**Course Description:**

Students will identify and apply principles and routine husbandry practices to production animal populations. Topics will include principles of nutrition, feed utilization, animal welfare, selection and management of facilities and herd populations. Students will apply knowledge of production animal care to enhance animal growth, selection of breeding stock, and management practices. Throughout the course, students will develop management plans reflecting practices for care and legal compliance.

**Strand 1. Business Operations/21st Century Skills**

Learners apply principles of economics, business management, marketing and employability in an entrepreneur, manager and employee role to the leadership, planning, developing and analyzing of business enterprises related to the career field.

**Outcome: 1.1. Employability Skills**

Develop career awareness and employability skills (e.g., face-to-face, online) needed for gaining and maintaining employment in diverse business settings.

**Competencies**

1.1.1. Identify the knowledge, skills and abilities necessary to succeed in careers.

1.1.2. Identify the scope of career opportunities and the requirements for education, training, certification, licensure and experience.

**Outcome: 1.2. Leadership and Communications**

Process, maintain, evaluate and disseminate information in a business. Develop leadership and team building to promote collaboration.

**Competencies**

1.2.1. Extract relevant, valid information from materials and cite sources of information.

1.2.2. Deliver formal and informal presentations.

**Outcome: 1.3. Business Ethics and Law**

Analyze how professional, ethical and legal behavior contributes to continuous improvement in organizational performance and regulatory compliance.

**Competencies**

1.3.1. Analyze how regulatory compliance (e.g., United States Department of Agriculture [USDA], Food and Drug Administration [FDA], United States Department of Interior [USDI], Ohio Livestock Care Standards, water quality standards, local water regulations, building codes) affects business operations and organizational performance.

1.3.2. Follow protocols and practices necessary to maintain a clean, safe and healthy work environment.

1.3.3. Use ethical character traits consistent with workplace standards (e.g., honesty, personal integrity, compassion, justice).

1.3.9. Identify potential conflicts of interest (e.g., personal gain, project bidding) between personal,

organizational and professional ethical standards.

**Outcome: 1.6. Business Literacy**

Develop foundational skills and knowledge in entrepreneurship, financial literacy and business operations.

**Competencies**

1.6.1. Identify business opportunities.

1.6.3. Explain the importance of planning your business.

**Outcome: 1.8. Operations Management**

Plan, organize and monitor an organization or department to maximize contribution to organizational goals and objectives.

**Competencies**

1.8.2. Select and organize resources to develop a product or a service.

1.8.8. Identify routine activities for maintaining business facilities and equipment.

1.8.9. Develop a budget that reflects the strategies and goals of the organization.

**Outcome: 1.10. Sales and Marketing**

Manage pricing, place, promotion, packaging, positioning and public relations to improve quality customer service.

**Competencies**

1.10.2. Determine the customer's needs and identify solutions.

1.10.3. Communicate features, benefits and warranties of a product or service to the customer.

1.10.5. Monitor customer expectations and determine product/service satisfaction by using measurement tools.

**Outcome: 1.12. Site and Personal Safety Procedures**

Follow site and personal safety procedures in specific situations with specialized tools and equipment, evaluate the situation and take corrective action.

**Competencies**

1.12.6. Identify procedures for the handling, storage and disposal of hazardous materials.

1.12.7. Select, use, store, maintain and dispose of personal protective equipment (PPE), appropriate to job tasks, conditions and materials.

1.12.9. Identify, inspect and use safety equipment appropriate for the task.

1.12.17. Identify symptoms of exposure to health-threatening environments (e.g., temperature; chemical noise, vibration, harshness [NVH] hazards).

*An “X” indicates that the pathway applies to the outcome.*

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| **Pathways** |  | Agribusiness and Production Systems | X | Animal Science and Management |  | Bioscience | | |  | Horticulture |
|  | Natural Resource Management |  | Power Technology | | |  |  | | |
| **Green Practices** |  | Green-specific |  | Context-dependent | | |  | Does not apply | | |

**Strand 2. Animal Science**

Learners apply principles of animal anatomy, physiology, genetics, behavior and nutrition to the research and development, selection and reproduction, health and management of animals in domestic and natural environments.

**Outcome: 2.1. Nutrition**

Analyze, formulate, prepare and administer a ration for a population of specific animal species based on economic, nutrition and availability of feed and evaluate its effects on animals.

**Competencies**

2.1.1. Identify the traditional and alternative types, compositions, quality and compatibility of feeds, feed additives and feed byproducts.

2.1.2. Determine the role of nutrients and the nutritional requirements of different animal life processes and species.

2.1.3. Analyze the nutritional content and quality of feeds.

2.1.4. Identify and address major nutrient deficiency and toxicity symptoms.

2.1.5. Identify and describe biological and non-biological contaminants found in feedstuffs and their

impacts on animals.

2.1.6. Determine feed efficiency and value in relation to the cost, quality and availability of feeds.

2.1.7. Formulate and prepare rations and diets for production, specialty markets and special diets.

2.1.8. Select and implement feeding and watering practices and systems, based on the animal population and purpose.

**Outcome: 2.2. Body Systems**

Describe the interrelationships of animal body systems with growth, development, health, maintenance, reproduction and economic production.

**Competencies**

2.2.2. Identify the anatomical parts of the digestive system and describe their physiology.

2.2.5. Identify the anatomy of the musculature systems, including striated, cardiac and smooth muscle, and describe their physiology.

2.2.6. Compare and contrast bone growth, muscle growth, and fat deposition in relation to developmental patterns.

2.2.12. Differentiate between the male and female reproductive system, structures and functions.

**Outcome: 2.3. Care and Management**

Apply animal care and management procedures to ensure animal husbandry and welfare, including managing environmental conditions to ensure animal health and performance.

**Competencies**

2.3.1. Identify species-specific terminology based on gender and age.

2.3.2. Identify, classify, evaluate and select animal species or breeds for a desired outcome.

2.3.4. Apply concepts of pest control, sanitation and disinfection procedures for the animals’ care and management.

2.3.5. Perform species-specific animal identification techniques (e.g., chipping, tagging, branding, notching, tattooing).

2.3.6. Use identification techniques for record keeping and traceability.

2.3.7. Estimate an operation’s or environment's carrying capacity and its impact on animal health.

2.3.8. Identify and recognize predator-prey relationships and implement control measures.

2.3.9. Evaluate and perform animal care procedures throughout the life of the animal.

2.3.10. Monitor and evaluate the quality of an animal’s habitat and implement corrective methods as needed.

2.3.11. Recognize common restraints and tack devices, including their use and adjustment.

**Outcome: 2.4. Recognizing Diseases and Disorders**

Evaluate animal conditions for species-specific diseases and disorders to assess an animal’s health and welfare.

**Competencies**

2.4.1. Identify general infectious and noninfectious causes of diseases and disorders.

2.4.2. Examine an animal to evaluate its general condition.

**Outcome: 2.5. Animal Health**

Implement preventive measures, treatment and maintenance options for species-specific diseases and disorders to improve an animal’s health and welfare.

**Competencies**

2.5.2. Apply concepts of body condition scoring to assess general health and nutrition status..

2.5.6. Describe the routes of administration for medications and the process of drug absorption, distribution, metabolism, withdrawal and excretion.

2.5.8. Simulate the administration of drug treatments and vaccines, following quality assurance guidelines, and monitor common adverse effects and potential problems associated with administration.

**Outcome: 2.6. Population Management**

Manage reproduction practices in animal populations across habitats to achieve the desired outcomes and specific goals.

**Competencies**

2.6.1. Identify factors that lead to reproductive maturity and select animals for reproductive readiness.

2.6.2. Compare and select superior individuals based on phenotype.

2.6.4. Determine the factors that influence estrus, gestation and parturition and employ appropriate

management practices.

2.6.5. Manipulate an animal’s reproductive processes to support breeding (e.g., sex-sorted semen, heat synchronization, nutritional flushing, light cycling).

2.6.6. Evaluate and employ breeding methods (e.g., artificial insemination, embryo transfer, natural

selection, selective breeding, invitro fertilization, cloning).

2.6.7. Describe nutritional and environmental influences during different stages of gestation.

2.6.8. Describe ethical and responsible animal population management practices (e.g., spaying, neutering, birth control, relocation, reintroduction, hunting, containment, culling).

**Outcome: 2.7. Animal Behavior**

Apply management practices to assure quality animal care, considering species-specific behaviors, human safety, social influences, public perception and regulations associated with animal welfare.

**Competencies**

2.7.1. Understand social influences, public perception and regulations that are associated with animal welfare.

2.7.2. Describe the adaptations and special senses (e.g., sight, hearing, smell, touch) of animals and how they contribute to animal behavior.

2.7.3. Identify and describe the innate behavioral patterns of animals.

2.7.4. Identify social relationships involved in behavioral adjustment and adaptation (e.g., animal-to-animal and human-to-animal interaction).

2.7.5. Interpret an animal’s intent based on its vocalization, body posture and chemical means of

communication.

2.7.6. Recognize behavior abnormalities and employ corrective action.

2.7.7. Handle, restrain and move animals, while ensuring the safety of the animals and their handlers.

*An “X” indicates that the pathway applies to the outcome.*

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| **Pathways** |  | Agribusiness and Production Systems | X | Animal Science and Management |  | Bioscience | | |  | Horticulture |
|  | Natural Resource Management |  | Power Technology | | |  |  | | |
| **Green Practices** |  | Green-specific |  | Context-dependent | | |  | Does not apply | | |

**Strand 3. Biotechnology**

Learners apply the skills and knowledge of interpreting laboratory requests, using protective clothing and hazardous material containment, specimen collection procedures, a variety of laboratory testing and techniques, and maintenance of laboratory equipment and supplies.

**Outcome: 3.4. Molecular-Genetics Technology**

Apply knowledge of nucleic acid structure and function, deoxyribonucleic acid (DNA) replication, transcription, translation, chromosome structure and remodeling and regulation of gene expression in prokaryotes and eukaryotes.

**Competencies**

3.4.1. Use a Punnet square to predict and explain Mendel’s Laws, genotype and phenotype.

3.4.6. Identify alternative types of gene expression (e.g., sex-limited, sex-linked, partial dominance,

epistatic, pleiotropic).

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| **Pathways** |  | Agribusiness and Production Systems | X | Animal Science and Management |  | Bioscience | | |  | Horticulture |
|  | Natural Resource Management |  | Power Technology | | |  |  | | |
| **Green Practices** |  | Green-specific |  | Context-dependent | | |  | Does not apply | | |

**Strand 6. Environmental Science**

Learners apply earth, life, and physical sciences to the production, extraction, processing, protection, use, and renewal of both renewable and non-renewable resources.

**Outcome: 6.7. Solid Waste and Renewable Resource Management**

Control and process solid waste using current and alternative technologies.

**Competencies**

6.7.6. Describe and implement solid waste management methods (e.g., composting, incineration, recycling, burial).

6.7.7. Explain the control processes and potential uses for solid waste byproducts (e.g., leachate, ash, landfill gas, sludge, methane, manure).

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| **Pathways** |  | Agribusiness and Production Systems | X | Animal Science and Management |  | Bioscience | | |  | Horticulture |
|  | Natural Resource Management |  | Power Technology | | |  |  | | |
| **Green Practices** |  | Green-specific |  | Context-dependent | | |  | Does not apply | | |

**Strand 7. Food Science**

Learners apply principles of biology, chemistry and physics to the research, development, production, processing and distribution of food products meeting quality assurance standards in a system that is safe and secure.

**Outcome: 7.1. The Science of Food**

Differentiate the structures, functions and sources of basic functional ingredients and the roles they play in the development and manufacturing of food products for human nutrition.

**Competencies**

7.1.5. Describe the composition, structure and sources of sugars, complex carbohydrates, lipids, vitamins, minerals and proteins (i.e., functional ingredients) and their nutritional contributions to dietary needs.

7.1.6. Relate the functions and physical properties of simple and complex carbohydrates, lipids, vitamins, minerals and proteins (i.e., functional ingredients) to the manufacturing of food products.

**Outcome: 7.2. Quality Assurance**

Inspect the food production process, locate potential sources of food quality and safety deviations in facilities and prepare a corrective action plan.

**Competencies**

7.2.1. Describe the types of spoilage (e.g., oxidation, microbial), their sources and impact.

**Outcome: 7.3. Meat Science**

Perform safe and sanitary harvest techniques and determine meat quality.

**Competencies**

7.3.6. Differentiate the degrees of marbling and describe its role in the quality grading of meat.

7.3.7. Calculate the maturity of an animal using skeletal ossification and lean maturity ratings.

7.3.8. Issue yield grades using the amount of boneless, closely trimmed retail cuts from the high-value parts of the carcass.

**Outcome: 7.7. Biosecurity**

Connect the sources and causes of contamination and develop the protocols to implement biosecurity procedures.

**Competencies**

7.7.4. Assess a facility's biosecurity, classify the level of risk and recommend improvements.

7.7.5. Implement biosecurity procedures to prevent cross-site contamination (e.g., proper use and disposal of personal protective equipment [PPE] from site to site, vehicle cleaning between farm and processing site).

7.7.6. Screen and test animals and plant products for infectious agents or contamination.

7.7.7. Select bio-containment practices (e.g., quarantine, eradicate, showering into facilities) to manage pests and diseases.

*An “X” indicates that the pathway applies to the outcome.*

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| **Pathways** |  | Agribusiness and Production Systems | X | Animal Science and Management |  | Bioscience | | |  | Horticulture |
|  | Natural Resource Management |  | Power Technology | | |  |  | | |
| **Green Practices** |  | Green-specific |  | Context-dependent | | |  | Does not apply | | |

**Strand 9. Energy**

Learners apply principles of physics, chemistry, the earth sciences and mathematics to energy sources, transformations, acquisition, and application.

**Outcome: 9.3. Biomass**

Describe and manage processes required to extract energy from biomass.

**Competencies**

9.3.3. Identify feedstock materials (e.g., plants, algae, municipal waste) used to produce energy and

compare the energy potential of each.

*An “X” indicates that the pathway applies to the outcome~~.~~*

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| **Pathways** |  | Agribusiness and Production Systems | X | Animal Science and Management |  | Bioscience | | |  | Horticulture |
|  | Natural Resource Management |  | Power Technology | | |  |  | | |
| **Green Practices** |  | Green-specific |  | Context-dependent | | |  | Does not apply | | |