

Animal Science Technology/Biotechnology (2013)

Demonstrate employability skills required by business and industry. AFNR-ASB-

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- 1 Communicate effectively through writing, speaking, listening, reading, and interpersonal abilities. 1.1
- 2 Demonstrate creativity by asking challenging questions and applying innovative procedures and methods. 1.2
- 3 Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations. 1.3
- 4 Model work readiness traits required for success in the workplace including integrity, honesty, accountability, punctuality, time management, and respect for diversity. 1.4
- 5 Apply the appropriate skill sets to be productive in a changing, technological, diverse workplace to be able to work independently and apply team work skills. 1.5
- 6 Present a professional image through appearance, behavior and language. 1.6

Orient and apply the comprehensive program of agricultural education, learns to work safely in the agriculture lab and work sites, demonstrates selected competencies in leadership through the FFA and agricultural industry organizations, and develops plans for a Supervised Agricultural Experience Program (SAEP). AFNR-ASB-2

- 1 Explain the role of the Agriculture Education program and the FFA in personal development. 2.1
- 2 Demonstrate knowledge learned through a SAEP. 2.2
- 3 Develop leadership and personal development skills through participation in the FFA. 2.3
- 4 Explore career opportunities in animal science through the FFA and Agriculture Education Program. 2.4
- 5 Explore the professional agricultural organizations associated with the course content. 2.5

Demonstrate the application of scientific methods in agricultural animal research and production. [AFNR-ASB-3](#)

- 1 Distinguish between basic and applied science.** [3.1](#)
- 2 Discuss the advances made in American agriculture.** [3.2](#)
- 3 Analyze how agricultural research has benefited the consumer.** [3.3](#)
- 4 Cite scientific discoveries in animal agriculture.** [3.4](#)
- 5 Explain scientific developments that have revolutionized animal agriculture.** [3.5](#)
- 6 List pharmaceuticals that are derived from animals and list their uses.** [3.6](#)
- 7 Discuss agriculture as a science.** [3.7](#)
- 8 Perform the steps involved in the scientific method.** [3.8](#)
- 9 Conduct a simple scientific research study.** [3.9](#)
- 10 Investigate and reports on selected animal science technology/biotechnology careers.** [3.10](#)

Describe the various phases, segments, trends, consumption, and economic scope of the large animal industry. [AFNR-ASB-4](#)

- 1 Describe ecological balance.** [4.1](#)
- 2 Describe the various segments of the beef industry.** [4.2](#)
- 3 Research the various phases of the sheep industry and the importance of wool as a consumer fabric.** [4.3](#)
- 4 Assess the various phases of the swine industry.** [4.4](#)
- 5 Explain how horses are used historically and in modern times.** [4.5](#)
- 6 Develop a chart of the per capita consumption of products from large animals grown in the United States.** [4.6](#)
- 7 Justify the use of agricultural land to produce meat animals.** [4.7](#)
- 8 Identify key production areas of beef cattle and hogs.** [4.8](#)
- 9 Determine relationships between feed crop production and the production of meat animals.** [4.9](#)
- 10 Identify breeds of large animals.** [4.10](#)
- 11 Locate on a map the states and regions foremost in the production of meat animals.** [4.11](#)

Describe the various phases, segments, trends, consumption, and economic scope of

- 1 Summarize the poultry industry's growth trends.** [5.1](#)
- 2 Evaluate the production of poultry products in each state.** [5.2](#)

**the poultry
industry.** AFNR-ASB-5

- 3 Identify on a map the states and regions foremost in production of poultry.** 5.3
- 4 Compute the per capita consumption of chicken, turkey and eggs.** 5.4
- 5 Describe vertical integration using segments of the poultry industry as examples.** 5.5
- 6 Outline the operation of modern poultry operations.** 5.6
- 7 Explain the operation of modern hatcheries.** 5.7
- 8 Identify breeds of poultry.** 5.8
- 9 Outline a modern poultry production operation.** 5.9
- 10 Describe the process of egg development in poultry.** 5.10
- 11 Trace the biological processes involved in the production of eggs.** 5.11
- 12 Analyze egg composition.** 5.12
- 13 Describe chick embryo development.** 5.13
- 14 Discuss proper storage conditions of hatching eggs.** 5.14

**Describe the various
phases, segments,
trends, consumption
and economic scope of
the dairy industry.** AFNR-

ASB-6

- 1 Identify the major areas and characteristics of dairy production in the United States and compares dairy production among the states.** 6.1
- 2 Discuss breeds of dairy cows and their characteristics.** 6.2
- 3 Demonstrate the steps used to milk cows in the modern dairy.** 6.3
- 4 Determine the per capita consumption of various dairy products.** 6.4
- 5 Assess the uses of milk from species other than cows and their importance in the dairy industry.** 6.5
- 6 Identify dairy products, their use and their economic importance.** 6.6
- 7 Examine the scientific process by which milk is produced.** 6.7
- 8 Trace the hormonal activity that controls lactation.** 6.8
- 9 Review the equipment and procedures involved in milking.** 6.9
- 10 Identify the breeds of dairy cattle.** 6.10
- 11 Contrast the breeds of dairy cattle, including their origin and breed characteristics.** 6.11

12 Assess the uses of goat and sheep milk in cheese manufacturing. 6.12

13 Describe the nutritive content of milk. 6.13

14 Explore the scientific processes of pasteurization and homogenization in milk processing. 6.14

15 Recognize and explains the differences in milk classifying and grading. 6.15

16 Demonstrate the conversion of milk to butter, cheese and ice cream products. 6.16

Evaluate trends in the aquaculture industry and the scientific principles involved in the production of aquatic animals. AFNR-

ASB-7

1 Explore the scope of the aquaculture industry. 7.1

2 Classify the characteristics of ectothermic animals. 7.2

3 Evaluate the feed-conversion efficiency of fish. 7.3

4 Research types of aquatic animal production in the United States. 7.4

5 Investigate the physical characteristics of water and its relationship to fish production. 7.5

6 Estimate fish populations in production operations by scientific sampling. 7.6

7 Measure and adjusts water pH as it relates to fish growth and development. 7.7

8 Describe how fish attain oxygen. 7.8

9 Explain how oxygen is dissolved into and depleted from water. 7.9

10 Test pond and river and other water for dissolved oxygen levels. 7.10

11 Provide for the addition of oxygen to water by mechanical agitation. 7.11

12 Describe the methods and facilities used in the production of various aquatic animals. 7.12

13 Interpret the behavioral characteristics of bullfrogs and alligators that make them difficult to produce in confinement. 7.13

Describe the various phases, segments, trends, demand, consumption and economic scope of the alternative and laboratory animals. AFNR-ASB-8

1 Analyze the advantages and disadvantages of raising alternative agricultural animals. 8.1

2 Describe alternative animal agriculture industry. 8.2

3 Explain the potential of ostriches, goats and other alternative animals as food animals. 8.3

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- 4 Describe the production of certified laboratory animal. 8.4**
 - 5 List the animals most often used in scientific research and explains reasons for their selection and use. 8.5**
 - 6 List the distinguishing characteristics of insects used in agricultural animal production. 8.6**
 - 7 Explain the importance of the honeybee to agriculture and the society of the honeybee. 8.7**
 - 8 Discuss the threat to American agriculture by the Africanized honeybee and explains the biological reasons for the problem. 8.8**
 - 9 Outline production practices to produce organic and natural animal products. 8.9**
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Classify animals using scientific binomial nomenclature as well as classifies agriculture animals by breed and use. AFNR-ASB-9

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- 1 Explain how agricultural animals are classified scientifically. 9.1**
 - 2 Explain the use of the binomial system of classification. 9.2**
 - 3 Utilize kingdoms to classify all living organisms. 9.3**
 - 4 Identify characteristics of animals that place them in different classifications. 9.4**
 - 5 Explain how breeds of livestock were developed. 9.5**
 - 6 Explain the purpose of breed associations. 9.6**
 - 7 Classify agricultural animals. 9.7**
 - 8 Identify characteristics that can be used to group objects. 9.8**
 - 9 Categorize common and distinguishing characteristics of several agricultural animals. 9.9**
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Explain and addresses the general public's food safety and environmental concerns. AFNR-ASB-10

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- 1 Rationalize consumer's concerns for food safety. 10.1**
 - 2 Explain the causes and types of problems with meat processing and consumption. 10.2**
 - 3 Demonstrate knowledge of how safety problems can be solved. 10.3**
 - 4 Differentiate between meat grading and meat inspection. 10.4**
 - 5 Discuss examples of how genetic engineering has benefited the producer and consumer as well as the concerns over genetic engineering. 10.5**
 - 6 Evaluate producers of agricultural animals as caretakers of the environment. 10.6**
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- 7 Describe the concept of the greenhouse effect.** 10.7
 - 8 Summarize how the balance of oxygen and carbon dioxide is maintained in the atmosphere.** 10.8
 - 9 Discuss how bacteria can be beneficial to the environment.** 10.9
 - 10 Determine consumer concerns with various phases of the animal and meat industry.** 10.10
 - 11 Explain the growth and popularity in organically produced animal products.** 10.11
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Compare and contrast crucial animal welfare issues and explain the benefits of treating animals in a humane manner and providing for the needs of animals. AFNR-ASB-11

- 1 Discern the difference between animal welfare and animal rights.** 11.1
 - 2 Research potential problems brought about by animals being raised in confinement.** 11.2
 - 3 Interpret the reasons given by some people for their objections to raising farm animals.** 11.3
 - 4 Debate the use of production practices such as confinement operations.** 11.4
 - 5 Debate management practices used in the production of agricultural animals.** 11.5
 - 6 Investigate the benefit to producers of content and healthy animals.** 11.6
 - 7 Explain potential problems of animal production such as the continuous use of antibiotics.** 11.7
 - 8 Cite examples of how the use of animals in research has benefited humans.** 11.8
 - 9 Investigate the laws that govern the use of laboratory animals for research.** 11.9
 - 10 Interpret the laws governing the use of agricultural animals.** 11.10
 - 11 Discuss the production and increasing popularity of natural and organic produced animal products.** 11.11
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Observe and interpret the natural behavior of agricultural animals and relate these behaviors to production practices yielding more content, healthier, and productive animals. AFNR-ASB-12

- 1 Describe the importance of ethology in the production of agricultural animals.** 12.1
- 2 Differentiate between instinctive and learned behaviors of animals.** 12.2
- 3 Judge animal intelligence based on behavior.** 12.3
- 4 Describe the conditioning response and its use in animal production.** 12.4

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- 5 Explain how animal behaviors are developed.** 12.5
 - 6 Infer how unusual stimuli and surroundings affect animals.** 12.6
 - 7 Examine how cattle view their surroundings and how that behavior is used to design cattle facilities.** 12.7
 - 8 Describe and identifies social, dominate, flight, and protective behaviors in animals.** 12.8
 - 9 Investigate the social behaviors of agricultural animals.** 12.9
 - 10 Identify dominant animals in a group.** 12.10
 - 11 Discuss how dominant behavior contributes to natural selection.** 12.11
 - 12 Analyze the types of sexual and reproductive behaviors in agricultural animals.** 12.12
 - 13 Observe animal behavior and successfully collect data for an ethogram.** 12.13
 - 14 Describe the methods used by agricultural animals to communicate.** 12.14
 - 15 Describe the types of ingestive behaviors in agricultural animals.** 12.15
 - 16 Explain how the natural behaviors of agricultural animals can be used to provide the animals with a safer, more comfortable environment.** 12.16
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Apply genetic principles to animal selection, breeding, and production. AFNR-ASB-13

- 1 Explain the basic function of deoxyribonucleic acid (DNA) and ribonucleic acid (RNA).** 13.1
 - 2 Explain how traits are passed from parent to offspring through genetic transfer.** 13.2
 - 3 Research and explain the concept of dominant genes verses recessive genes.** 13.3
 - 4 Describe the concept of co-dominant genes.** 13.4
 - 5 Explain how producers use the genetic principles to produce desired types of animals.** 13.5
 - 6 Explain how the sex of an animal is determined.** 13.6
 - 7 Explain the difference between phenotypic and genotypic characteristics.** 13.7
 - 8 Compute mathematically the expected color of offspring.** 13.8
 - 9 Compare the expected coat color with results obtained through scientific observation.** 13.9
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10 Describe how the concept of heritability is used in the selection of livestock. 13.10

11 Predict phenotypic and genotypic characteristics in animals. 13.11

12 Utilize performance data in the selection of livestock. 13.12

13 Describe Expected Progeny Difference (EPD). 13.13

Apply scientific methods of animal selection and explain the advantages and disadvantages. AFNR-ASB-14

1 Explain the concept of natural selection. 14.1

2 Discuss how humans have influenced the development of animals. 14.2

3 Illustrate how scientific research has influenced the development of animals. 14.3

4 Cite examples of how problems have developed in animals because of the selection process controlled by humans. 14.4

5 Compare and contrast the benefits of scientific animal selection and breeding by the producer with natural selection and random mating. 14.5

6 Trace the stages in the development of modern swine. 14.6

7 Discuss problems associated with overly muscled pigs. 14.7

8 Interpret the reasoning behind the selection of sex character in agricultural animals. 14.8

9 Outline selection criteria for specific agricultural animals and uses. 14.9

10 Outline the physical characteristics associated with growth in animals. 14.10

11 Compare and contrast the characteristics of modern beef, swine, and dairy animals with those of their ancestors. 14.11

12 Cite examples of heterosis in agricultural animal production. 14.12

Discuss the reproductive anatomy and biological processes involved in the reproduction of agricultural animals. AFNR-ASB-15

1 Distinguish between asexual and sexual reproduction. 15.1

2 Explain the process by which gametes are produced in both the male and female. 15.2

3 Diagram and explain the steps involved in meiosis. 15.3

4 Describe the parts and functions of the male and female reproductive system. 15.4

5 Analyze the functions of the hormones that control reproduction. 15.5

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- 6 Describe the phases of the female reproductive cycle. 15.6**

 - 7 Explain the process by which fertilization takes place. 15.7**

 - 8 Compare the size and shape of sperm cells and egg cells. 15.8**

 - 9 Demonstrate the procedures used in artificial insemination. 15.9**

 - 10 Explain the use and procedures of embryo transfer and evaluate its economic importance. 15.10**

 - 11 Describe the process and advantages of estrus synchronization. 15.11**

 - 12 Research and predict new scientific technology that will be of benefit to livestock producers. 15.12**

Describe the physiological processes involved in prenatal and postnatal growth and development of agricultural animals. AFNR-ASB-16

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- 1 Measure the growth process in an animal. 16.1**

 - 2 Analyze the circumstances of growth that affect production enterprises. 16.2**

 - 3 Distinguish between prenatal and postnatal growth and illustrate the phases of each. 16.3**

 - 4 Describe and explain the phases of mitosis. 16.4**

 - 5 Explain the layers of the blastula and the organs that are derived from each layer. 16.5**

 - 6 Describe the functions of the placenta. 16.6**

 - 7 Identify characteristics of twenty-four, forty-eight, and seventy-two hour old chick embryos. 16.7**

 - 8 Differentiate between body cells and explain the functions of each type cell. 16.8**

 - 9 Sequence fat deposition in an animal's body. 16.9**

 - 10 Investigate and explain why selection for muscling in animals is important. 16.10**

 - 11 Compare and contrast the growth and reproductive phases in an animal's life. 16.11**

 - 12 Describe the effects of hormones in the growth process. 16.12**

 - 13 Describe the effects castration has on the growth of an animal. 16.13**

 - 14 Explain the aging process in animals. 16.14**

 - 15 Distinguish between chronological and physiological age. 16.15**

Explain nutrient sources and functions as they relate to monogastric and ruminant agricultural animals. AFNR-ASB-17

- 1 List nutrients that are essential to the growth and development of animals.** 17.1
- 2 Describe the role water plays in supporting animal growth and development.** 17.2
- 3 Discuss the relationship between proteins and amino acids.** 17.3
- 4 Identify protein feed sources.** 17.4
- 5 Distinguish between carnivores, omnivores, and herbivores and give examples.** 17.5
- 6 Explain the role and importance of protein, carbohydrates, and fats in the diets of animals.** 17.6
- 7 Identify types of common sugars and their role in animal nutrition.** 17.7
- 8 Identify the common grains that are used as a source of carbohydrates.** 17.8
- 9 Distinguish between concentrates and roughages and gives examples of each.** 17.9
- 10 List the sources of fats, minerals, vitamins, roughages, starches, sugars, proteins, etc., in animal rations.** 17.10
- 11 Discuss the role that minerals play in animal growth and development.** 17.11
- 12 Demonstrate the use of chemical tests to indicate the presence of nutrients.** 17.12
- 13 Distinguish between a monogastric and a ruminant digestive system.** 17.13
- 14 List and define the function of the organs of monogastric and ruminant digestive systems.** 17.14
- 15 Explain the differences in feed used by monogastrics and feed used by ruminants.** 17.15
- 16 Classify agricultural animals as monogastrics or ruminants and predict feed sources of each.** 17.16

Investigate the physiological and chemical properties of meat products and preservation. AFNR-ASB-

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- 1 Describe the physiological processes that take place in the animal's body at death.** 18.1
- 2 Explain the steps in the slaughter of meat animals.** 18.2
- 3 Describe the biological process of ossification.** 18.3
- 4 Estimate the marbling of beef.** 18.4
- 5 Explain the value of high versus low yield grades.** 18.5

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- 6 Calculate the quality and yield grades for beef.** 18.6
 - 7 Identify the wholesale and retail cuts of beef, pork, and lamb.** 18.7
 - 8 Explain the different types of tissues that compose muscles.** 18.8
 - 9 Describe the factors that affect the palatability of meats and the sensation of taste.** 18.9
 - 10 Describe the importance of meat to the human diet.** 18.10
 - 11 Evaluate the value of nutrients provided by meat.** 18.11
 - 12 Discuss the types of microbes that cause spoilage of meat products.** 18.12
 - 13 List the factors that favor the growth of microbes.** 18.13
 - 14 Research the scientific principles involved in meat preservation.** 18.14
 - 15 Demonstrate the preservation of meat products using various curing methods.** 18.15
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Describe the effects, development, and control of parasites in agricultural animals. AFNR-ASB-19

- 1 Explain symbiotic relationships.** 19.1
 - 2 Distinguish between mutualism, commensalism, and parasitism.** 19.2
 - 3 Discuss how parasitism causes harm to the host animal.** 19.3
 - 4 Identify parasites of agricultural animals and match the parasite to the host.** 19.4
 - 5 Estimate production losses due to parasites of agricultural animals.** 19.5
 - 6 Diagram the phases of a parasite's life cycle and identify how knowledge of life cycle can be used to control the parasite.** 19.6
 - 7 Differentiate between internal and external parasites.** 19.7
 - 8 Explain how scientific research is used in the control and/or eradication of parasites.** 19.8
 - 9 Explain the conventional means of controlling parasites of agricultural animals.** 19.9
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Identify and describe animal diseases, animal immune systems, and disease prevention and control programs. AFNR-

ASB-20

- 1 List the types and characteristics of disease-causing organisms.** AFNR-ASB-20.1
- 2 Describe three types and characteristics of bacteria.** AFNR-ASB-20.2
- 3 Characterize viruses and protozoa.** AFNR-ASB-20.3

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- 4 Identify signs and symptoms that are used to recognize and quarantine sick animals.** [AFNR-ASB-20.4](#)
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- 5 List and discuss agricultural animal diseases caused by microorganisms.** [AFNR-ASB-20.5](#)
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- 6 Determine sources of disease-causing organisms in the environment.** [AFNR-ASB-20.6](#)
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- 7 Describe how an animal's immune system works.** [AFNR-ASB-20.7](#)
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- 8 Explain the function of red and white blood cells.** [AFNR-ASB-20.8](#)
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- 9 Describe how disease vaccines are developed and the success of their uses.** [AFNR-ASB-20.9](#)
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- 10 Discuss how antigens enter the body and explain the body's reactions.** [AFNR-ASB-20.10](#)
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- 11 Distinguish between active and passive immunity.** [AFNR-ASB-20.11](#)
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- 12 Differentiate between naturally acquired immunity and artificially acquired immunity.** [AFNR-ASB-20.12](#)
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- 13 Differentiate between infectious and noninfectious diseases.** [AFNR-ASB-20.13](#)
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- 14 Describe how diseases are spread and prescribe methods to limit infection.** [AFNR-ASB-20.14](#)
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- 15 List examples of diseases caused by genetic disorders.** [AFNR-ASB-20.15](#)
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- 16 Cite examples of diseases caused by improper nutrition.** [AFNR-ASB-20.16](#)
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- 17 Research plants that are poisonous to agricultural animals.** [AFNR-ASB-20.17](#)
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- 18 Provide examples of government disease-eradication programs.** [AFNR-ASB-20.18](#)
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- 19 List zoonotic diseases and concerns for human health.** [AFNR-ASB-20.19](#)