terminology to effectively communicate information related to animal genetics.
 | 11 | 12, 16, 17, 18, 19, 20 | 1, 2, 3, 4, 5, 7, 8, 9, 11, 16, 17, 19, 20, 21, 22 | 8, 9, 10, and 11 |
| 1. Calculate genotypic and phenotypic outcomes.
 | 11 | 16 and 17 | 2, 3, 5, 9, 11, 16, 17, 20, 21, and 22 |  |
| 1. Explain the concepts of genetic variation, qualitative, and quantitative traits.
 | 11 | 16 and 17 | 2, 3, 5, 7, 9, 11, 16, 17, 19, 20, 21, and 22 | 11 |
| 1. Understand the concepts of heritability and heterosis.
 | 11 | 16 and 17 | 2, 3, 5, 6, 9, 11, 16, 17, 20, 21, and 22 | 11 |
| 1. Understand how animal records are used to evaluate breeding values of livestock or companion animals.
 | 11 | 18 | 2, 3, 4, 5, 8, 9, 10, 11, 16, 17, 19, 20, 21, and 22 | 11, 12, 18, 22, and 23 |
| 1. Understand the use of adjustment factors for production records in evaluating livestock for breeding.
 | 11 | 16 | 2, 3, 5, 6, 9, 11, 16, 17, 19, 20, 21, and 22 | 10, 11, 12, and 15 |
| 1. Describe different selection methods and their measurability.
 | 11 | 18, 19, and 20 | 2, 3, 5, 9, 10, 11, 16, 17, 19, 20, 21, and 22 | 12 and 13 |
| 1. Explain the primary factors that affect rate of improvement through selection.
 | 11 | 18, 19, and 20 | 2, 3, 5, 9, 11, 16, 17, 19, 20, 21, and 22 | 11 and 12 |

**Content Area: Overview & Technology**

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Explain trends of consumer demands in the meat industry.
 | 1, 2, 3, and 5 | 2 | 1, 2, 5, 10, and 11 | 12, 20, and 24 |
| 1. Identify the areas of the carcass that produce the more valuable cuts of meat.
 | 2, 3, 12, 13, and 15 |  | 1, 2, 9, 20, 21, 2 and 2 | 16 |
| 1. Identify issues associated with animal biotechnology.
 | 1, 2, 3, 5, 6, 8, 13, and 14 | 2, 3 and 4 | 6, 7, 8, 9, and 19 | 2, 6, and 7 |
| 1. Identify and explain the importance of different technologies used in livestock production and companion animals.
 | 1, 2, and 3 | 4 | 2, 5, 19, and 20 | 2 and 14 |
| 1. Discuss advantages and disadvantages of different dairy technologies.
 | 13 and 15 |  | 5, 14, and 19 | 7 |
| 1. Explain how the use of EPDs can improve a livestock operation.
 | 3, 12, 13, 15 |  | 21 and 22 |  |
| 1. Describe beneficial reproductive technologies.
 | 1, 3, 11, 15, 18, 19, and 20 | 4, 16, and 17 | 16, 17, 21, and 22 | 2 and 14 |

**Content Area: Reproduction**

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Identify the anatomy and primary function of the male and female reproductive tract components in livestock and companion animals.
 | 20 | 10, 16, 17, 18, 19, and 20 | 16, 18, 19, 20, 21, and 22 | 8, 10, and 11 |
| 1. Develop and utilize a vocabulary of appropriate terminology to effectively communicate information related to reproductive cycles.
 | 11 and 12 | 1, 10, 16, 17, 18, 19, and 20 | 16, 17, 18, 19, 20, 21, and 22 | 8, 10, and 11 |
| 1. Identify the major reproductive hormones and define their role in reproductive processes and the development of secondary sex characteristics in different livestock species.
 | 1, 11, and 12 | 16 | 16, 17, 18, 19, 20, 21, and 22 | 10 and 11 |
| 1. 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.
 | 20 | 16 and 18 | 16, 18, 19, 20, 21, and 22 | 11 |
| 1. 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.
 | 20 | 10, 16, 18, 19, and 20 | 16, 18, 19, 20, 21, and 22 | 11 |
| 1. Identify the critical period within the estrus cycle of cattle and the visual actions that signify ideal timing of insemination.
 | 20 | 16, 18, 19, and 20 | 16, 18, 19, 20, 21, and 22 | 11 |

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Describe different signs of estrus in different female livestock and companion animal species.
 |  | 10, 16, 18, 19, and 20 | 16, 18, 19, 20, 21, and 22 | 11 |
| 1. 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.
 |  |  | 5, 18, 19, 20, 21, and 22 | 11 |
| 1. Know the current value of artificial insemination and embryo transfer of livestock in the United States.
 | 11 and 20 | 1, 2, and 10 C | 18, 19, 20, 21, and 22 |  |
| 1. Understand the primary methods of artificial insemination of different species of livestock and companion animals.
 |  | 10 C, 16, and 18 | 18, 19, 20, 21, and 22 | 11 and 19 |
| 1. Explain the process of estrus synchronization.
 | 20 | 16 | 18, 19, 20, 21, and 22 | 11 |
| 1. Explain how embryo transfer perpetuates outstanding female progeny.
 | 11 and 20 | 16 and 17 | 18, 19, 20, 21, and 22 | 11 |

**Content Area: Safety - Personal, Animal, and Public Perception**

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| Learning Outcome | Agriscience | Small Animal Science | Large Animal Science | Veterinary Science |
| 1. Understand the basics of animal behavior as it pertains to safe animal handling for the major livestock species and companion animals.
 | 2 | 7 and 8 | 9 A, 18 B, 19 B, 20 B, and 21B  | 3, 4, and 5 |
| 1. Discuss the major sources of food borne illness and the impact of food borne illness on public health.
 | 5 | 5 and 6 | 19, 20, 21, and 22 |  |
| 1. Understand proper animal restraint techniques and equipment functions to ensure safety for both animal and handler.
 | 5 | 7, 8, 10, 18, 19, and 20 | 8 and 9 A | 3, 4, and 5 |
| 1. Identify common human and animal hazards in typical livestock facilities and veterinary clinics.
 | 2 |  | 6, 8, and 9 | 3, 4, and 5 |
| 1. Explain the components of a quality assurance program as it pertains to safety.
 |  | 5, 7, 8, 10, 18, 19, and 20 | 18, 19, and 21 |  |
| 1. Understand state and federal regulations for animal and consumer safety.
 | 1 and 5 | 2, 5, and 6 | 7 | 6 and 7 |