North Dakota Agriculture Education

ANIMAL SYSTEMS

Analyze historic and current trends impacting the animal systems industry.

10 **Evaluate the development and implications of animal origin, domestication, and distribution on production practices and the environment.** 3.10

1 Summarize the origin, significance, distribution, and domestication of different animal species. 3.1.1

2 Summarize major components of animal industrial systems (e.g., livestock, small animal, research, etc.). 3.1.2

3 Examine characteristics of animals that developed in response to environmental and production related influences. 3.1.3

4 Analyze the development of a variety of animal industries, technological advancements, research, and engineering practices and how they influenced products, services, and careers. 3.1.4

5 Evaluate the implications of animal characteristics on production practices and the environment. 3.1.5

6 Evaluate trends (e.g., labor, economic, environmental, etc.) and implications of future developments within different animal industries on production practices and the environment. 3.1.6

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2 **Assess and select animal production, marketing, and management methods based upon effectiveness and potential social and environmental impacts.** 3.2

1 Define terms and methods related to animal production, marketing, and management (e.g., sustainable, conventional, responsibly sourced, quality assurance, natural, organic, etc.). 3.2.1

2 Compare marketing methods Assess and select animal production, marketing, and management methods based upon effectiveness and potential social and environmental impacts for animal products and services (e.g., conventional, niche markets, locally grown, etc.). 3.2.2

3 Summarize the types, purposes, and characteristics of effective record keeping and documentation practices for animal enterprises (e.g., breeding and genetic improvement, medical treatment, financial, legal requirements, etc.). 3.2.3

4 Identify wildlife management methods (e.g., depredation, invasive issues, biosecurity, habitat improvement, etc.) as they relate to animal production. 3.2.4

5 Analyze the impact of animal production, marketing, and management methods on end product quality (e.g., price, sustainability, transportation, labeling, animal welfare, etc.). 3.2.5

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Determine costs of marketing versus predicted increases in sales. 3.2.6

7 Execute effective record keeping and documentation practice for animal enterprises. 3.2.7

8 Analyze local wildlife populations, challenges, and ecological measures that are being utilized as they relate to animal production. 3.2.8

9 Evaluate the effectiveness of different production, marketing, and management methods using data and evidence. 3.2.9

10 Develop marketing plans for an animal agriculture product or service. 3.2.10

11 Appraise the use of a specific record management system based upon its effectiveness for a business related to animal systems. 3.2.11

12 Design plans to manage wildlife populations to achieve a balance of optimal ecological health and animal production. 3.2.12

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3 Analyze laws and sustainable practices that impact animal agriculture from a local, tribal, state, national, and global perspective. 3.3

1 Identify the types of laws pertaining to animal production, marketing, and management. 3.3.1

2 Explain sustainability in animal production, marketing, and management. 3.3.2

3 Analyze the roles of state and federal agencies and how they govern animal industries, international trade, and animal production policies. 3.3.3

4 Analyze the local and global impact of sustainable animal agriculture practices on human and environmental systems. 3.3.4

5 Evaluate the impact of laws pertaining to animal agriculture (e.g., pros, cons, effect on individuals, effect on businesses, etc.). 3.3.5

6 Create a plan for sustainable practices in animal agriculture. 3.3.6

Utilize best-practice protocols based upon animal behaviors for animal husbandry and welfare.

4 Explain management techniques that ensure animal welfare. 3.4

1 Explain the difference between animal welfare and animal rights. 3.4.1

2 Identify the challenges involved in working with animals and the various resources available (e.g., variety of tools, technology, equipment, facilities, animal behavior signals, etc.). 3.4.2

3 Analyze programs that ensure the welfare of animals (e.g., prevent abuse or mistreatment). 3.4.3

4 Analyze animal welfare procedures used to ensure safety and minimize stress during management practices. 3.4.4

5 Design quality-assurance programs and procedures for animal production. 3.4.5

6 Design safety procedures and plans for working with different species of animals based on animal behaviors and economical impact. 3.4.6

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5 Analyze procedures to ensure that animal products are safe for consumption. 3.5

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1 Identify technology and equipment used in animal systems that support a safe and abundant food supply. 3.5.1

2 Explain animal production best practices that minimize health risks. 3.5.2

3 Identify animal tracking systems used in production (e.g., livestock, companion animals, exotics, premise, etc.). 3.5.3

4 Utilize technology and equipment to perform animal husbandry and welfare procedures and techniques. 3.5.4

5 Analyze consumer concerns with animal production practices relative to human health. 3.5.5

6 Analyze the impact of animal traceback capabilities on producers and consumers. 3.5.6

7 Recommend the use of specific techniques used to perform animal husbandry and welfare procedures. 3.5.7

8 Evaluate programs to ensure the safety of animal products for consumption. 3.5.8

9 Evaluate the effectiveness of animal tracking systems for a given species. 3.5.9

Design and provide proper animal nutrition to achieve desired outcomes for performance, development, reproduction and/or economic production.

6 Analyze the nutritional needs of animals. 3.6

1 Identify essential nutrients required for animal health and analyze each nutrient's role in growth and performance. 3.6.1

2 Differentiate between nutritional needs of animals based on growth stages, anatomy, and/or production systems (e.g., maintenance, gestation, work, growth, etc.). 3.6.2

3 Develop a nutritionally balanced ration for an animal based on its production stage. 3.6.3

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7 Analyze feed rations and assess if they meet the nutritional needs of animals. 3.7

1 Compare and contrast common types of feedstuffs and their general quality and condition. 3.7.1

2 Summarize the purpose, impact, and mode of action of feed additives and growth promotants in animal production. 3.7.2

3 Evaluate the adequacy of feed rations using data from the analysis of feedstuffs, animal requirements, and performance. 3.7.3

4 Compare and contrast methods that utilize feed additives and growth promotants with natural production practices. 3.7.4

5 Select appropriate feedstuffs for animals based on a variety of factors (e.g., economics, digestive system, and nutritional needs, etc.). 3.7.5

6 Recommend whether or not to use feed additives and growth promotants using scientific evidence, production system needs, goals, and industry standards. 3.7.6

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8 Utilize tools, equipment, techniques, and technology to make animal nutrition decisions. 3.8

Identify the tools, equipment, techniques, and technology used to meet animal nutrition needs and ensure an abundant, safe, and quality food supply. 3.8.1

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2 Summarize the meaning of various components of feed labels and feeding directions. 3.8.2

3 Utilize tools, equipment, techniques, and technology to perform animal nutrition tasks. 3.8.3

4 Apply information from a feed label and feeding directions to feed animals. 3.8.4

5 Evaluate the use of specific tools, equipment, techniques, and technology used to perform animal nutrition tasks. 3.8.5

6 Evaluate the potential impacts, positive and negative, of compliance and/or noncompliance with a feed label and feeding directions. 3.8.6

Apply principles of animal reproduction to achieve desired outcomes for performance, development and/or economic production.

9 Evaluate animals for breeding readiness and soundness. 3.9

1 Identify the male and female reproductive organs of the major animal species. 3.9.1

2 Identify how age, size, life cycle, maturity level, and health status affect the reproductive efficiency of male and female animals. 3.9.2

3 Summarize the importance of efficient and economic reproduction in animals. 3.9.3

4 Analyze the functions of major organs in the male and female reproductive systems. 3.9.4

5 Describe factors that lead to reproductive maturity. 3.9.5

6 Evaluate reproductive disorders that occur in animals. 3.9.6

7 Select breeding animals based on the health of the reproductive organs (e.g., reproductive soundness exams, etc.). 3.9.7

8 Evaluate animals for reproductive readiness. 3.9.8

9 Defend decisions to treat or cull animals with reproductive problems with both welfare and economic factors. 3.9.9

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10 Apply scientific principles to select and care for breeding animals. 3.10

1 Summarize genetic inheritance in animals. 3.10.1

2 Define inheritance and terms related to inheritance in animal breeding (e.g., dominate, codominant, recessive, homozygous, heterozygous, etc.). 3.10.2

3 Identify genetic defects that affect animal performance. 3.10.3

4 Summarize different needs of breeding animals based on reproductive stage (e.g., newborn, parturition, gestation, gestation lengths, etc.). 3.10.4

5 Analyze how genetics can optimize economic, ecological, health, and welfare outcomes. 3.10.5

6 Demonstrate how to determine the probability of one or more traits 3.10.6

7 Perform a DNA analysis. 3.10.7

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8 Analyze the care needs for breeding stock in each stage of reproduction. 3.10.8

9 Evaluate breeding systems based on the principles of genetics. 3.10.9

10 Justify the selection of breeding pairs to achieve a desired outcome. 3.10.10

11 Recommend breeding decisions using DNA analysis data. 3.10.11

12 Create a plan to differentiate care of a species of breeding animals throughout their reproductive stages. 3.10.12

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11 Apply scientific principles to animal breeding. 3.11

1 Identify natural and artificial breeding methods (e.g., natural breeding, artificial insemination, estrous synchronization, flushing, cloning, etc.). 3.11.1

2 Describe the process and materials used in artificial insemination. 3.11.2

3 Summarize the advantages and disadvantages of major reproductive management practices, including estrous synchronization, superovulation, flushing, and embryo transfer (e.g., cost, labor, equipment, etc.). 3.11.3

4 Describe the use of quantitative breeding values (e.g., EPDs, Performance records, pedigrees) in the selection of genetically superior breeding stock. 3.11.4

5 Calculate the potential economic benefits of natural versus artificial breeding methods. 3.11.5

6 Demonstrate artificial insemination techniques. 3.11.6

7 Analyze the processes of major reproductive management practices, including estrous synchronization, superovulation, flushing, and embryo transfer. 3.11.7

8 Compare and contrast quantitative breeding value differences between genetically superior animals and animals of average genetic value. 3.11.8

9 Select animal breeding methods based on reproductive and economic efficiency. 3.11.9

10 Evaluate the implementation and effectiveness of artificial insemination techniques. 3.11.10

11 Create a breeding plan that outlines procedures for estrous synchronization, superovulation, flushing, embryo transfer, and other reproductive management practices given a scenario. 3.11.11

12 Evaluate animals for theoretical purchase based on Expected Progeny Difference, performance records, pedigrees, and specified production scenarios. 3.11.12

Evaluate environmental factors affecting animal performance and implement procedures for enhancing performance and animal health.

12 Design and evaluate animal housing, equipment, and handling facilities for the major systems of animal production. 3.12

1 Describe the types of facilities needed to house and produce animal species in a safe, efficient, and humane manner. 3.12.1

2 Identify equipment, technology, and handling facility procedures used in modern animal production (e.g., climate control devices, sensors, automation, etc.). 3.12.2

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3 Critique designs for an animal facility and prescribe alternative layouts and adjustments for the safe, sustainable, and efficient use of the facility. 3.12.3

4 Analyze the use of modern equipment, technology, and handling facility procedures to determine if they enhance the safe, economic, and sustainable production of animals. 3.12.4

5 Design an animal facility focusing on animal requirements, economic efficiency, sustainability, safety, and ease of handling. 3.12.5

6 Recommend enhancements to equipment, technology, and handling procedures to improve sustainability and production efficiency. 3.12.6

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13 Comply with government regulations and safety standards for facilities used in animal production. 3.13

1 Summarize the general standards that must be met in facilities for animal production (e.g., environmental, local zoning considerations, construction, etc.). 3.13.1

2 Categorize laws and regulations pertaining to animal systems (e.g., environmental, consumer protection, entertainment, etc.). 3.13.2

3 Analyze animal facilities to determine if industry standards have been met. 3.13.3

4 Analyze laws pertaining to animal systems. 3.13.4

5 Create facility designs to ensure they meet standards for the legal, safe, ethical, economical, and efficient production of animals. 3.13.5

6 Evaluate the impact of laws pertaining to animal systems. 3.13.6

Classify, evaluate, and select animals based on anatomical and physiological characteristics.

14 Classify animals according to taxonomic classification systems and use (e.g., agricultural, companion, etc.). 3.14

1 Explain the importance of the binomial nomenclature system for classifying animals. 3.14.1

2 Compare and contrast major uses of different animal species (e.g., agricultural, companion, etc.). 3.14.2

3 Summarize common classification terms utilized in animal systems (e.g., external and internal body parts, maturity, mature male, immature female, animal products, breeds, etc.). 3.14.3

4 Classify animals using a taxonomic classification system. 3.14.4

5 Analyze the economic value of animals for various applications in the agriculture industry. 3.14.5

6 Analyze the visual characteristics of an animal or animal product to select correct classification terminology when referring to companion and production animals. 3.14.6

7 Evaluate taxonomic characteristics to arrange animals according to the taxonomic classification system. 3.14.7

8 Recommend different uses for an animal species based upon an analysis of local market needs, economic circumstances, and environmental circumstances. 3.14.8

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9 Communicate knowledge of animal systems with proper classification terms to others in an effective and accurate manner. 3.14.9

15 Apply principles of comparative anatomy and physiology to uses within various animal systems. 3.15

1 Compare characteristics of a typical animal cell and identify the organelles. 3.15.1

2 Describe the basic functions of animal cells in animal growth, reproduction, maintenance, and performance. 3.15.2

3 Identify the properties, locations, functions, and types of animal cells, tissues, organs and body systems. 3.15.3

4 Analyze the functions of each animal cell structure. 3.15.4

5 Analyze the processes of meiosis and mitosis in animal growth, development, health, and reproduction. 3.15.5

6 Compare and contrast animal cells, tissues, organs, body system types, and functions among animal species. 3.15.6

7 Correlate the functions of animal cell structures to animal growth, development, health, and reproduction. 3.15.7

8 Investigate how the processes of meiosis and mitosis can solve animal growth, development, health, and reproductive problems. 3.15.8

9 Apply knowledge of anatomical and physiological characteristics of animals to make production and management decisions. 3.15.9

16 Select animals for specific purposes and maximum performance based on anatomy and physiology. 3.16

1 Identify optimal anatomical and physiological characteristics according to established breed standards. 3.16.1

2 Summarize the use of products and by-products derived from animals. 3.16.2

3 Compare and contrast desirable anatomical and physiological characteristics of animals within and between species. 3.16.3

4 Select products from animals based on industry standards. 3.16.4

5 Select animals to maximize performance based on anatomical and physiological characteristics. that affect health, growth, and reproduction. 3.16.5

6 Evaluate animals to produce superior animal products based on industry standards. 3.16.6

Apply principles of effective animal health care.

17 Design programs to prevent animal diseases, parasites, and other disorders and ensure animal welfare. 3.17

1 Identify specific tools, techniques, and technology used in animal health management. 3.17.1

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2 Explain methods of determining animal health and disorders. 3.17.2

3 Summarize the characteristics of wounds, common diseases, parasites, and physiological disorders that affect animals. 3.17.3

4 Identify characteristics of causal agents and vectors of diseases and disorders in animals. 3.17.4

5 Explain the clinical significance of common veterinary methods and treatment (e.g., aseptic techniques, antibiotic use, wound management, etc.). 3.17.5

6 Demonstrate the proper use and function of specific tools, techniques, and technology related to animal health management. 3.17.6

7 Perform simple health-check evaluations on animals. 3.17.7

8 Analyze illnesses and disorders of animals based on symptoms and problems caused by wounds, diseases, parasites, and physiological disorders. 3.17.8

9 Analyze data to evaluate preventive measures for controlling and limiting the spread of diseases, parasites, and disorders among animals. 3.17.9

10 Assess the safety and effectiveness of facilities and equipment used for surgical and nonsurgical veterinary treatments and procedures. 3.17.10

11 Select tools, techniques, and technology to meet specific animal health management goals. 3.17.11

12 Determine when an animal health concern needs to be referred to an animal health professional. 3.17.12

13 Treat common diseases, parasites, and physiological disorders of animals according to directions prescribed by an animal health professional. 3.17.13

14 Design a health maintenance and a disease and disorder prevention plan for animals in their natural and/or confined environments. 3.17.14

15 Recommend surgical and nonsurgical veterinary treatments and procedures to meet specific animal health care objectives. 3.17.15

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18 Analyze biosecurity measures utilized to protect the welfare of animals and health of humans on a local, state, national, and global level. 3.18

1 Summarize the importance of biosecurity to the animal industry at multiple levels (e.g., local, state, national, global). 3.18.1

2 Identify zoonotic diseases including their historical significance and potential future implications. 3.18.2

3 Analyze procedures at the local, state, and national levels to ensure biosecurity of the animal industry. 3.18.3

4 Analyze the health risk of different zoonotic diseases to humans and identify prevention methods. 3.18.4

5 Design a biosecurity plan for an animal operation. 3.18.5

6 Evaluate the effectiveness of zoonotic disease prevention methods and procedures to identify those that are best suited to ensure public safety and animal welfare. 3.18.6

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Analyze environmental factors associated with animal production.

19 **Design management practices related to animal agriculture to enhance the environment.** 3.19

1 Describe the effects of animal agriculture on the environment (e.g., waste disposal, carbon footprint, air quality, environmental efficiencies, grazing, improved soil, etc.). 3.19.1

2 Assess the effectiveness of methods of reducing the negative effects and maximizing the positive effects of animal agriculture on the environment. 3.19.2

3 Devise a plan that includes measures to reduce the negative impact and maximize the positive impact of animal agriculture on the environment. 3.19.3

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20 **Evaluate the effects of environmental conditions on animals.** 3.20

1 Summarize environmental conditions that impact animals (e.g., weather, sources of water, food resources, temperature, extreme weather, etc.). 3.20.1

2 Identify best practices for ensuring optimal environmental conditions for animals. 3.20.2

3 Critique the reliability and validity of evidence presented to support claims regarding the effects of environmental conditions on animal populations and performance (e.g., population changes, emerging species, extinction, climate change, etc.). 3.20.3

4 Evaluate the effectiveness of methods to ensure optimal environmental conditions for animals. 3.20.4

5 Apply valid and reliable research evidence to predict the potential effects of different environmental conditions for an animal population. 3.20.5

6 Develop plans to establish favorable environmental conditions for animal growth, performance, welfare, and health based on a variety of factors (e.g., economic feasibility, environmental sustainability, impact on animals, etc.). 3.20.6