

Bringing out the Science in 4-H Projects

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Science can be found in many of the 4-H activities we do. This book of activities will describe the scientific method and provide leaders and staff with examples of or resources for science experiments in livestock, horse, food, and clothing 4-H projects. Leaders and staff can also follow the template to create their own experiments. Please share your created experiments with Tim Ewers tewers@uidaho.edu and Carrie Stark cstark@uidaho.edu. Plans are for all experiments to be posted to the 4-H website.

The experiments listed in this book can be used in multiple ways: as individuals, as club activities, during education days, etc. Members should keep a journal for their experiments: what they tested, what they saw, smelled, or touched, any data collected, and how they can use the information in the future. Adults should ask direct questions during the experiments to challenge members to think and understand what is going on.

The “process” of science or the scientific method is very simple:

1. There is something known out in the world; research a topic
2. A question, problem or a situation that is different has arrived
3. Hypothesize, give a theory or guess what may happen
4. Develop a method and collect the needed items to test the hypothesis
 - In your methods, there is a control and variable. In the control, nothing is changed. In the variable, one thing is different from the control.
5. Do the experiment; Question; Change the method and redo the experiment
6. Record any information or data
7. Summarize and interpret what happened
8. Report and apply what we learned from the experiment

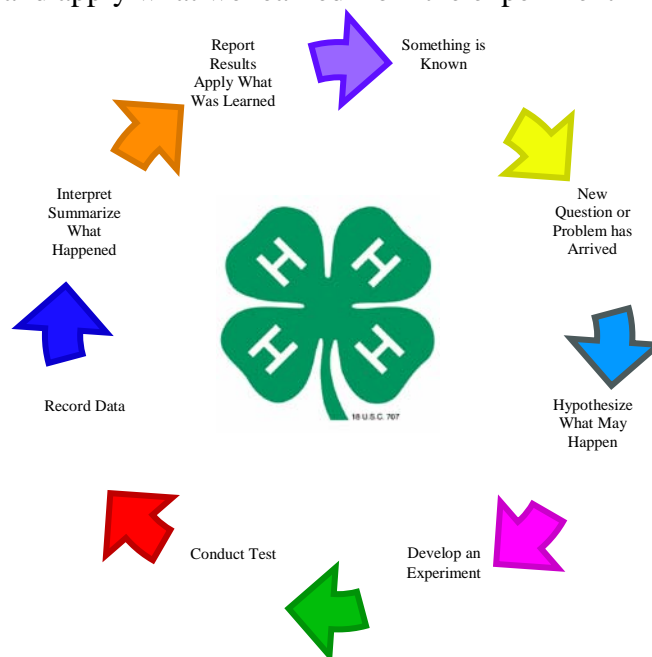


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Science Experiment Template

Clothing Science Experiment

Topic Title: Fabric wicking ability, fiber, textile materials

What we know. Look it up! (Research)

Wicking is when the water spreads on fabric. Different fabrics have different absorbencies. Research different types of fabric.

Problem (Situation)

Clothing is made from many fabrics, some natural and some manmade. Knowing the use of a garment will help determine what fabrics can be used.

Write your hypotheses

1. The _____ fabric absorbs water the (fastest/slowest) of the ____ (number) of fabrics I tested.
- 2.

Testing your hypothesis (Methods)

Test how water reacts to different fabrics.

What you need

Gather at least four different fabrics size 2” by 7”. Fabrics may include: cotton, linen, rayon, wool, silk, acetate, nylon, polyester, acrylic, lyocell. Some fabrics are blends, you should note the percent of each fiber.

Marker, water, glasses, timer

Set up the experiment

Draw a line across one end of the fabric strip one inch from the end. Attach a paper clip to the other end of the sample. Pour at least two inches of water into each of the glasses. Submerge the fabric strip into the water to the one inch mark and place the end with the paper clip over the glass edge. Set the timer for two minutes then remove the fabric strip from the water and place on a dry flat surface. Compare the fabrics.

Change and Re-do the Experiment

Add soap, oil etc.

What happened? (Results/Observations)

Record what happened to the water and to each fabric.

Apply what we found out (Conclusions)

What did you find out?

Which fabrics would you use for different activities (summer/winter sports)?

Food Science Experiment

Topic Title: Bone up on Calcium

What we know. Look it up! (Research)

Calcium is a mineral that is a nutrient for your body. Calcium is important to keep your bones strong. Research how much calcium you and others need.

Problem (Situation)

Older people who have not had enough calcium in the foods they eat develop weak bones that break easily.

Write your hypotheses

1. Water will cause the calcium to _____ and cause the bone to _____
2. Vinegar will cause the calcium to _____ and cause the bone to _____

Testing your hypothesis (Methods)

Test what happens when calcium is removed from a bone.

What you need

Two quart jars, two chicken leg bones, white vinegar, water, liquid measuring cup

Set up the experiment

Place a chicken leg bone in each jar; add two cups of water (control) to one jar and two cups of vinegar (variable) to the second jar. Put the lid on each jar and leave for at least three days. Remove the bones and rinse them with water. If you want to see more dramatic results, leave the bones in for seven days total.

Change and Re-do the Experiment

What happened? (Results/Observations)

Try to bend each one. Compare how flexible the bones are.

Apply what we found out (Conclusions)

What did you find out? Is calcium important? Where else is calcium important?

Livestock & Horse Science Experiment

Topic Title: Processed Feeds, Feeding Methods, Feed Storage

What we know. Look it up! (Research)

There are different types of livestock feed processing. Processes can be found for grains: ground, cracked, rolled, whole. Processes can be found for forages: standing in the field, baled, ground, silage. Select one and do some research; find the advantages and disadvantages.

Problem (Situation)

Feed is expensive and a major cost in horse and market animal projects. Therefore feeding methods and storage are very important. There are many kinds of feeding methods for animal projects. Some methods are better than others. Which type of feed processes is best for the feeding method you have?

Write your hypotheses

1. I think the _____ feed process is better/worse for my _____ project.
2. Storing my feed in _____ keeps the feed fresher.

Testing your hypothesis (Methods)

Test your feed storage and feeding methods with the different types of processed feeds.

What you need

Collect three types of processed feed: ground, whole and pelleted, others

Collect equipment for feeding methods: feed pan (different kinds), self feeder, bunk

Collect equipment needed for storage: paper sack, plastic bag, others

Collect equipment for conditions: fan (this represents wind), water (represents rain & moisture), others

Set up the experiment

Have members feed in the different equipment for feed or storage methods. Apply various conditions, i.e., windy day, feed got wet, old feed not cleaned out, feed pans get dumped over, broken bottom to the feed bunk. Think of animal behaviors at feeding time.

Change and Re-do the Experiment

What happened? (Results/Observations)

Members record in their journals what they did and what they saw. Measure out how much feed went in and how much feed was left after a condition. What did the feed look, smell, and feel like.

Apply what we found out (Conclusions)

What did members find out? Ground feed blows away, feed gets moldy, waste of feed issues, feed not available so animals can grow.

Credit: written by Cindy A. Kinder, University of Idaho Extension Educator

Livestock & Horse Science Experiment

Topic Title: Water Quantity

What we know. Look it up! (Research)

Different species of livestock require different amounts of water on a daily basis. Research how much your project animal needs on a daily basis.

Problem (Situation)

There are lots of containers to water animals in. Having the correct size that holds enough and keeps it clean and cool is important. What type of container is best for your animal?

Write your hypotheses

1. I think _____ will be the best water container

Testing your hypothesis (Methods)

Test different water containers determining how much they each hold, calculating how many times it would have to be filled on a daily or weekly basis.

What you need

Water
Different types of water containers
Journal for recording data

Set up the experiment

Gather up different types of water containers and determine the capacity of each one. Figure how many times you would have to fill the container to meet animal's daily requirements. If it holds more than required, how many days would it take to empty it.

Change and Re-do the Experiment

What happened? (Results/Observations)

Record how often the container had to be filled or how long the water lasted. Determine the best container for your animal.

Apply what we found out (Conclusions)

What did members find out? When horses don't drink do they perform as well?

Credit: written by Shannon K. Williams, University of Idaho Extension Educator

Livestock & Horse Science Experiment

Topic Title: Changing Feeds, Animal Behavior

What we know. Look it up! (Research)

Animals react in different ways to a change in feed. Animal behavior research can predict some of the reactions. Research one animal behavior.

Problem (Situation)

There are times when we underestimate the amount of feed needed for our animals. Sometimes feed stores run out of the type or brand of feed we have been feeding. Because of that we purchase a different feed and animals react to that and that reaction will impact their average daily gain or performance needs (horses).

Write your hypotheses

1. My animal will eat more/less of a new feed.

Testing your hypothesis (Methods)

Test your new feed on your club members by introducing a new “feed” to them.

What you need

- New “feed” to be served as the refreshment at a club meeting
- Plates

Set up the experiment

Volunteer to do the refreshments at a club meeting. You could purchase some different foods such as kippers or smoked oysters and see how many club members eat them and then monitor if they consume the entire portion or not. Another idea is to make toast and butter it with flavored butters: garlic, licorice, cayenne pepper, etc. Cut the toast into strips and have club members choose. Monitor which ones they choose and do they eat all of it.

Change and Re-do the Experiment

What happened? (Results/Observations)

Members record in the journals what they did and saw. They could also interview members and asked them why they chose what they did and what it tasted like.

Apply what we found out (Conclusions)

What did members find out? We “shy” away from new foods. If we do try it, it is in very small quantities’ and most of the time we won’t finish all of the serving. When our animals do this, it will lower their consumption and therefore their average daily gain or energy for performance.

Livestock Science Experiment

Topic Title: Frame Size and Market Ready Weights

What we know. Look it up! (Research)

Animals are different sizes: small, medium and large frame. Frame size will determine individual market ready weight. All livestock specie industries have an ideal market weight. Research frame scores and market weights for your project.

Problem (Situation)

Market animal projects need to be market ready by fair time. If you underfed your animal, you have potentially lost money because your animal should have been heavier at sale time. If you fed past your animal's market weight you have lost money due to the extra feed you purchased.

Write your hypotheses

1. My animal is a _____ frame and will have a market ready weight of _____.

Testing your hypothesis (Methods)

This is a long term experiment using 4-H/FFA county feeding periods for livestock species: typically 150 days for beef, 100 days for swine and 60 days for sheep and meat goats. Test your frame size selection.

What you need

- Animals of different frame sizes. (If members have multiple animals they may select different frame sizes or they may work as a club together)
- Feeding period of 150, 100 or 60 days
- Proper feed ration for the animal species

Set up the experiment

Select your market animals and determine the frame size.

Determine proper feed ration and follow through.

At beginning weigh-in estimate the market ready weight of each animal.

Weigh your project every 30, 15, or 7 days depending on the length of the feeding period.

Change and Re-do the Experiment

This is a long term experiment; change and redo with next year's animal project or review and change last years project.

What happened? (Results/Observations)

Record in journal: what animals look like at beginning and end, i.e., take a picture or draw the animal, explain your feed ration, describe the animals you selected; record weight estimates, record dates and weights and plot in a table graph, record carcass information if available, list other observations.

Apply what we found out (Conclusions)

- What did members find out?
- Was your animal ideal market weight? Why or Why not?
- What will you do different next year when selecting or feeding your project animal?

Credit: written by Cindy A. Kinder, University of Idaho Extension Educator

Science Experiment Template

Topic Title:

What we know. Look it up! (Research)

Problem (Situation)

Write your hypotheses

Testing your hypothesis (Methods)

What you need

Set up the experiment

Change and Re-do the Experiment

What happened? (Results/Observations)

Apply what we found out (Conclusions)

Credit: written by



<http://www.4h.uidaho.edu/> check the website often for more science experiments