Career & Technical Education

Agriscience

AGRICULTURAL CAREER CLUSTER

CAREER MAJORS/CAREER PATHWAYS

Animal Science Systems
Agriscience Exploration (7th-8th Grade) - (no credit toward career major)
Recommended Courses
Principles of Agricultural Science & Technology **Agriscience** **Animal Science** **Animal Technology** **Equine Science** **Adv. Animal Science** **Small Animal Tech** **Veterinary Science**
Elective Courses
Ag. Math Food Science & Technology Food Processing, Dist. & Mkt. Aquaculture Ag. Sales and Marketing Ag. Construction Skills Ag. Power & Machinery Operation Agri-Biology Adv. Ag. Economics and Agribusiness Ag. Business/Farm Mgmt Ag. Employability Skills • Leadership Dynamics • Business Management • Marketing Management * Other Career and Technical Education Courses

- Other Career and Technical Education courses directly related to the student's Career Major/Career Pathway.
- "Bolded" courses are the "primary recommended courses" for this career major/career pathway. At least 3 of the 4 courses should come from this group of courses.

To complete a career major, students must earn four career-related credits within the career major. Three of the four credits should come from the recommended courses for that major.

NOTE: Agribiology is an interdisciplinary course, which meets the graduation requirements for Life Science. Agriscience Interdisciplinary course also meets the graduation requirements for Life Science. Agriculture Math is an interdisciplinary course, which may be offered for Math Credit.

KENTUCKY CAREER PATHWAY/PROGRAM OF STUDY TEMPLATE

COLLEGE/UNIVERSITY: _____

HIGH SCHOOL (S): _____

_____

CLUSTER: Agriculture, Food, and Natural Resources

PATHWAY: Animal Science Systems

PROGRAM: Agricultural Education

	GRADE	ENGLISH	MATH	SCIENCE	SOCIAL STUDIES	REQUIRED COURSES RECOMMENDED ELECTIVE COURSES OTHER ELECTIVE COURSES CAREER AND TECHNICAL EDUCATION COURSES				CREDENTIAL CERTIFICATE DIPLOMA DEGREE
SECONDARY	9	△ English 1	△ Alegbra 1	△ Earth Science	△ Survey of SS	△ Health/PE	Principles of Ag. ☆			
	10	△ English 2	△ Geometry	△ Biology	△ World Civ.	△ Humanities	Agriscience Or Animal Science ☆			
	11	△ English 3	△ Alegbra 2	△ Chemistry	△ US History	≈ Foreign Lan.	Small Animal or Animal Science ☆	☆ Equine Science		
	12	△ English 4	△ 4th math*	Anatomy/ Physiology ≈		≈ Foreign Lan.	☾ ☆ Adv. Animal	Vet Tech or Animal Tech ☆		☾ Skill Stds Assmt- Animal
			* Pre Cal Rec. for College							
POSTSECONDARY	Year 13	Writing	Math	Chemistry + Labs	Humanities	Animal Science	Agronomy	Area of Specialization Course		
	Year 14	Writing		Biology	Social Sciences	Area of Specialization Course	Area of Specialization Course	Area of Specialization Course		
	Year 15			Organic Chemistry		Animal Nutrition	Production Courses	Area of Specialization Course		
	Year 16					Capstone/Sr. Seminar Class	Area of Specialization Course	Area of Specialization Course		BS Degree

Required Courses △

Recommended Elective Courses ☆

Other Elective Courses ≈

Career and Technical Education Courses ⇨

Credit-Based Transition Programs (e.g. Dual/Concurrent Enrollment, Articulated Courses, 2+2+2)
(◆=High School to Comm. College) (• =Com. College to 4-Yr Institution) (■ = Opportunity to test out) ☾

Mandatory Assessments, Advising, and Additional Preparation ⊗

League.org CCTI College and Career Transitions Initiative

Funded by the U. S. Department of Education

(V051B020001)

Revised Jan. 2005

October, 2006-CTE/Kentucky

Note: Categories of courses (e.g. Required, Recommended Electives, other Electives and career and Technical Education) apply to both secondary and postsecondary levels.

Agriscience

Course Description: Agriscience introduces the scientific agricultural approach to animal science and selection, and plant and land science. Agricultural career opportunities will be emphasized in each class. Laboratory experiences relating to basic and current technology will be part of the program. Content may be enhanced by utilizing appropriate computer applications. Leadership development will be provided through FFA. Each student will be expected to have a supervised agricultural experience program and keep appropriate records.

Academic Expectations	Content/Process
	Students will
1	• apply basic chemical and biological concepts to the production of food, including the interrelationships between soil and plants and the natural cycles which sustain all ecosystems.
2	• apply basic physiological and genetic principles to animal production systems.
3	• investigate the impact of human activities on the environment and resource conservation and stewardship and interpret the impact of globalization on agriculture.
4	• examine the application of technology and genetic engineering in modern agriculture systems.
5	• maintain records on supervised agricultural experience program and be able to summarize and analyze results in making financial decisions.
6	• utilize activities of FFA as an integral component of course content and leadership development.
7	• apply science, math and communication skills within the technical content.
8	• demonstrate employability and social skills relative to the career cluster.

Connections

- Kentucky Occupational Skill Standards
- Secretary's Commission on Achieving Necessary Skills (SCANS)

Agriscience Course Outline

Unit	Topics	Lesson	Activity	Learning Targets
Soil Science - 10 days	Use, Formation, and Properties of Soil	Soil forming properties and soil characteristics	-"Go With the Flow" Soil Particle and Permeability Lab	Evaluate permeability of soil particles; Determine soil forming factors; Anaylze color, texture, and structure.
	Fertilizer and Macronutrients	Soil Amendments	Soil Sampling Lab; Dr. Dirt (Suggesting amendments to the soil based on plant needs)	Perform proper soil sampling techniques; Defend the use of N, P, K with plant needs
	Conservation	Soil Conservation Practices and Importance	Conservation Essay (NRCS)	Defend the need to conserve natural resources
	Land Judging	How to properly evaluate land use and soil properties	Land Judging CDE and Demonstrate the use of NRCS Web Soil Survey	Evaluate land useage and conservation measure based on available land; Demonstrate the use of the Web Soil Survey and GPS systems
Plant Science - 10 days	Plant Cells	Properties of Plant Cells	Develop cell models; Use Cells Alive	Identify and describe cell parts; Evaluate the physiology of a cell organelles
	Physiology	Plant Anatomy & Plant Process	Plant Anatomy Dissection; Photosynthesis Lab (Monitor Growth Based on Light); Transpiration Lab;	Identify and describe plant parts and functions; Identify plant growth requirements; Analyze the effects of light on plant growth; Determine the process of transpiration
	Crops	Selecting the appropriate crops based on production goals	Case Study - Cropville Scenario	Evaluate production needs and goals to select an appropriate crop
	Selection Techniques	Determining production needs based on maturation timeline	Seeding to Maturation Calendar (for common fruits and vegetables)	Develop a seeding to maturation calendar for common fruits and vegetables through by seed recommendation.
	Disease and Pest	Identify common plant disease and pest	Mystery Diagnosis - Plant Science	Identify and describe common plant disease and pest; Determine the appropriate pest management strategies for given scenario.
Animal Science - 15 days	Antatomy and Physiology	Anaylze the internal and external parts of various species in the livestock industry	Posters; Sidewalk Chalk	Identify the internal and external parts of various livestock species
	Bone Structure	Basic Animal Bone Structure	Comparsion Of Human to Animal	Identify major bones in livestock species
	Basic Digestion & Nutrition	Understanding the basic feeds and 4 digestive systems	Bloat Lab; Digestion Models; Enzymatic Lab;	Describe the major components of the monogastric, rumenient, avian, pseudo-rumenient digestive system;
	Basic Reproduction	Understanding male and female reproduction systems	Label and Identify diagrams of bovine reproductive tracts; dissect reproductive tracts	Identify major parts of the male and female bovine reproductive anatomy; Describe the physiology of the male and female bovine reproductive system
	Animal Production Systems	Covering basic production techniques within the livestock industry (farrow to finish, feeder operations, etc.)	Production Scenarios; Swine Time	Compare and Contrast differences in animal production systems amoung species ; Evaluate production scenarios to determine the appropriate production technique;

	Disease and Pest	Internal and External Parasites, Vaccination Schedules, and Common Diseases	Conduct a fecal egg float on a pulled fecal sample	Identify steps to management livestock health; Develop a vaccination schedule for a given scenario; Identify common internal and external parasites; Identify common livestock diseases; Evaluate the economic impact of disease and pest to a farming operation.
Agriculture Sales and Marketing - 15 days	SAE	Implement SAE plans.	SAE Placement Contract; SAE Yearly SMART Goals	Implement a comprehensive SAE plan; Implement a comprehensive SAE with connections to a Career Path
	Grants, Credit, and Loans	Obtaining farm and/or business funding.	Complete a loan application from the Farm Service Agency's Youth Loan Program	Evaluate financial information and assets needed to obtain a grant, credit, and/or loan; Complete a financial balance sheet as part of the Kentucky SAE Record Book;
	Management Plans	Developing management plans for entreprenuerial endeavors	Complete the National FFA AgriEntreprenuership SAE Grant Application; Guest Speakers (Development of Management Plans	Identify the basic concepts of a management plan ; Develop a management plan; Evaluate the proposed effectiveness of a management plan
	Agricultural Law	Policies and organizations; Liabilities and contracts	Identify various agricultural ogranizations and compare and contrast their mission towards agriculture	Compare and contrast various agricultural organizations and their implications to agricultural and public law and policy
	World Trade	The effects of imports, exports, supply, demand, and trade agreements on agricultural economy.	The Fair Game (http://www.marquisproject.com/?page_id=152)	Describe the effects of agriculture trade on world economy; Demonstrate the methods used by world leaders to import and export commodities through "The Fair Game"
	Futures	Futures role in the agriculture commodities	Guest Speaker	Define futures: Identify the purpose of the futures market in agriculture
Agriculture Research - 15 days	Scientific Processes	Scientific method	Conduct any lab; write a lab report for it	Identify the components of the scientific method; Create a lab report for a research problem
	Agriscience Fair	Identify a problem,conduct literature review, implement the scientific method, and collect data (both qualitative and quantitative).	Identify a problem and design an experiment to address the problem	Create an experiment for a problem with the students SAE or Career Path; Conduct the proper procedures of the scientific method to complete a student designed research project.
	Data Anaylsis	Use computational software (i.e., Microsoft Excel) to evaluate data.	Analyze data from previous experiments using Microsoft Excel	Analyze research data collect from student design experiment/procedure; Demonstrate use of technology to create and diagram information
	Communication Skills	Verbal, Written, and Non-verbal Communication Skills Developed.	Present your research paper to a committee of judges at the local agriscience fair	Defend and summarize student research within a student presentation and interview
Current Issues in Agriculture - 10 days	Global and Local Agriculture Issues	Use social media, technology, and community resources to understand and evaluate agriculture issues.	What's in the News? (Social Media Survey)	Evaluate agriculture issues through the use of social media; Support and defend agriculture industry

Course Title **Agriscience** Grade Levels 9-10 Credit Value 1

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Prerequisites It is recomended that students have Principles of Agriculture prior to Agriscience

Unit Title Soil Science

Technical Content

1- Apply basic chemical and biological concepts to the production of food, including the interrelationships between soil and plants and the natural cycles which sustain all ecosystems.

KY Academic Standards (Big Idea)

Biological Change (Biological Science) - Science
The only thing certain is that everything changes. At the high school level, students evaluate the role natural selection plays in the diversity of species. Modern ideas of evolution provide a scientific explanation for three main sets of observable facts about life on Earth: the enormous number of different life forms we see about us, the systematic similarities in anatomy and molecular chemistry we see within that diversity, and the sequence of changes in fossils found in successive layers of rock that have been formed over more than a billion years.

The Earth and the Universe (Earth/Space Science) - Science
The Earth system is in a constant state of change. These changes affect life on Earth in many ways. At the high school level, most of the emphasis is on why these changes occur. An understanding of systems and their interacting components will enable students to evaluate supporting theories of Earth changes. The use of models and observance of patterns to explain common phenomena is essential to building a conceptual foundation and supporting ideas with evidence at all levels. Patterns play an important role as students seek to develop a conceptual understanding of gravity in their world and in the universe. High school is the time

Unity and Diversity (Biological Science) - Science
All matter is comprised of the same basic elements, goes through the same kinds of energy transformations, and uses the same kinds of forces to move. Living organisms are no exception. At the high school level, an in-depth study of the specialization and chemical changes occurring at the cellular level builds upon the foundational ideas developed earlier to investigate deoxyribonucleic acid (DNA) and effects of alterations in DNA for an individual organism as well as for a species. Emphasis at every level should be placed upon the understanding that while every living thing is composed of similar small constituents that combine in predictable

English/Language Arts Standards

CC.9-10.W.2 Text Types and Purposes: Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
CC.9-10.W.4 Production and Distribution of Writing: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
CC.9-10.W.5 Production and Distribution of Writing: Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (Editing for conventions should demonstrate command of Language standards 1–3 on up to and including grades 9-10 page 55.)
CC.9-10.W.6 Production and Distribution of Writing: Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

Mathematics Standards

CC.9-12.A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*
CC.9-12.S.ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.*

21st Century Skills and Knowledge

Creativity and Innovation

ICT (Information, Communications, and Technology) Literacy

Environmental Literacy

Critical Thinking and Problem Solving

KOSSA Standards

OC001 Apply use of related electronic technology (e-mail, computer applications, GPS, precision farming, ultrasound, electronic ear tags, and computer feeding).

OC004 Maintain awareness of current trends in production agriculture through industry associations, trade journals, and internet resources.

OL003 Use appropriate agricultural terminology.

ON001 Utilize appropriate soil conservation practices.

ON002 Identify and apply appropriate water conservation practices.

ON003 Analyze and enhance soil fertility.

ON004 Assess fertilizer and pesticide applications.

ON005 Utilize livestock to enhance soil and water quality.

OF007 Calculate area and volume measurements (acreage, storage, stocking).

Learning Targets	Sample Learner Activities - Click in the box to go to Activities
Evaluate permeability of soil particles; Determine soil forming factors; Analyze color, texture, and structure.	-Students will analyze the properties of soil through the "Go with Flow Lab." Students will determine the amount of each soil particle in the sample as well as the structure by texturing the soil. Furthermore students will investigate how soil forms. -"Go With the Flow" Lab
Perform proper soil sampling techniques; Defend the use of NPK with plant needs.	-Students will perform the skills needed to take a soil sample. Students will then take the role as a "soil doctor" and determine the amendment for the soil based on the picture given in the Dr. Dirt activity. -Soil Sampling Lab -Dr. Dirt
Defend the need to conserve the natural resources.	-Each year the Natural Resource Conservation Service (NRCS) offers a conservation essay contest that requires students to write an essay about the importance of natural resource conservation. This particular activity requires students to write about the importance of soil conservation. -Conservation Essay
Evaluate land useage and conservation measures based on available land; Demonstrate the use of the Web Soil Survey	-In this lesson, students will learn more about land evaluation through class participation in the Land Judging Contest. -http://www.ukwoodcenter.net/WWW%202008/4ba08me%20Soil%20Judging.pdf -Students will use the NRCS online Websoil Survey to map the location, topography, and soil series of the soil that is found in the students yard and/or farm. -The Soil Series

Technical Literacy Standards

Key Ideas and Details – 11-12 – Determine central ideas or conclusions of a text; summarize complex concepts

Craft and Structure – 11-12 – Determine meaning of symbols, key terms, and other domain-specific words and phrases

Integration of Knowledge and Ideas – 11-12 – Synthesize information from a range of sources

Research to Build and Present Knowledge – 11-12 – Conduct short as well as more sustained research projects to answer a question

Course Title **Agriscience** Grade Levels 9-10 Credit Value 1

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Prerequisites It is recomended that students have Principles of Agriculture prior to Agriscience

Unit Title Plant Science

Technical Content

1- Apply basic chemical and biological concepts to the production of food, including the interrelationships between soil and plants and the natural cycles which sustain all ecosystems.

KY Academic Standards (Big Idea)

Biological Change (Biological Science) - Science
The only thing certain is that everything changes. At the high school level, students evaluate the role natural selection plays in the diversity of species. Modern ideas of evolution provide a scientific explanation for three main sets of observable facts about life on Earth: the enormous number of different life forms we see about us, the systematic similarities in anatomy and molecular chemistry we see within that diversity, and the sequence of changes in fossils found in successive layers of rock that have been formed over more than a billion years.

Unity and Diversity (Biological Science) - Science
All matter is comprised of the same basic elements, goes through the same kinds of energy transformations, and uses the same kinds of forces to move. Living organisms are no exception. At the high school level, an in-depth study of the specialization and chemical changes occurring at the cellular level builds upon the foundational ideas developed earlier to investigate deoxyribonucleic acid (DNA) and effects of alterations in DNA for an individual organism as well as for a species. Emphasis at every level should be placed upon the understanding that while every living thing is composed of similar small constituents that combine in predictable

English/Language Arts Standards

CC.9-10.SL.4 Presentation of Knowledge and Ideas: Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
CC.9-10.SL.5 Presentation of Knowledge and Ideas: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
CC.9-10.SL.6 Presentation of Knowledge and Ideas: Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (See grades 9-10 Language standards 1 and 3 on pages 54 for specific expectations.)
CC.9-10.SL.1 Comprehension and Collaboration: Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
CC.9-10.SL.3 Comprehension and Collaboration: Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.

Mathematics Standards

CC.9-12.S.IC.4 Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.*

21st Century Skills and Knowledge

Collaboration
Communication
Creativity and Innovation
Environmental Literacy
Flexibility and Adaptability
Initiative and Self-Direction
Productivity and Accountability

KOSSA Standards

OA003 Utilize appropriate livestock selection techniques.
OB004 Identify appropriate seed bed preparation techniques (no-till, conventional-till, rotations).
OB006 Understand plant growth requirements.
OC001 Apply use of related electronic technology (e-mail, computer applications, GPS, precision farming, ultrasound, electronic ear tags, and computer feeding).
OC004 Maintain awareness of current trends in production agriculture through industry associations, trade journals, and internet resources.
OF005 Calculate fertilizer and pesticide application rates.
OF007 Calculate area and volume measurements (acreage, storage, stocking).
OH002 Recognize common plant and animal diseases.
OH003 Apply appropriate prevention techniques and treatments of plant and animal diseases.
OL002 Identify weeds and other crop pests.
OL003 Use appropriate agricultural terminology.
ON004 Assess fertilizer and pesticide applications.
ON005 Utilize livestock to enhance soil and water quality.

Learning Targets	Sample Learner Activities - Click in the box to go to Activities
Identify and describe cell parts; Evaluate the physiology of cell organelles	-Properties of Plant Cells -The teacher will be using Cells Alive to a construct diagram and establish the purpose of cell organelles
Indentify and describe plant parts and functions; identify plant growth requiremtns; analyze the effects of light on plant growth; Determine the process of transpiration	-Transpiration Lab -Teachers will conduct a transpiration lab to determine the upflow of water throughout the plant to maintain turgor.
Evaluation production needs and goals to select an appropriate crop	-Cropville Scenario -Students will read and respond to a scenario on selecting crops to grow.
Develop a seeding to maturation calendar for common fruits and begetables through by seed recommendation	-Seeding Maturation Calendar -Students will make a timeline for planning greenhouse plants using production scenarios.
Identify and describe common plant disease and pest; determine the appropriate pest management strategies for a given scenario	-Mystery Diagnosis Plant Science and Biological Interactions PDF -Students will identify various pest found in garden and crop production. Students will discuss how weeds reduce crop productivity, identify various pests, list symptoms of plant disease, and explain ways to prevent pests in crops.

Technical Literacy Standards

Key Ideas and Details – 11-12 – Determine central ideas or conclusions of a text; summarize complex concepts
Key Ideas and Details – 11-12 – Follow precisely a complex multistep procedure
Craft and Structure – 11-12 – Determine meaning of symbols, key terms, and other domain-specific words and phrases
Research to Build and Present Knowledge – 11-12 – Gather relevant information from multiple authoritative print and digital sources

Course Title **Agriscience** Grade Levels 9-10 Credit Value 1

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Prerequisites It is recomended that students have Principles of Agriculture prior to Agriscience

Unit Title Animal Science

Technical Content

2- Apply basic physiological and genetic principles to animal production systems.

KY Academic Standards (Big Idea)

Biological Change (Biological Science) - Science

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Mathematics Standards

CC.9-12.S.MD.5b (+) Evaluate and compare strategies on the basis of expected values. For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.*

CC.9-12.N.CN.6 (+) Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.

21st Century Skills and Knowledge

Civic Literacy
Collaboration
Communication
Creativity and Innovation
Environmental Literacy
Flexibility and Adaptability
Global Awareness
Information Literacy
Initiative and Self-Direction

KOSSA Standards

OB001 Utilize appropriate variety selection techniques.
OC001 Apply use of related electronic technology (e-mail, computer applications, GPS, precision farming, ultrasound, electronic ear tags, and computer feeding).
OC004 Maintain awareness of current trends in production agriculture through industry associations, trade journals, and internet resources.
OF007 Calculate area and volume measurements (acreage, storage, stocking).
OH002 Recognize common plant and animal diseases.
OH003 Apply appropriate prevention techniques and treatments of plant and animal diseases.
OH006 Understand agriculture's relationship and responsibility to guarantee a safe food supply and a healthy environment.
OL003 Use appropriate agricultural terminology.
ON005 Utilize livestock to enhance soil and water quality.

Technical Literacy Standards

Key Ideas and Details – 11-12 – Cite specific textual evidence to support analysis of text
Key Ideas and Details – 11-12 – Determine central ideas or conclusions of a text; summarize complex concepts
Integration of Knowledge and Ideas – 11-12 – integrate and evaluate multiple sources of information
Integration of Knowledge and Ideas – 11-12 – Synthesize information from a range of sources
Text Types and Purposes – 11-12 – Write arguments focused on discipline-specific content

Learning Targets	Sample Learner Activities - Click in the box to go to Activities
Identify the internal and external parts of various livestock species	-Posters - Students will have the opportunity to learn more about each part of the bovine anatomy in this activity by recreating their own life size poster. Teachers have a key provided and students have a blank copy of the teachers text. -Sidewalk Chalk Animals - Students will get the opportunity to recreate a life size version of a livestock species using sidewalk chalk. They will create the axial and appendicular portions of the skeleton and label each of the primary parts. They have to present there animal to the class and be able to tell about the primary bones found in livestock. Following the completion of the project, the teacher will take a picture of the work for students to use as a study tool.
Identify major bones in livestock species	-Basic Animal Bone Structure - This lesson compares the bovine skeletal structure to the human skeletal structure using the bovine skeletal handout and a free iPod App called Bones Lite. The objective is to help students draw off of prior knowledge to identify similar bones on the bovine structure.
Describe the major components of the monogastric, ruminent, avian, and pseudo-rumenant digestive systems	-Digestion Model - Is an activity that will allow students to make a model of the monogastric digestive system using everyday materials. Students can further complete additional worksheets and terminology practice with this activity. This material was provided by the University of Missouri Columbia Exentsion Services. -Bloat in a Bottle - Bloat is often an issue in monogastric and polygastric animals. This activity requires that students learn more about the ruminant animal and its digestive system to understand how bloat occurs and how it can be prevented. Students will watch as microbes eat away at cattle feed and blow up the balloon on top of the bottle that is representing the stomach/rumen of the bottle. This is also a great activity for an animal science health management lesson. -Enzymatic Lab - Students will learn more about the effects of various factors on the activity of enzymes through this comprehensive unit plan. Students will investigate how that different enzymes will act with the different materials. -Journey to the Center of the...- This activity requires that students think critically and outside of the box. They have to make a connection with the parts of the digestive system to a specific location to make a TRAVEL GUIDE for a visitor. Examples include comparing the digestive system of the pig to a 5 Star Resort called "Piggy's Paradise" or to a Car (where the fuel is food and the exhaust pipe is the rectum).
Identify major parts of the male and female bovine reproductive anatomy; Describe the physiology of the male and female bovine reproductive system	-Understanding the Male and Female Reproductive Tract - Students will have the opportunity to learn more about the reproductive anatomy of both male and female livestock. Extension projects may be that student dissect the reproductive tract of a female bovine. A dissection guide and dissection/anatomy article are included at the end of the PowerPoint provided.
Compare and contrast differences in animal production systems among species; Evaluate production scenarios to determine the appropriate production technique	-Beef Production Scenarios - Students will have the opportunity to make a decision on the most appropriate production practices for a given scenario. Students will have to defend the reasons why they selected that type of production system. -Swine Time - This is a unit plan specifically for Swine Production. It requires the students to use inquiry based learning to complete these student-centered tasks. Students will research, survey, make models, present topics, make the determination of production, defend, analyze, synthesize and much more through this unit. The unit is complete with all lessons, rubrics, and keys required.
Identify steps to the management of livestock health; develop a vaccination schedule for a given scenario; indentify common internal and external parasites; Identify common livestock diseases;	-Internal and External Parasites - Fecal Egg Float Lab - Within this lab activity students will examin fecal matter for evidence of parasites. Furthermore, they will develop skills needed to identify the types of parasitic eggs in the sample.

Course Title **Agriscience** Grade Levels 9-10 Credit Value 1

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Prerequisites It is recomended that students have Principles of Agriculture prior to Agriscience

Unit Title Agriculture Management, Marketing, and Sales

Technical Content

5- Maintain records on supervised agricultural experience program and be able to summarize and analyze results in making financial decisions.
7- Apply science, math, and communication skills within the technical content.
8- Demonstrate employability and social skills relative tot he career cluster.

KY Academic Standards (Big Idea)

Economics - Social Studies
Economics includes the study of production, distribution and consumption of goods and services. Students need to understand how their economic decisions affect them, others, the nation and the world. The purpose of economic education is to enable individuals to function effectively both in their own personal lives and as citizens and participants in an increasingly connected world economy. Students need to understand the benefits and costs of economic interaction and interdependence among people, societies, and governments.

Financial Literacy - Vocational Studies
Financial literacy provides knowledge so that students are responsible for their personal economic well-being. As consumers, individuals need economic knowledge as a base for making financial decisions impacting short and long term goals throughout one's lifetime. Financial literacy will empower students by providing them with the knowledge, skills and awareness needed to establish a foundation for a future of financial responsibility and economic independence.

Employability Skills - Vocational Studies
Employability skills will focus on student's competencies with their work habits and academic/technical skills that will impact an individual's success in school and workplace. School-to-work transition skills will help students develop interpersonal skills and positive work habits.

English/Language Arts Standards

CC.9-10.W.2 Text Types and Purposes: Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
CC.9-10.SL.1 Comprehension and Collaboration: Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
CC.9-10.SL.2 Comprehension and Collaboration: Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
CC.9-10.SL.3 Comprehension and Collaboration: Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.

Mathematics Standards

CC.9-12.A.SSE.4 Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments.*
CC.9-12.A.SSE.3c Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15^t can be rewritten as [1.15^(1/12)]^(12t) ≈ 1.012^(12t) to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
CC.9-12.S.MD.6 (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).*
CC.9-12.S.MD.7 (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).*
CC.9-12.S.IC.4 Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.*
CC.9-12.S.MD.5 (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.*

21st Century Skills and Knowledge

Civic Literacy
Collaboration
Communication
Creativity and Innovation
Critical Thinking and Problem Solving
Financial, Economic, Business and Entrepreneurial Literacy
Flexibility and Adaptability
Global Awareness
Information Literacy
Leadership and Responsibility

KOSSA Standards

OB001 Utilize appropriate variety selection techniques.
OC004 Maintain awareness of current trends in production agriculture through industry associations, trade journals, and internet resources.
OD003 Understand requirements for and sources of credit.
OL003 Use appropriate agricultural terminology.

Technical Literacy Standards

Key Ideas and Details – 11-12 – Cite specific textual evidence to support analysis of text
Craft and Structure – 11-12 – Determine meaning of symbols, key terms, and other domain-specific words and phrases
Integration of Knowledge and Ideas – 11-12 – Evaluate the hypotheses, data analysis, and conclusions in scientific and/or technical text
Research to Build and Present Knowledge – 11-12 – Conduct short as well as more sustained research projects to answer a question

Learning Targets	Sample Learner Activities - Click in the box to go to Activities
Implement a comprehensive SAE plan with connections to a career pathway	-SAE Placement Agreement Plan - This is a contract to have on file for students with a Placement SAE. The contact information of the employer, employee, and parents are required. -SAE Yearly SMART Goals - This activity allows students to set and develop an understanding for SMART goals. Furthermore, it prompts students to consider their production and work goals for their SAE programs.
Evaluate financial information and assets needed to obtain a grant, credit, and/or loan; complete a financial balance sheet as part of the Kentucky SAE Record Book	-Obtaining Farm and/or Business Loans and Obtaining Farm and Business Loan Information - Contact your local Farm Service Agency for a Youth Loan Application. Options for guest speakers may include someone from Farm Credit Services, Ag. Credit, FSA, or other lending institutions. Additionally, forms of insuring the business may be a point of discussion.
Indentify the basic concepts of a management plan; Develop a management plan; Evaluate the proposed effectiveness of a management plan	-The National FFA AgriEntreprenership SAE Grant Application - National FFA is discontinuing the National FFA AgriEntreprenuership Award Program for revision during 2012 with the hopes of creating something new for the upcoming years. However, a number of resources can be found on the Kentucky FFA website. Including lessons on entreprenuership and marketing plans. http://kyffa.org/index.php/teacher/entrepreneurship-resources/ -Guest Speakers (Development of Management Plans) - Guest Speakers are a component of agriculture that can be one of the greatest assets for students. Ask a local entreprenuer or business owner to speak on about the development of a management and marketing plan for their business. To accompany this activity there is a worksheet included to guide the students through questions and information that the speaker may provide.
Compare and contrast various agricultural organizations and their implications to agricultural, public law, and policy	-Policies and Organizations - In groups of two students should research the goals of each of 15 different agriculture groups and their impact on animal agriculture. Students will create an organization profile in the attached worksheet.
Describe the effects of agriculture trade on world economy; demonstrate the methods used by world leaders to import and export commodities through "The Fair Game"	-The Fair Game - What is always done in World Trade isn't always fair. This role-playing game which explores the costs and benefits of world trading systems demonstrates that fact to students. Results are tabulated and connected to real world situations. Students will have to work together and will be put under similar real world pressures of trying to obtain the needed commodities for your society.
Define futures; Identify the purpose of the futures market in agriculture	-Guest Speaker - Ask a local farmer, banker, stock broker, or community member to speak about the role of futures in the agriculture industry. The worksheet provided will help students guide their questions and responses for the guest speaker in your classroom.

Course Title **Agriscience** Grade Levels 9-10 Credit Value 1

Description Agriscience introduces the scientific agricultural approach to animal science and selection and plant and land science. Agricultural career opportunities will be emphasized in each class. Laboratory experiences relating to baic and current technology will be part of the program. Content may be enhanced by utilizing appropriate computer applications. Leadership development will be provided through FFA. Each student will be expected to have a supervised agricultural experience program and keep appropriate records.

Prerequisites It is recomended that students have Principles of Agriculture prior to Agriscience

Unit Title Agriculture Research

Technical Content

6- Utilize activities of FFA as an integral component of course content and leadership development.
7- Apply science, math, and communication skills within the technical content.

KY Academic Standards (Big Idea)

Research, Inquiry/Problem-Solving and Innovation - Technology
Students understand the role of technology in research and experimentation. Students engage technology in developing solutions for solving problems in the real world. Students will use technology for original creation and innovation.

Information, Communication and Productivity - Technology
Students demonstrate a sound understanding of the nature and operations of technology systems. Students use technology to learn, to communicate, increase productivity and become competent users of technology. Students manage and create effective oral, written and multimedia communication in a variety of forms and contexts.

English/Language Arts Standards

CC.9-10.W.4 Production and Distribution of Writing: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
CC.9-10.W.5 Production and Distribution of Writing: Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (Editing for conventions should demonstrate command of Language standards 1–3 on up to and including grades 9-10 page 55.)
CC.9-10.W.6 Production and Distribution of Writing: Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
CC.9-10.W.2 Text Types and Purposes: Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
CC.9-10.W.7 Research to Build and Present Knowledge: Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
CC.9-10.W.8 Research to Build and Present Knowledge: Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
CC.9-10.W.9 Research to Build and Present Knowledge: Draw evidence from literary or informational texts to support analysis, reflection, and research.
CC.9-10.W.6 Production and Distribution of Writing: Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
CC.9-10.SL.4 Presentation of Knowledge and Ideas: Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
CC.9-10.SL.5 Presentation of Knowledge and Ideas: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
CC.9-10.SL.6 Presentation of Knowledge and Ideas: Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (See grades 9-10 Language standards 1 and 3 on pages 54 for specific expectations.)

Mathematics Standards

CC.5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

CC.9-12.S.ID.9 Distinguish between correlation and causation.*

CC.9-12.S.MD.5b (+) Evaluate and compare strategies on the basis of expected values. For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.*

CC.9-12.S.MD.6 (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).*

CC.9-12.S.MD.7 (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).*

CC.8.SP.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example,

CC.9-12.N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.*

21st Century Skills and Knowledge

Collaboration

Communication

Creativity and Innovation

Critical Thinking and Problem Solving

Flexibility and Adaptability

ICT (Information, Communications, and Technology) Literacy

Information Literacy

Initiative and Self-Direction

Leadership and Responsibility

Productivity and Accountability

KOSSA Standards

OC001 Apply use of related electronic technology (e-mail, computer applications, GPS, precision farming, ultrasound, electronic ear tags, and computer feeding).

OC004 Maintain awareness of current trends in production agriculture through industry associations, trade journals, and internet resources.

OF001 Utilize basic units of distance, dry and liquid measurements.

OF007 Calculate area and volume measurements (acreage, storage, stocking).

OL003 Use appropriate agricultural terminology.

Technical Literacy Standards

Key Ideas and Details – 11-12 – Cite specific textual evidence to support analysis of text

Key Ideas and Details – 11-12 – Follow precisely a complex multistep procedure

Integration of Knowledge and Ideas – 11-12 – Evaluate the hypotheses, data analysis, and conclusions in scientific and/or technical text

Research to Build and Present Knowledge – 11-12 – Conduct short as well as more sustained research projects to answer a question

Learning Targets	Sample Learner Activities - Click in the box to go to Activities
Identify the components of the scientific method; Create a lab report for a research poblem	-The Quicker Picker Upper - Students will learn how to create a basic experiment and learn the value of detailed information for an experiment in this project. This lab requires that students design an experiment to see which paper towel brand is the most absorbent. The lesson focuses on teaching students the basic steps of the scientific method as well as several of the required terminology.
Create an experiement for a problem with the students SAE or career path; Conduct the proper procedures of the scientific method to complete a student designed research project	-Agriscience Fair PowerPoint - This is a tool that can be used to show students the foundations of the FFA Agriscience Fair Contest. Furthermore, it explains the categories and divisions for the contest as well as the required sections for the project. -Agriscience Handbook - This is a resource tool for the teacher and student. A copy is useful for both parties to establish the safety precautions, procedures, and parameters for the project.
Analyze research data collected from student designed experiments/procedures; Demonstrate the use of technology to create a diagram of the information	-Data Analysis - Excel Cheat Sheet - This document is a cheat sheet of formulas to help make the Microsoft Excel a useful tool in analysizing data collected in the student experiment. -Data Analysis - Excel Data - This document can be used to show students a data set and how the data set can be analysized to make a determination about the project hypothesis.
Defend and summarize student research within a student presentation and interview	-Agriscience Fair Research Resource Guide - This is the last step in the evaluation of the student portfolio. This resource gives students the basis for the portfolio (abstract, introduction, procedures, etc.) -Agriscience Handbook - Teachers will return to this handbook for tables, rubrics, and practice questions for the students presentation and interview. There are sample abstracts and interview questions in this guide.

Course Title **Agriscience** Grade Levels 9-10 Credit Value 1

Description Agriscience introduces the scientific agricultural approach to animal science and selection and plant and land science. Agricultural career opportunities will be emphasized in each class. Laboratory experiences relating to baic and current technology will be part of the program. Content may be enhanced by utilizing appropriate computer applications. Leadership development will be provided through FFA. Each student will be expected to have a supervised agricultural experience program and keep appropriate records.

Prerequisites It is recomended that students have Principles of Agriculture prior to Agriscience

Unit Title Current Issues In Agriculture

Technical Content

3- Investigate the impact of human activities on the environment and resource conservation and stewardship and interpret the impact of globalization on agriculture.
7- Apply science, math, and communication skills within the technical content.
8- Demonstrate employability and social skills relative to the career cluster.

KY Academic Standards (Big Idea)

Communication/Technology - Vocational Studies
Special communication and technology skills are needed for success in schooling and in the workplace. Students will be able to express information and ideas using a variety of technologies in various ways.

Government and Civics - Social Studies
The study of government and civics equips students to understand the nature of government and the unique characteristics of American representative democracy, including its fundamental principles, structure, and the role of citizens. Understanding the historical development of structures of power, authority, and governance and their evolving functions in contemporary U.S. society and other parts of the world is essential for developing civic competence. An understanding of civic ideals and practices of citizenship is critical to full participation in society and is a central purpose of the social studies.

Information, Communication and Productivity - Technology
Students demonstrate a sound understanding of the nature and operations of technology systems. Students use technology to learn, to communicate, increase productivity and become competent users of technology. Students manage and create effective oral, written and multimedia communication in a variety of forms and contexts.

English/Language Arts Standards

CC.9-10.SL.2 Comprehension and Collaboration: Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.

CC.9-10.SL.3 Comprehension and Collaboration: Evaluate a speaker’s point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.

Mathematics Standards

CC.9-12.S.IC.6 Evaluate reports based on data.*
CC.9-12.S.IC.4 Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.*
CC.9-12.S.MD.7 (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).*

21st Century Skills and Knowledge

Civic Literacy
Collaboration
Communication
Creativity and Innovation
Critical Thinking and Problem Solving
Environmental Literacy
Global Awareness
Flexibility and Adaptability
ICT (Information, Communications, and Technology) Literacy
Initiative and Self-Direction

KOSSA Standards

OC001 Apply use of related electronic technology (e-mail, computer applications, GPS, precision farming, ultrasound, electronic ear tags, and computer feeding).
OC004 Maintain awareness of current trends in production agriculture through industry associations, trade journals, and internet resources.
OH006 Understand agriculture's relationship and responsibility to guarantee a safe food supply and a healthy environment.
OL003 Use appropriate agricultural terminology.

Learning Targets	Sample Learner Activities - Click in the box to go to Activities
Evaluate agriculture issues through the use of social media; Support and defend the agriculture industry	-What's in the News - This activity requires that students research current issues in agriculture, survey their community using social media or technology, and present the implications of their findings to their class. A number of 21st Century skills are asked of the student and require them to think outside the box. An extension project of this activity could be a great lead into the Agricultural Issues Career Development Event. -What's in the News Rubric - This is a scoring guide for the presentation for the What's in the News activity.

Technical Literacy Standards

Research to Build and Present Knowledge – 11-12 – Gather relevant information from multiple authoritative print and digital sources
Research to Build and Present Knowledge – 11-12 – Draw evidence from informational text to support analysis, reflection, and research
Integration of Knowledge and Ideas – 11-12 – Synthesize information from a range of sources
Text Types and Purposes – 11-12 – Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes