Career & Technical Education (CTE) Standards Revision Project

Cluster: Agriculture & Natural Resources

Pathways: Animal Science, Agribusiness Systems, Environmental Service Systems, Food Products & Processing Systems, Natural Resources, Plant Science, Power, Structural & Technology Systems

The standards for this cluster were created under the direction of Dr. Kellie Enns with countless hours provided by the agriculture education instructors of Colorado. The finished product is the result of a compilation of existing Colorado secondary ag education standards, National AFNR standards created by the National Council on Agriculture Education and introductory course standards from Colorado community colleges. The attached standards for each of the pathways identify links to Colorado core content standards which have been validated by content specialists in each of the core content areas. Future work with this project will include linkage of the new standards to current Colorado curriculum in agriculture education, identification or development of curriculum in new areas and the creation of a course development website to facilitate effective utilization of the information by Colorado Agriculture Education instructors.

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Career Cluster/Cluster Grouping:	**Agriculture, Natural Resources & Energy**
Pathway(s):	**Animal Systems**

Prepared Completer Competencies:
AS 01.Industry Overview

High School Expectations

Concepts and skills students know include:
AS 01.01 The student will understand the role of agriculture in determining the need and supply of the world's food

Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.01.01.a. Define the difference in food supply and food need **AS.01.01.b.** Analyze global trends (population, societal, income, health, environmental) and the impact on food supply (MAT1.4a MAT 2.2b; MAT2.2d; MAT2.3a; MAT2.3b; MAT3.1a; MAT 3.1b; MAT 3.1c; MAT 3.2b RWC04.02.a; RWC04.02.e; RWC04.10.c) **AS.01.01.c.** Relate trends of food supply and food need to theories of Thomas Malthus and the work of Norman Borlaug (RWC03.05.a; RWC03.05.b; RWC03.02.g)	**Academic Content Knowledge Alignment:** MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision. MAT2.2.b-Mathematics, Patterns, Functions, and Algebraic Structures, Analysis of elementary functions and their inverses, by investigating rates of change, intercepts, asymptotes, domain, range, and local and global behavior using all available tools, including technology. - Distinguish between functions and relations defined in any representation. MAT2.2.d- Make qualitative statements about the rate of change of a function, based on its graph or table or values.

	MAT2.3.a-Mathematics, Patterns, Functions, and Algebraic Structures, Application of transformations, including arithmetic combinations (addition, subtraction, and multiplication) and translations (vertical, horizontal, and dilations) to representations of elementary functions using tables, graphs, symbols, text, and geometric models, using all available tools, including technology. - Sketch the graph of common elementary functions and translations of those functions. MAT2.3.b- Given two functions in any representation, evaluate the sum and difference of the two functions. RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - *Draw a conclusion by synthesizing information* RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments* RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Locate and select appropriate information that clearly supports a definite purpose, topic, or position* RWC04.02.a - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - *Synthesize information to support a logical argument*

	RWC04.02.e - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - *Summarize ideas that include alternate views, rich detail, well developed paragraphs, and logical argumentation* RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Implement a purposeful and articulated process to solve a problem*
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.01.02.**The student will understand the history and global significance of animal systems	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
Levels **AS.01.02.a.** Define major components of animal systems **AS.01.02.b.** Define the major trends and relationships of animal systems to global agriculture production **AS.01.02.c.** Identify various cultural perspectives in agriculture and the impact on animal systems **AS.01.02.d.** Understand current cultural perspectives, global trade, and environmental impact of agriculture and the impact on animal systems	**Academic Content Knowledge Alignment:** **Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):**

High School Expectations	
Concepts and skills students know include: **AS.01.03**The student will relate the segments of the agriculture industry and their distribution channels on the efficiency of animal systems	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
Levels **AS.01.03.a.** Define agriculture industry segments (producers, processors, consumers, etc) and distribution channels **AS.01.03.b.** Explain the local, regional, national and global agriculture production and the role of animal systems at each level **AS.01.03.c.** Describe the movement of agriculture products through industry segments and industry distribution channels **AS.01.03.d.** Analyze the changes in animal systems management to the efficient production and distribution of agriculture products (RWC04.02.a; RWC04.02.e; RWC04.10.c;)	**Academic Content Knowledge Alignment:** RWC04.02.a - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - *Synthesize information to support a logical argument* RWC04.02.e - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - *Summarize ideas that include alternate views, rich detail, well developed paragraphs, and logical argumentation* RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Implement a purposeful and articulated process to solve a problem*
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.01.04** Industry (See also Food Products and Processing Standards)	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
Levels **AS.01.04.a.** Define animal science and animal systems and determine the importance of the animal systems **AS.01.04.b.** Explore local, regional, national and global animal production and define biosecurity, biotechnology **AS.01.04.c.** Describe techniques to insure biosecurity in our animal production **AS.01.04.d.** Integrate concepts of Animal Science into other agricultural pathways	**Academic Content Knowledge Alignment:** **Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):**

High School Expectations	
Concepts and skills students know include: **AS.01.05** Distribution Channels	
Evidence Outcomes - Students can:	**21st Century Skills and Readiness Competencies**
AS.01.05.a. Define Distribution Channels (Wholesalers, Local Markets, Direct Markets, Retailers, Government, Institutions, Restaurants, Hotels, Catering) **AS.01.05.b.** Describe the movement of products through channels **AS.01.05.c.** Illustrate the impact of the distribution channels **AS.01.05.d.** Design a new distribution channel (vertical integration)	**Academic Content Knowledge Alignment:** **Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):**

High School Expectations	
Concepts and skills students know include: Careers	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.01.06.a. Identify careers and explore advantages and disadvantages within pathway **AS.01.06.b.** Choose a career based upon skills and education necessary **AS.01.06.c.** Develop and ICAP specific to Animal Systems (RWC03.05.a; RWC03.05.b; RWC03.02.g; RWC03.03.a) **AS.01.06.d.** Review, and modify and implement Animal Systems Pathway ICAP (Individual Career and Academic Plan)	**Academic Content Knowledge Alignment:** RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - *Draw a conclusion by synthesizing information* RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - *Follow the conventions of Standard English to write varied, strong, correct, complete sentences* RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments* RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Locate and select appropriate information that clearly supports a definite purpose, topic, or position*
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

Career Cluster/Cluster Grouping:	**Agriculture, Natural Resources & Energy**
Pathway(s):	**An Systems**

Prepared Completer Competencies:
AS.02. Classification and Selection

High School Expectations

Concepts and skills students know include:
AS.02.01. Taxonomy

Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
Levels **AS.02.01.a.** Define common taxonomic terms and explain the importance of taxonomic classification **AS.02.01.b.** Demonstrate the correct use of scientific animal names	**Academic Content Knowledge Alignment:** **Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):**

High School Expectations	
Concepts and skills students know include: **AS.02.02.a.** External Anatomy	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
Levels **AS.02.02.a.** Identify body components **AS.02.02.b.** Relate body components to function & purpose	**Academic Content Knowledge Alignment:** **Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):**

High School Expectations	
Concepts and skills students know include: **AS.02.03.** Breed Identification	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
Levels **AS.02.03.a.** Identify common breeds in agriculturally important animal species **AS.02.03.b.** Understand breed characteristics and purpose **AS.02.03.c.** Select an animal for a specific purpose and environment (SCI 2.9b) **AS.02.03.d.** Appraise & evaluate economic value of animals for various application in animal agriculture	**Academic Content Knowledge Alignment:** SCI2.9.b-Science, Life Science, Evolution occurs as the heritable characteristics of populations change across generations and can lead populations to become better adapted to their environment. - Analyze and interpret multiple lines of evidence supporting the idea that all species are related by common ancestry such as molecular studies, comparative anatomy, biogeography, fossil record and embryology **Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):**

High School Expectations	
Concepts and skills students know include: **AS.02.04.** Live Animal Evaluation	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
Levels **AS.02.04.a.** Describe procedure for evaluating animals **AS.02.04.b.** Evaluate market and breeding animals for a specific purpose (SCI 2.9b) **AS.02.04.c.** Develop rationale for evaluation of livestock for purpose (RWC01.07.b; RWC01.07.c; RWC01.07.d; RWC01.07.e; RWC04.06.a; RWC04.06.c; RWC04.06.d; RWC04.07.a; RWC04.07.b) **AS.02.04.d.** Evaluate production scenario and select livestock for practical application	**Academic Content Knowledge Alignment:** RWC01.07.b - Oral Expression and Listening - Oral presentations require effective preparation strategies - *Use verbal and nonverbal techniques to communicate information* RWC01.07.c - Oral Expression and Listening - Oral presentations require effective preparation strategies - *Define a position and select evidence to support that position* RWC01.07.d - Oral Expression and Listening - Oral presentations require effective preparation strategies - *Develop a well-organized presentation to defend a position* RWC01.07.e - Oral Expression and Listening - Oral presentations require effective preparation strategies - *Use effective audience and oral delivery skills to persuade an audience* RWC04.06.a - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - *Define and narrow a topic for research, developing the central idea, focus, or question at issue* RWC04.06.c - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - *Identify and evaluate potential sources of information for accuracy, reliability,*

	validity, and timeliness RWC04.06.d - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - *Use a variety of strategies (such as search engines, online databases, interview) to collect and organize relevant and significant information* RWC04.07.a - Research and Reasoning - An author's reasoning is the essence of legitimate writing and requires evaluating text for validity and accuracy - *Analyze the logic (including assumptions and beliefs) and use of evidence (existing and missing information, primary sources, and secondary sources) used by two or more authors presenting similar or opposing arguments (such as articles by two political co* RWC04.07.b - Research and Reasoning - An author's reasoning is the essence of legitimate writing and requires evaluating text for validity and accuracy - *Evaluate the accuracy of the information in a text, citing text-based evidence, author's use of expert authority, and author's credibility to defend the evaluation* --- SCI2.9.b-Science, Life Science, Evolution occurs as the heritable characteristics of populations change across generations and can lead populations to become better adapted to their environment. - Analyze and interpret multiple lines of evidence supporting the idea that all species are related by common ancestry such as molecular studies, comparative anatomy, biogeography, fossil record and embryology

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

Career Cluster/Cluster Grouping:	**Agriculture, Natural Resources & Energy**
Pathway(s):	**An Systems**

Prepared Completer Competencies:
AS.03. Anatomy and Physiology

High School Expectations

Concepts and skills students know include:
AS.03.01. Growth and Development

Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
Levels **AS.03.01.a.** Distinguish growth processes in animals (SCI 2.6a) **AS.03.01.b.**Define life span and relate it to living condition; explain the stages of life **AS.03.01.c.**Analyze the growth factors that affect production enterprises **AS.03.01.d.**Explore the role that humans have in each of the life stages of agriculturally important animals	**Academic Content Knowledge Alignment:** SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism **Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):**

High School Expectations	
Concepts and skills students know include: **AS.03.02.** Cell Structure and Function	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
Levels **AS.03.02.a.** Describe the basics of an animal cell and describe the cellular organelles and their functions **AS.03.02.a.** Identify and explain DNA structure and replication processes (SCI2.4.a; SCI 2.7a; SCI 2.7b; SCI 2.7c) **AS.03.02.a.** Diagram and label the cell cycle (mitosis and meiosis) and have understanding of each phase (SCI2.7.b; SCI2.7d) **AS.03.02.a.** Select and use appropriate technologies to gather, process, and analyze data and to report information related to an investigation (MAT 3.1.a; MAT 3.1.b; MAT3.1.c; SC I 2.7e; SCI 2.7d; SCI 2.8c)	**Academic Content Knowledge Alignment:** MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis. MAT3.1.b-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Determine appropriate data collection methods to answer a research question. SCI2.4.a-Science, Life Science, The energy for life primarily derives from the interrelated processes of photosynthesis and cellular respiration. Photosynthesis transforms the sun's light energy into the chemical energy of molecular bonds. Cellular respiration allows cells to utilize chemical energy when these bonds are broken. -Develop, communicate, and justify an evidence-based scientific explanation the optimal environment for photosynthetic activity SCI2.7.a-Science, Life Science, Physical and behavioral characteristics of an organism are influenced to varying degrees by heritable genes,

	many of which encode instructions for the production of proteins. – Analyze and interpret data that genes are expressed portions of DNA. SCI2.7.b-Science, Life Science, - Analyze and interpret data on the processes of DNA replication, transcription, translation, and gene regulation, and show how these processes are the same in all organisms SCI2.7.c-Science, Life Science,- Recognize that proteins carry out most cell activities and mediate the effect of genes on physical and behavioral traits in an organism SCI2.7.d-Science, Life Science, - Evaluate data showing that offspring are not clones of their parents or siblings due to the meiotic processes of independent assortment of chromosomes, crossing over, and mutations SCI2.7.e-Science, Life Science, - Explain using examples how genetic mutations can benefit, harm, or have neutral effects on an organism SCI2.8.c-Science, Life Science, Multi-cellularity makes possible a division of labor at the cellular level through the expression of select genes, but not the entire genome. - Develop, communicate, and justify an evidence-based scientific explanation for how a whole organism can be cloned from a differentiated – or adult – cell
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.03.03.** Circulatory System	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
Levels **AS.03.03.a.** Identify major parts and their functions **AS.03.03.b.** Relate functions to other systems (SCI2.4.a;SCI 2.6a) **AS.03.03.c.** Determine how changes effect the individual systems and a healthy animal	**Academic Content Knowledge Alignment:** SCI2.4.a-Science, Life Science, The energy for life primarily derives from the interrelated processes of photosynthesis and cellular respiration. Photosynthesis transforms the sun's light energy into the chemical energy of molecular bonds. Cellular respiration allows cells to utilize chemical energy when these bonds are broken. -Develop, communicate, and justify an evidence-based scientific explanation the optimal environment for photosynthetic activity SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.03.04.** Digestion System	
Evidence Outcomes **Students can:**	**21st Century Skills and Readiness Competencies**
Levels **AS.03.04.a.** Identify major parts and their functions **AS.03.04.a.** Relate functions to other systems (SCI 2.6a) **AS.03.04.a.** Determine how changes effect the individual systems and a healthy animal (SCI 2.3e; SCI 2.6b; I 2.6c)	**Academic Content Knowledge Alignment:** SCI2.3.e-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism SCI2.6.b-Science, Life Science, Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to maintain homeostasis SCI2.6.c-Science, Life Science - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.03.05.** Endocrine System	
Evidence Outcomes - Students can:	**21st Century Skills and Readiness Competencies**
Levels **AS.03.05. a** Identify major parts and their functions **AS.03.05. b** Relate functions to other systems (SCI2.6.a) **AS.03.05.c** Determine how changes effect the individual systems and a healthy animal (SCI 2.3e; SCI 2.6b; SCI 2.6c)	**Academic Content Knowledge Alignment:** SCI2.3.e-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism SCI2.6.b-Science, Life Science, Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to maintain homeostasis SCI2.6.c-Science, Life Science - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.03.06** Excretory System	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
Levels **AS.03.06. a** Identify major parts and their functions **AS.03.06. a** Relate functions to other systems (SCI2.6.a) **AS.03.06. a** Determine how changes effect the individual systems and a healthy animal (SCI 2.3e; SCI 2.6b; SCI 2.6c)	**Academic Content Knowledge Alignment:** SCI2.3.e-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism SCI2.6.b-Science, Life Science, Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to maintain homeostasis SCI2.6.c-Science, Life Science - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.03.07** Immune System	
Evidence Outcomes - Students can:	**21st Century Skills and Readiness Competencies**
Levels **AS.03.07.a** Identify major parts and their functions **AS.03.07.b** Relate functions to other systems (SCI2.6.a) **AS.03.07.c** Determine how changes effect the individual systems and a healthy animal (SCI 2.3e; SCI 2.6b; SCI 2.6c)	**Academic Content Knowledge Alignment:** SCI2.3.e-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism SCI2.6.b-Science, Life Science, Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to maintain homeostasis SCI2.6.c-Science, Life Science - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.03.08** Integumentary System	
Evidence Outcomes **Students can:**	**21st Century Skills and Readiness Competencies**
Levels **AS.03.08.a** Identify major parts and their functions **AS.03.08.b** Relate functions to other systems (SCI2.6.a) **AS.03.08.c** Determine how changes effect the individual systems and a healthy anima (SCI 2.3e; SCI 2.6b; SCI 2.6c)	**Academic Content Knowledge Alignment:** SCI2.3.e-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism SCI2.6.b-Science, Life Science, Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to maintain homeostasis SCI2.6.c-Science, Life Science - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.03.09.** lymphatic system	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.03.09.a Identify major parts and their functions **AS.03.09.b** Relate functions to other systems (SCI2.6.a) **AS.03.09.c** Determine how changes effect the individual systems and a healthy animal SCI 2.3e; SCI 2.6b; SCI 2.6c)	**Academic Content Knowledge Alignment:** SCI2.3.e-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism SCI2.6.b-Science, Life Science, Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to maintain homeostasis SCI2.6.c-Science, Life Science - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.03.10** muscular system	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.03.10.a Identify major parts and their functions **AS.03.10.b** Relate functions to other systems (SCI2.6.a) **AS.03.10.c** Determine how changes effect the individual systems and a healthy animal(SCI 2.3e; SCI 2.6b; SCI 2.6c)	**Academic Content Knowledge Alignment:** SCI2.3.e-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism SCI2.6.b-Science, Life Science, Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to maintain homeostasis SCI2.6.c-Science, Life Science - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.03.11.** nervous system	
Evidence Outcomes **Students can:**	**21st Century Skills and Readiness Competencies**
AS.03.11.a Identify major parts and their functions **AS.03.11.a** Relate functions to other systems (SCI2.6.a) **AS.03.11.a** Determine how changes effect the individual systems and a healthy animal (SCI 2.3e; SCI 2.6b; SCI 2.6c)	**Academic Content Knowledge Alignment:** SCI2.3.e-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism SCI2.6.b-Science, Life Science, Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to maintain homeostasis SCI2.6.c-Science, Life Science - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.03.12** reproductive system	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.03.12.a Identify major parts and their functions **AS.03.12.b** Relate functions to other systems (SCI2.6.a) **AS.03.12.c** Determine how changes effect the individual systems and a healthy animal (SCI 2.3e; SCI 2.6b; SCI 2.6c; SCI 2.7a; SCI 2.7b; SCI 2.7c; SCI 2.7d; SCI 2.7e)	**Academic Content Knowledge Alignment:** SCI2.3.e-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism SCI2.6.b-Science, Life Science, Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to maintain homeostasis SCI2.6.c-Science, Life Science - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases SCI2.7.a-Science, Life Science, Physical and behavioral characteristics of an organism are influenced to varying degrees by heritable genes, many of which encode instructions for the production of proteins – Analyze and interpret data that genes are expressed portions of DNA.

	SCI2.7.b-Science, Life Science,. - Analyze and interpret data on the processes of DNA replication, transcription, translation, and gene regulation, and show how these processes are the same in all organisms SCI2.7.c-Science, Life Science, - Recognize that proteins carry out most cell activities and mediate the effect of genes on physical and behavioral traits in an organism SCI2.7.d-Science, Life Science, - Evaluate data showing that offspring are not clones of their parents or siblings due to the meiotic processes of independent assortment of chromosomes, crossing over, and mutations SCI2.7.e-Science, Life Science, - Explain using examples how genetic mutations can benefit, harm, or have neutral effects on an organism
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.03.13.** respiratory system	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.03.13.a Identify major parts and their functions **AS.03.13.a** Relate functions to other systems (SCI2.6.a) **AS.03.13.a** Determine how changes effect the individual systems and a healthy animal (SCI 2.3e; SCI 2.6b; SCI 2.6c)	**Academic Content Knowledge Alignment:** SCI2.3.e-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism SCI2.6.b-Science, Life Science, Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to maintain homeostasis SCI2.6.c-Science, Life Science - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations

Concepts and skills students know include:
AS.03.14. skeletal system

Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
AS.03.14.a Identify major parts and their functions **AS.03.14.b** Relate functions to other systems (SCI2.6.a) **AS.03.14.c** Determine how changes effect the individual systems and a healthy animal (SCI 2.3e; SCI 2.6b; SCI 2.6c)	**Academic Content Knowledge Alignment:** SCI2.3.e-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism SCI2.6.b-Science, Life Science, Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to maintain homeostasis SCI2.6.c-Science, Life Science - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

Career Cluster/Cluster Grouping:	**Agriculture, Natural Resources & Energy**
Pathway(s):	**Animal Systems**

Prepared Completer Competencies:
AS.04. The student will explain the role of genetics and reproductive management in animal systems.

High School Expectations

Concepts and skills students know include:
AS.04.1. principles of sexual reproduction

Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.04.1. a. Identify the parts of the male and female reproductive systems and describe gamete production, define fertilization, gestation, and parturition **AS.04.1. b.** Describe the phases of the female reproductive cycle **AS.04.1. c.** Compare hormone action involved in the reproductive cycle; identify their sources, effects, and purposes (SCI2.3.e; SCI 2.6b)	**Academic Content Knowledge Alignment:** MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis. MAT3.1.b-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Determine appropriate data collection methods to answer a research question.

AS.04.1. d. Evaluate the effects of manipulating the hormones in a reproductive system (SCI2.6.b; SCI 2.6 c MAT3.1a; MAT3.1.b; MAT3.1.c)	MAT3.1.c-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Explain how data will be analyzed to provide answers to a research question. SCI2.3.e-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins SCI2.6.b-Science, Life Science, Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to maintain homeostasis SCI2.6.c-Science, Life Science - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.04.2.** fundamentals of inheritance	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.04.02. a. Define terms associated with genetics (SCI2.7.a) **AS.04.02. b.** Explain how genetics relates to improvement in livestock production (MAT3.1a; MAT3.1.b; MAT 3.1.c **AS.04.02. c.** Diagram and explain how characteristics are inherited (SCI 2.7a; SCI 2.7b; SCI 2.7d) **AS.04.02. d.** Diagram and explain the role of genetics with sex determination, linkage, crossover, and mutation (SCI 2.7a; SCI 2.7b; SCI 2.7c; SCI 2.7d; SCI 2.7e)	**Academic Content Knowledge Alignment:** MAT3.1.b-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Determine appropriate data collection methods to answer a research question. MAT3.1.c-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Explain how data will be analyzed to provide answers to a research question. SCI2.7.a-Science, Life Science, Physical and behavioral characteristics of an organism are influenced to varying degrees by heritable genes, many of which encode instructions for the production of proteins – Analyze and interpret data that genes are expressed portions of DNA. SCI2.7.b-Science, Life Science,. - Analyze and interpret data on the processes of DNA replication, transcription, translation, and gene regulation, and show how these processes are the same in all organisms

	SCI2.7.c-Science, Life Science, - Recognize that proteins carry out most cell activities and mediate the effect of genes on physical and behavioral traits in an organism SCI2.7.d-Science, Life Science, - Evaluate data showing that offspring are not clones of their parents or siblings due to the meiotic processes of independent assortment of chromosomes, crossing over, and mutations SCI2.7.e-Science, Life Science, - Explain using examples how genetic mutations can benefit, harm, or have neutral effects on an organism
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: Students can explain the process of selection, and the role selection plays in improving animal systems	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.04.03. a. Explain selection, goals for selection and why and how selection has been used in animal systems (MAT 3.1.a; MAT 3.1.b; MAT3.1.c;) **AS.04.03. a.** Select an animal for a specific purpose based on genotype and utilize the punnet square to project genetic outcomes— (MAT1.3aMAT1.4a MAT2.3b MAT2.3c Mat2.3d; MAT2.3e MAT2.4a) **AS.04.03. a.** Select an animal for a specific purpose based on genotype and phenotype **AS.04.03. a.** Apply selection principles to a group of animals	**Academic Content Knowledge Alignment:** MAT1.3.a-Mathematics, Number Sense, Properties, and Operations, Development of an understanding of counting techniques. - Use combinatorics (Fundamental Counting Principle, permutations and combinations) to solve problems in real world contexts. MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision. MAT2.3.b- Given two functions in any representation, evaluate the sum and difference of the two functions. MAT2.3.c- Given two linear or power functions in any representation, evaluate the product of the two functions. MAT2.3.d- Determine how translations affect the symbolic and graphical forms of a function. Know how to use graphing technology to examine translations. MAT2.3.e- - Perform arithmetic combinations on elementary (linear, quadratic, power, and exponential) functions, using all available tools including technology.

	MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis. MAT3.1.b- Determine appropriate data collection methods to answer a research question. MAT3.1.c- Explain how data will be analyzed to provide answers to a research question. MAT2.4.a-Mathematics, Patterns, Functions, and Algebraic Structures, Understand equivalent forms of expressions, equations, inequalities, and relations. - Perform and justify steps in generating equivalent expressions by identifying properties used.
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.04.04.** reproductive management technologies	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.04.04. a. Identify technologies used in animal reproduction **AS.04.04. b.** Explain the procedures used in artificial insemination, embryo transfer, and cloning (SCI 2.8c;) **AS.04.04. c.** Demonstrate the steps of artificial insemination and embryo transfer **AS.04.04. d.** Develop a breeding system utilizing current	**Academic Content Knowledge Alignment:** SCI2.8.c-Science, Life Science, Multi-cellularity makes possible a division of labor at the cellular level through the expression of select genes, but not the entire genome- Develop, communicate, and justify an evidence-based scientific explanation for how a whole organism can be cloned from a differentiated – or adult – cell **Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):**

Career Cluster/Cluster Grouping:	**Agriculture, Natural Resources & Energy**
Pathway(s):	**Animal Systems**

Prepared Completer Competencies:
AS.05. animal health and disease management

High School Expectations

Concepts and skills students know include:
AS.05.01. a. diseases, parasites and physiological disorders

Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
AS.05.01. a. Recognize signs of proper function of body systems (SCI2.3d; SCI2.6.a; SCI2.6c) **AS.05.01. b.** Identify signs of illnesses and disorders for specific parasites, diseases & disorders of animals **AS.05.01. c.** Describe treatment protocol and proper administration routes and techniques (MAT1.4a; RWC03.05.a; RWC03.05.b; RWC03.02.g; RWC03.03.a;)	**Academic Content Knowledge Alignment:** RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments* RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Locate and select appropriate information that clearly supports a definite purpose, topic, or position* RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - *Draw a conclusion by synthesizing information* RWC03.03.a - Writing and Composition - Standard English conventions

AS.05.01. d. Determine treatment protocol including alternative methods of treatment (massage and acupuncture) (RWC3.05a; RWC3.05b; RWC3.02g; RWC3.03a)	effectively communicate to targeted audiences and purposes - *Follow the conventions of Standard English to write varied, strong, correct, complete sentences* SCI2.3.d-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Infer the consequences to organisms of suboptimal enzyme function – such as altered blood pH or high fever – using direct and indirect evidence SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism SCI2.6.c-Science, Life Science, -Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.05.02.** routes and prevention of disease transmission	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.05.02. a. Recognize signs of good health & disease conditions **AS.05.02. b.** Classify diseases, identify causative agents of transmission, including zoonotic diseases (SCI2.6.c;) **AS.05.02. c.** Recognize common management practices for disease prevention, including biosecurity issues **AS.05.02. d.** Design a program of disease prevention including biosecurity plans for production operations	**Academic Content Knowledge Alignment:** SCI2.6.c-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases **Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):**

High School Expectations	
Concepts and skills students know include: **AS.05.02.** principles of immunity	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.05.03. a. Identify components of immune system & understand role in disease prevention (SCI 2.6a) **AS.05.03. b.** Describe the outcomes of the immune response & common immunological disorders **AS.05.03. ca.** Understand the role of colostrum and the immune response in newborn animals **AS.05.03. d.** Understand the principles of vaccination & design immunization protocol for all production animals (SCI2.5c)	**Academic Content Knowledge Alignment:** SCI2.5.c-Science, Life Science, Cells use passive and active transport of substances across membranes to maintain relatively stable intracellular environments - Diagram the cell membrane schematically, and highlightreceptor proteins as targets of hormones, neurotransmitters, or drugs that serve as active links between intra and extracellular environments SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism **Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):**

Career Cluster/Cluster Grouping:	**Agriculture, Natural Resources & Energy**
Pathway(s):	**Animal Systems**

Prepared Completer Competencies:
AS.06. principles of nutrition and digestion

High School Expectations

Concepts and skills students know include:
AS.06.01. digestive processes

Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.06.01.a. Compare the three types of digestive systems and the major species that have each **AS.06.01.b.** Select feedstuffs that are appropriate for each system **AS.06.01.c.** Trace the breakdown of feedstuffs through the digestive process (SCI 2.3a; SCI 2.3b; SCI 2.3c; SCI 2.3d; SCI 2.3e)	**Academic Content Knowledge Alignment:** SCI2.3.a-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Identify biomolecules and their precursors/building blocks SCI2.3.b-Science, Life Science, - Develop, communicate, and justify an evidence-based explanation that biomolecules follow the same rules of chemistry as any other molecule SCI2.3.c-Science, Life Science,. - Develop, communicate, and justify an evidence-based explanation regarding the optimal conditions required for enzyme activity SCI2.3.d-Science, Life Science, - Infer the consequences to organisms of suboptimal enzyme function – such as altered blood pH or high fever – using direct and indirect evidence

AS.06.01.d. Evaluate the chemical processes happening in the digestive cycle (organic acids, protein digestion) (SCI 2.3a; SCI 2.3b; SCI 2.3c; SCI 2.3d; SCI 2.3e)	SCI2.3.e-Science, Life Science, - Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins **Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):**

High School Expectations	
Concepts and skills students know include: **AS.06.02.** nutrients and their functions	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.06.02.a. Identify common nutrients (SCI2.3.a; SCI2.3e) **AS.06.02.ab.** Discuss the importance of each nutrient and its function (SCI2.3.a; SCI2.3e) **AS.06.02.c.** Determine the correct amounts of each nutrient needed for each species (SCI2.3.a; SCI2.3e; MAT1.4a;) **AS.06.02.d.** Analyze the metabolic rate of each nutrient (SCI2.3.a; SCI2.3e; MAT3.3.a)	**Academic Content Knowledge Alignment:** MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision. MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics. SCI2.3.a-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Identify biomolecules and their precursors/building blocks SCI2.3.e-Science, Life Science, - Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.06.03.** species nutritional requirements and stages of production.	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.06.03.a. Identify compare and contrast common feeds for each species nutritional requirements (SCI2.3.a; SCI2.3e) **AS.06.03.b.** Determine the specific nutritional needs for each species, environmental condition, and stages of production **AS.06.03.c.** Evaluate symptoms of nutritional deficiencies (SCI 2.6b; SCI 2.6c) **AS.06.03.d.** Improve management system to correct nutritional deficiency (RWC4.11.m; MAT3.1a; MAT3.1b;) MAT3.1c;)	**Academic Content Knowledge Alignment:** MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis. MAT3.1.b- Determine appropriate data collection methods to answer a research question. MAT3.1.c- Explain how data will be analyzed to provide answers to a research question. SCI2.3.a-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Identify biomolecules and their precursors/building blocks SCI2.3.e-Science, Life Science, - Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins SCI2.6.b-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments. - Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to

	maintain homeostasis SCI2.6.c-Science, Life Science, - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.06.04. describe feed classification and composition**	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.06.04.a. Compare and contrast common types of feedstuffs (roughages and concentrates, additives, supplements) **AS.06.04.b.** Determine the relative nutritional value of feedstuffs as a result of different processing methods **AS.06.04.c.** Select appropriate feedstuffs for animals based on factors such as the environment and economy (SCI2.6.d) **AS.06.04.d.** Determine ways to improve relative feed value in feedstuffs	**Academic Content Knowledge Alignment:** SCI2.6.d-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments. - Use computer simulations and models of homeostatic mechanisms **Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):**

High School Expectations	
Concepts and skills students know include: **AS.06.04.** Describing feed additives and growth promoters	
Evidence Outcomes - Students can:	**21st Century Skills and Readiness Competencies**
AS.06.04.a. Explain the purpose and benefits of feed additives and growth promoters **AS.06.04.b.** Discuss how feed additives and growth promoters are administered **AS.06.04.c.** Explain how feed additives and growth promoters impact the growth process **AS.06.04.d.** Research the benefits and precautions that should be used with feed additives and growth promoters (RWC03.05.a; RWC03.05.b; RWC03.02.g; RWC03.03.a)	**Academic Content Knowledge Alignment:** RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - *Draw a conclusion by synthesizing information* RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - *Follow the conventions of Standard English to write varied, strong, correct, complete sentences* RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments* RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Locate and select appropriate information that clearly supports a definite purpose, topic, or position*

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

Career Cluster/Cluster Grouping:	**Agriculture, Natural Resources & Energy**
Pathway(s):	**Animal Systems**

Prepared Completer Competencies:
AS.07. Characteristics of animal husbandry

High School Expectations

Concepts and skills students know include:
AS.07.01. Understanding animal behavior

Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.07.01.a. List and describe types of animal behavior **AS.07.01.b.** Explain through examples the nine major behavior patterns and how they are interrelated **AS.07.01.c.** Summarize how behavioral activities affect animal wellbeing, productivity, and profitability (SCI2.7c) **AS.07.01.d.** Evaluate management system's affect on animal behavior	**Academic Content Knowledge Alignment:** SCI2.7.c-Science, Life Science, Physical and behavioral characteristics of an organism are influenced to varying degrees by heritable genes, many of which encode instructions for the production of proteins - Recognize that proteins carry out most cell activities and mediate the effect of genes on physical and behavioral traits in an organism **Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):**

High School Expectations	
Concepts and skills students know include: Observe and recognize signs of health in animals	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.07.02.a. Compare the observable signs of healthy animals to the observable signs of unhealthy animals **AS.07.02.b.** Explain the benefit to producers of content and healthy animals **AS.07.02.c.** Perform simple health-check evaluations on animals **AS.07.02.d.** Design a health maintenance and disease prevention plan for animals in confined environments (MAT1.4a; RWC03.05.a; RWC03.05.b; RWC03.02.g; RWC03.03.a)	**Academic Content Knowledge Alignment:** MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision. RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - *Draw a conclusion by synthesizing information* RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - *Follow the conventions of Standard English to write varied, strong, correct, complete sentences* RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments*

	RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Locate and select appropriate information that clearly supports a definite purpose, topic, or position*
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.07.03 E**nvironments impact an animals' production	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.07.03.a. Identify the environmental influences on livestock, intensive management systems, and extensive management systems **AS.07.03.b.** Describe how animals adapt to environments and how that affects management practices **AS.07.03.c.** Describe how genetics, nervous system functions, and behavior systems affect an animal's ability to adapt to an environment (SCI 2.6c) **AS.07.03.d.** Explain how producers may assist animals adaptations to the environment	**Academic Content Knowledge Alignment:** SCI2.6.c-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases **Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):**

High School Expectations	
Concepts and skills students know include: **AS.07.04.** Proper techniques for handling and restraint of animals	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.07.04.a. Identify proper animal handling and restraining principles **AS.07.04.b.** Outline safety procedures for working with animals by species **AS.07.04.c.** Design an animal facility that allows for easy and safe handling and restraint (MAT1.4a; MAT4.1b; MAT4.1e; MAT4.1f MAT4.2e;)	**Academic Content Knowledge Alignment:** MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision. MAT4.1.b-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms. MAT4.1.e-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and spheres. MAT4.1.f-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Develop and justify conjectures about relationships among properties of shapes in two- and three-dimensions using construction tools, including

	technology.
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.04. 07** principles of facility management that will allow for safe and efficient handling of animals	
Evidence Outcomes **Students can:**	**21st Century Skills and Readiness Competencies**
AS.07.05.a. Indentify types of facilities for given production scenarios **AS.07.05.b.** Analyze facilities for functionality and safety (RWC04.02.a; RWC04.02.e; RWC04.10.c) **AS.07.05.c.** Make recommendations for improvements; analyze current laws relating to facilities and management (RWC03.05.a; RWC03.05.b; RWC03.02.g; RWC03.03.a) **AS.07.05.d.** Design a facility incorporating all phases of production (from processing to waste management)	**Academic Content Knowledge Alignment:** RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - *Draw a conclusion by synthesizing information* RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - *Follow the conventions of Standard English to write varied, strong, correct, complete sentences* RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments* RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Locate and select appropriate information that clearly supports a definite purpose, topic, or position* RWC04.02.a - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - *Synthesize information to support a logical argument*

	RWC04.02.e - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - *Summarize ideas that include alternate views, rich detail, well developed paragraphs, and logical argumentation* RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Implement a purposeful and articulated process to solve a problem*
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

Career Cluster/Cluster Grouping:	**Agriculture, Natural Resources & Energy**
Pathway(s):	**Animal Systems**

Prepared Completer Competencies:
AS.08. principles of meat science

High School Expectations

Concepts and skills students know include:
AS.08.01. principles of carcass evaluation

Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.08.01.a. Use visual appraisal to predict the quality and yield grade of a carcass **AS.08.01.b.** Define measurement tools to predict the quality and yield grade of a carcass **AS.08.01.c.** Use measurement tools to predict the quality and yield grade of a carcass (MAT4.1.a) **AS.08.01.d.** Predict carcass quality based on live animal evaluation and husbandry practices	**Academic Content Knowledge Alignment:** MAT4.1.a-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Calculate (or estimate when appropriate) through successive iterations the perimeter and area of a two-dimensional irregular shape. **Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):**

High School Expectations	
Concepts and skills students know include: **AS.08.02.** yield grade calculations and the impact of percent yield on industry production standards	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.08.02.a. Define yield grade and calculate dressing percentages (MAT1.4a) **AS.08.02.b.** Explain yield grade factors **AS.08.02.c.** Evaluate carcass indicators to determine yield grade (MAT1.4.a; MAT4.1.c) **AS.08.02.d.** Analyze production of percent yield of meat products and the impact on the goals of the animal industry (MAT2.3.a)	**Academic Content Knowledge Alignment:** MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision. MAT2.3.a-Mathematics, Patterns, Functions, and Algebraic Structures, Application of transformations, including arithmetic combinations (addition, subtraction, and multiplication) and translations (vertical, horizontal, and dilations) to representations of elementary functions using tables, graphs, symbols, text, and geometric models, using all available tools, including technology. - Sketch the graph of common elementary functions and translations of those functions. MAT4.1.c-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and surface area.

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

High School Expectations	
Concepts and skills students know include: **AS.08.03.** Identification of commercial cuts of meat	
Evidence Outcomes **Students can:**	**21st Century Skills and Readiness Competencies**
AS.08.03.a. Identify wholesale cuts **AS.08.03.b.** Identify retail cuts **AS.08.03.c.** Explain the importance of cut identification as it relates to animal production	**Academic Content Knowledge Alignment:** **Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):**

High School Expectations	
Concepts and skills students know include: Correctly quality grade animals and determine the importance of quality in the animal/meat production	
Evidence Outcomes Students can:	**21st Century Skills and Readiness Competencies**
AS.08.04.a. Define quality grade **AS.08.04.b.** Explain quality grade factors **AS.08.04.c.** Evaluate carcass indicators to determine quality grades **AS.08.04.d.** Analyze impact of quality grades on production and the goals of the animal industry (RWC04.02.a; RWC04.02.e; RWC04.10.c)	**Academic Content Knowledge Alignment:** RWC04.02.a - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - *Synthesize information to support a logical argument* RWC04.02.e - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - *Summarize ideas that include alternate views, rich detail, well developed paragraphs, and logical argumentation* RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Implement a purposeful and articulated process to solve a problem*
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of…):

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