



PURDUE
UNIVERSITY

Animal Sciences
COLLEGE OF AGRICULTURE

Lesson Plan 4 of 6

Careers with Animals: Research-Based

Created: 08/2018 by the National FFA Organization

STUDENT LEARNING OBJECTIVES:

After completing these activities, students will...

1. Recognize the importance of research-based careers with animals.
2. Develop a lab procedure using the scientific method.

TIME REQUIRED: 45 minutes

EQUIPMENT AND SUPPLIES NEEDED:

1. One set of "Scientific Method Cards" per group
2. A copy of one of the "Animal Research Topic" pages per group
3. A copy of the "Animal Research Topics" worksheet for each student
4. One copy of the "Animal Research Topics Poster" worksheet per group (or use poster materials)
5. A copy of the "Animal Research Topics Gallery Walk" worksheet for each student
6. A copy of the "Let's Break It Down" worksheet for each student
7. A copy of the "Research Roadmap" worksheet for each student
8. Computer access as desired
9. Poster materials such as poster board, markers, old magazines, etc. (or use the "Animal Research Topics Poster" worksheet)

THIS QUICK LESSON PLAN WOULD WORK WELL AS:

1. A component of an animal science career pathway unit.
2. A complement to any agricultural career unit.
3. A complement to a unit about the scientific method.

THESE ACTIVITIES ARE ALIGNED TO THE FOLLOWING STANDARDS:

FFA Precept

- FFA.PL-A.Action: Assume responsibility and take the necessary steps to achieve the desired results, no matter what the goal or task at hand.
- FFA.PL-C.Vision: Visualize the future and how to get there.
- FFA.PG-J.Mental Growth: Embrace cognitive and intellectual development relative to reasoning, thinking and coping.
- FFA.CS-M.Communication: Effectively interact with others in personal and professional settings.
- FFA.CS-N.Decision Making: Analyze a situation and execute an appropriate course of action.

NASDCTec

- AGC02.02 Employ the use of technical information effectively to maintain and communicate records and reporting procedures commonly used in the AFNR cluster.

Common Core—Reading: Informational Text

- CCSS.ELA-Literacy.RI.9-10.4 Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).

Common Core—Writing

- CCSS.ELA-Literacy.W.9-10.2: 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.
CCSS.ELA-Literacy.W.9-10.9b: Apply grades 9-10 reading standards to literary nonfiction (e.g., "Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning").

Common Core—Speaking and Listening

- CCSS.ELA-Literacy.SL.9-10.1: 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.
- CCSS.ELA-Literacy.SL.9-10.1.A: Come to discussions prepared, having read and researched material under study;

explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.

- CCSS.ELA-Literacy.SL.9-10.2: Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
- CCSS.ELA-Literacy.SL.9-10.4: 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.

Common Core—Literacy in Science & Technical Subjects: Writing

- CCSS.ELA-Literacy.WHST.9.10.1: Write arguments focused on discipline-specific content.
- CCSS.ELA-Literacy.WHST.9.10.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
- CCSS.ELA-Literacy.WHST.9.10.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Common Core—Math Practices

- CCSS.MP1: Make sense of problems and persevere in solving them.
- CCSS.MP2: Reason abstractly and quantitatively.
- CCSS.MP5: Use appropriate tools strategically.
- CCSS.MP6: Attend to precision.

AFNR Career Ready Practices

- CRP.02. Apply appropriate academic and technical skills. Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive.
- CRP.04. Communicate clearly, effectively, and with reason. Career-ready individuals communicate thoughts, ideas and action plans with clarity, whether using written, verbal and/or visual methods.
- CRP.06. Demonstrate creativity and innovation. Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization.
- CRP.07. Employ valid and reliable research strategies. Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies.
- CRP.08. Utilize critical thinking to make sense of problems and persevere in solving them. Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem.

Partnership for 21st Century Skills

- Communication
- Critical Thinking and Problem Solving
- Flexibility and Adaptability
- Initiative and Self-direction
- Leadership and Responsibility
- Think Creatively

LESSON PLAN:

1. ***Bell Ringer:*** Post the following question on the board or a public writing surface with the instructions to identify the best answer or answers. *If you had a report due about nutrition, which of the following sources would be most reliable? A) websites with a .gov address B) websites with a .edu address C) articles published in scholarly journals D) Wikipedia E) All of the above F) all of the above except D* (Best answer, F). Briefly discuss and emphasize the importance of checking sources of information for credibility. Discuss .org and .com websites and areas of caution with these.
2. ***Introduction:*** Divide the class into six groups. Pass out one set of “Scientific Method Cards” to each group. Have students put the cards in the correct order of the scientific method. Check each group’s progress and result. Check for understanding and clarify as needed.
3. ***Activity 1:*** Keep students divided into the six groups and have them set the “Scientific Method Cards” to the side for now. Each group should receive one “Animal Research Topic” page (there are a total of six different research topics, one for each group) and one “Animal Research Topics” worksheet. Students are to work together in their group to review their animal research topic and create an “Animal Research Topic Poster” (directions on poster worksheet) for their topic, which will be shared with the class. *If desired, other poster materials could be utilized such as poster board, markers, etc.
4. ***Activity 2:*** Display each group’s poster around the room. Provide students with the opportunity to gallery walk

through all the "Animal Research Topic Posters." Students should capture information gained from the gallery walk on their "Animal Research Topics Gallery Walk" worksheets. To have a gallery walk, hang all the posters around the room to display them, similar to an art gallery. Students will then walk by each poster and record the necessary information.

5. *Activity 3:* Have students return to their groups. Hand out the "Let's Break It Down" worksheet. Have students identify the research topic area of most interest to them. Students will then develop three specific research questions for the topic they select from their gallery walk. Example, if a student were to select animal welfare, a specific question could be "Are farrowing crates humane?" Next, hand out the "Research Road Map" worksheet. Students should select one of their questions and create a research road map, using the scientific method as a guide, to develop a laboratory procedure to address that question.
6. *Follow-up:* After completing Activity 3, have groups share their animal research question and lab idea with the class. Have students give peer feedback.
7. *Leveling Up:*
 - a. Have students carry out the lab procedures they developed in small groups.
 - b. If carrying out the lab procedure is not possible, have students conduct research to see if their identified animal-research topic has been researched by anyone else. Examples of places/ways to search: Google Scholar, academic journals, university websites, USDA, FDA, etc.
8. *Exit Ticket:* On index cards or paper, have students respond to this statement: Animal-based research on animal topics is important because

NAME: _____

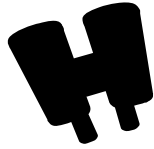
Aligned to the following standards:

FFA.PL-A; FFA.PL-C; FFA.PG-J; FFA.CS-M; FFA.CS-N; AGC02.02; CCSS.ELA.RI.9-10.4;
CCSS.ELA.W.9-10.2; CCSS.ELA.W.9-10.9b; CCSS.ELA.SL.9-10.1; CCSS.ELA.SL.9-10.1A;
CCSS.ELA.SL.9-10.2; CCSS.ELA.SL.9-10.4; CCSS.ELA.WHST.9.10.1; CCSS.ELA.WHST.9.10.2;
CCSS.WHST.9.10.4; MP1; MP2; MP5; MP6; CRP.02; CRP.04; CRP.06; CRP.07; CRP.08

Scientific Method Cards

DIRECTIONS:

The teacher/instructor will need to cut out and mix up one set of cards for each student group. Students should then work together to put the steps of the scientific method in the correct order.



Make observations



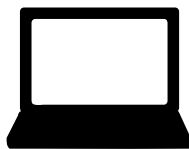
**Do research/
Ask a question**



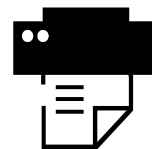
Conduct experiment



Form hypothesis



**Analyze data and
draw conclusions**



Share results

NAME: _____

Animal Research Topics Poster

DIRECTIONS:

As a group, determine the key words and images, icons or emojis that best describe or explain your research topic.

ANIMAL RESEARCH TOPIC: _____



KEY WORDS:



IMAGES, PICTURES, ICONS, EMOJIS:

NAME: _____

Aligned to the following standards:
FFA.PL-A; FFA.PL-C; FFA.PG-J; FFA.CS-M; FFA.CS-N; AGC02.02; CCSS.ELA.RI.9-10.4;
CCSS.ELA.W.9-10.2; CCSS.ELA.W.9-10.9b; CCSS.ELA.SL.9-10.1; CCSS.ELA.SL.9-10.1A;
CCSS.ELA.SL.9-10.2; CCSS.ELA.SL.9-10.4; CCSS.ELA.WHST.9.10.1; CCSS.ELA.WHST.9.10.2;
CCSS.WHST.9.10.4; MP1; MP2; MP5; MP6; CRP.02; CRP.04; CRP.06; CRP.07; CRP.08

Animal Research Topics Gallery Walk

DIRECTIONS:

Review each group’s animal research topic posters and capture information about each topic in the chart below.

Research Topic	Key Words/Description	Images/Icons/Emojis Related to This Topic

NAME: _____

Let's Break It Down

Aligned to the following standards:

FFA.PL-A; FFA.PL-C; FFA.PG-J; FFA.CS-M; FFA.CS-N; AGC02.02; CCSS.ELA.RI.9-10.4; CCSS.ELA.W.9-10.2; CCSS.ELA.W.9-10.9b; CCSS.ELA.SL.9-10.1; CCSS.ELA.SL.9-10.1A; CCSS.ELA.SL.9-10.2; CCSS.ELA.SL.9-10.4; CCSS.ELA.WHST.9.10.1; CCSS.ELA.WHST.9.10.2; CCSS.WHST.9.10.4; MP1; MP2; MP5; MP6; CRP.02; CRP.04; CRP.06; CRP.07; CRP.08

DIRECTIONS:

From your gallery walk, select the research topic area in which you are most interested. Next, create three specific research questions that you could develop into a research project. Examples of research questions: What is the growth rate of a Boer goat wether on a 14 percent protein ration? Do members of Johnson County 4-H feel that farrowing crates are ethical? Do dairy cows prefer rotary milking parlors or herringbone milking parlors? Is artificial insemination in swine more successful than traditional reproduction methods?

Research topic area:

Research Question 1:

Research Question 2:

Research Question 3:

NAME: _____

Research Road Map

Aligned to the following standards:

FFA.PL-A; FFA.PL-C; FFA.PG-J; FFA.CS-M; FFA.CS-N; AGC02.02; CCSS.ELA.RI.9-10.4; CCSS.ELA.W.9-10.2; CCSS.ELA.W.9-10.9b; CCSS.ELA.SL.9-10.1; CCSS.ELA.SL.9-10.1A; CCSS.ELA.SL.9-10.2; CCSS.ELA.SL.9-10.4; CCSS.ELA.WHST.9.10.1; CCSS.ELA.WHST.9.10.2; CCSS.WHST.9.10.4; MP1; MP2; MP5; MP6; CRP.02; CRP.04; CRP.06; CRP.07; CRP.08

DIRECTIONS:

Select one of the research questions you developed. Now, create a research roadmap using the scientific method for the question that you selected. The following information should be included:

1. Your selected research question.
2. Hypothesis.
3. Procedure.
4. Data tables and descriptions of the type of data you will be collecting.

NAME: _____

Animal Research Topics

Animal Well-Being

Helping producers provide abundant, safe, nutritious and affordable food-animal products that are produced in ways that respect animals and the environment is essential. This includes seeking to understand how to best measure well-being as well as methods of enhancing animal comfort and well-being.

www.nifa.usda.gov/program/animal-well-being

Aligned to the following standards:

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NAME: _____

Animal Research Topics

Animal Health

Animal disease is one of the greatest threats to animal agriculture. Recent events in the United States and abroad have made us aware of how animal diseases can affect the food supply, human health and national economies. Healthy livestock, poultry and other agriculturally important animals are areas of focus through research, education and extension activities.

www.nifa.usda.gov/program/animal-health

Aligned to the following standards:

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NAME: _____

Animal Research Topics

Animal Reproduction

Reproductive success in livestock is essential for the economic livelihood of producers and ultimately affects the consumer cost of meat and other animal products. Poor fertility is a problem to some degree in all animal production systems. A major challenge for many producers is finding practical, cost-effective solutions to improve reproductive performance without compromising the production of safe, high-quality meat and milk products.

www.nifa.usda.gov/program/animal-reproduction

Aligned to the following standards:

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NAME: _____

Animal Research Topics

Animal Genetics

Improvements in yields and efficiencies of animal production are critical to meet the ever-increasing demand for dietary protein in the United States and around the world. Expanding knowledge in animal genetics is one strategy that may help meet this demand.

www.nifa.usda.gov/program/animal-breeding-genetics-and-genomics

Aligned to the following standards:

FFA.PL-A; FFA.PL-C; FFA.PG-J; FFA.CS-M; FFA.CS-N; AGC02.02; CCSS.ELA.RI.9-10.4; CCSS.ELA.W.9-10.2; CCSS.ELA.W.9-10.9b; CCSS.ELA.SL.9-10.1; CCSS.ELA.SL.9-10.1A; CCSS.ELA.SL.9-10.2; CCSS.ELA.SL.9-10.4; CCSS.ELA.WHST.9.10.1; CCSS.ELA.WHST.9.10.2; CCSS.WHST.9.10.4; MP1; MP2; MP5; MP6; CRP.02; CRP.04; CRP.06; CRP.07; CRP.08

NAME: _____

Animal Research Topics

Animal Nutrition and Growth

Efficient nutrient use in animal operations is more financially sound for producers and friendlier to the environment. Research on nutrient utilization and growth, food product quality and safety, along with animal operations and the environment, are all areas of focus in this research area.

www.nifa.usda.gov/program/animal-nutrition-growth-and-lactation

Aligned to the following standards:

FFA.PL-A; FFA.PL-C; FFA.PG-J; FFA.CS-M; FFA.CS-N; AGC02.02; CCSS.ELA.RI.9-10.4; CCSS.ELA.W.9-10.2; CCSS.ELA.W.9-10.9b; CCSS.ELA.SL.9-10.1; CCSS.ELA.SL.9-10.1A; CCSS.ELA.SL.9-10.2; CCSS.ELA.SL.9-10.4; CCSS.ELA.WHST.9.10.1; CCSS.ELA.WHST.9.10.2; CCSS.WHST.9.10.4; MP1; MP2; MP5; MP6; CRP.02; CRP.04; CRP.06; CRP.07; CRP.08

NAME: _____

Animal Research Topics

Animal Biosecurity

By studying disease transmission and detection, conducting educational programs for producers on controlling and preventing diseases, and providing information and outreach programs to the public, we can help ensure a safe food supply.

www.nifa.usda.gov/program/animal-plan-biosecurity

Aligned to the following standards:

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NAME: _____

KEY: Scientific Method Cards

Aligned to the following standards:

FFA.PL-A; FFA.PL-C; FFA.PG-J; FFA.CS-M; FFA.CS-N; AGC02.02; CCSS.ELA.RI.9-10.4; CCSS.ELA.W.9-10.2; CCSS.ELA.W.9-10.9b; CCSS.ELA.SL.9-10.1; CCSS.ELA.SL.9-10.1A; CCSS.ELA.SL.9-10.2; CCSS.ELA.SL.9-10.4; CCSS.ELA.WHST.9.10.1; CCSS.ELA.WHST.9.10.2; CCSS.ELA.WHST.9.10.4; MP1; MP2; MP5; MP6; CRP.02; CRP.04; CRP.06; CRP.07; CRP.08

DIRECTIONS:

The teacher/instructor will need to cut out and mix up one set of cards for each student group. Students should then work together to put the steps of the scientific method in the correct order.

1



Make observations

2



**Do research/
Ask a question**

3



Conduct experiment

4



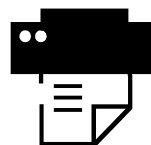
Form hypothesis

5



**Analyze data and
draw conclusions**

6



Share results

NAME: _____

Aligned to the following standards:

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CCSS.ELA.SL.9-10.2; CCSS.ELA.SL.9-10.4; CCSS.ELA.WHST.9.10.1; CCSS.ELA.WHST.9.10.2;
CCSS.WHST.9.10.4; MP1; MP2; MP5; MP6; CRP.02; CRP.04; CRP.06; CRP.07; CRP.08

KEY – Let's Break It Down

DIRECTIONS:

From your gallery walk, select the research topic area in which you are most interested. Next, create three specific research questions that you could develop into a research project. Examples of research questions: What is the growth rate of a Boer goat wether on a 14 percent protein ration? Do members of Johnson County 4-H feel that farrowing crates are ethical? Do dairy cows prefer rotary milking parlors or herringbone milking parlors? Is artificial insemination in swine more successful than traditional reproduction methods?

Research topic area: **One of the six areas.**

Research Question 1:
Answers will vary.

Research Question 2:
Answers will vary.

Research Question 3:
Answers will vary.