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BIO-SECURITY in 4-H Animal Science

A Project Curriculum ◆ Volunteer Guide for 4-H Youth Ages 9–11

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Understanding Disease Transmission

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Curriculum Overview

Animal Science projects are a cornerstone of the 4-H Youth Development Program. Many 4-H youth enroll in these projects, and the majority focus on the rearing and husbandry of market animals, including poultry, ruminants, and swine.

The activities in Module 1 of this curriculum teach youth how contagious diseases spread among livestock. Module 2 focuses on recognizing and addressing disease risks that are present at home or at any given fair or livestock event. Modules 3A and 3B (choose one or the other for your group) have activities that address the issue of tracking animal movement, including the use of Global Positioning System (GPS) technology in 3B.

ACTIVITY

Disease Transmission Detectives

Subject Overview and Background Information

A **disease** is a condition found in plants or animals that causes harm and typically is characterized by a group of identifiable **symptoms.** Diseases can affect tissues, organs, or entire systems of an organism and can result in discomfort, dysfunction, distress, or even death. Diseases can be caused by genetic defects or environmental factors and they may or may not be **infectious diseases** brought about by disease-causing organisms **(pathogens).** There are various ways for a disease to be transmitted from one organism to another, including **direct contact** (physical contact with an active case of the disease), **indirect contact** (contact with a contaminated object), and **airborne transmission** (pathogens carried by the air).

Microorganisms *(microbes)* are microscopic or submicroscopic organisms (e.g., bacteria). There are millions of different microorganisms living on earth. Some of these microbes are harmless, but some can cause mild to serious diseases. Diseases caused by microorganisms are referred to as **infectious diseases.** Microorganisms that cause disease are referred to as **pathogens.**

Activity Concepts and Vocabulary

- **Airborne transmission:** Exchange of pathogens that are carried by the air, as pollen and dust.
- **Direct contact:** Physical contact between an ill person or animal and a healthy person or animal.
- **Disease:** An impairment of health or condition of abnormal and harmful functioning.
- **Indirect contact:** When an uninfected person or animal touches the contaminated surface of an inanimate object (e.g., a food dish or table top) that has previously come into contact with an infected person or animal.
- **Infectious disease:** A disease that is caused by a bacterium, fungus, parasite, or virus that can be transmitted to another healthy individual, causing disease.
- **Microorganism/microbe** (pronounced my-kro-*awr*-guh-niz-uhm/*my*-krobe): A minute form of life.
- **Pathogen** (pronounced *path*-uh-juhn): A disease-causing organism.
- **Symptoms:** Signs or indicators of a disorder or a disease.
- **Zoonotic disease:** A disease that can be transmitted between humans and other animals.

Life Skills

- **Head:** Learning to learn, keeping records.
- **Heart:** Cooperation, communication, sharing.
- **Hands:** Teamwork, self-motivation.
- **Health:** Disease prevention.

California Educational Content Standards

- Third Grade:
  - ✓ Life Sciences and Investigation and Experimentation – 3a, 3c, 5e
- Fourth Grade:
  - ✓ Life Sciences – 3b, 3d
- Fifth Grade:
  - ✓ Life Sciences – 2a
- Sixth Grade:
  - ✓ Ecology (Life Sciences) – 5b, 5d

Subject Links

Science and Language Arts.

Purpose of Activity

The purpose of this activity is to have youth explore where, when, and how diseases can be transmitted during their daily activities.

Overview of Activity

This activity will illustrate how diseases can be spread through direct contact, indirect contact, and airborne transmission. In order to demonstrate indirect contact, the youth may become "contaminated" with colored glitter placed on door knobs, the floor, a table, etc., in the room where the activity takes place. Direct contact will be illustrated by transmitting "pathogens" (colored glitter) by shaking hands with an "infected person" who has glitter on his or her hands. At the same time, to illustrate airborne transmission, different fragrances (e.g., scented perfume; food extracts; candles) will be placed around the room to allow students to smell the scent. Whoever detects the smell can be classified as having become "infected." Youth will have to be "Disease Transmission Detectives" to figure out where the sources of infection are.

Time Required

30 to 40 minutes.

Suggested Grouping

Pairs, small groups, or one large group.

Materials Needed

- Glitter (4–6 different colors; each color represents a separate pathogen)
- Small (2–3 oz) plastic mist sprayer or sprayers (1 or 2 of them)
- 1–2 types of liquid food extract (peppermint and vanilla are recommended)
- Vacuum cleaner for clean up
- Paper towels and water for clean up
- Flip chart paper
- Pencils, pens, or markers

Getting Ready

Note: ***Do this part before the youth arrive.***

- Sprinkle one color of glitter on the floor near entrances to the room.
- Sprinkle a second color of glitter on doorknobs.
- Sprinkle a third color of glitter on surfaces (e.g., tables, chairs).
- Sprinkle a fourth color of glitter in the area where snacks or beverages are served.
- Sprinkle glitter on the volunteers' hands, and then have the volunteers shake hands with random youth as they arrive for the activity.
- Using the mist sprayer(s), spray the extract(s) in localized areas within the room where the activity is occurring.
  - ✓ **Volunteer Tip:** Do not let the youth see you sprinkling the glitter or spraying the extracts.

Opening Questions

1. **Think of times when you've been sick, and explain what you know about different ways humans contract illnesses.** Ask the youth to write their thoughts and ideas on the paper provided.
2. **What are some ways that you think diseases can be spread from one human to another?** Ask the youth to write their thoughts and ideas on the paper provided.
3. **If you get an illness, what are some of the signs that indicate you are sick?** Ask the youth to write their thoughts and ideas on the paper provided.

Procedure (Experiencing)

1. After the youth have entered and moved around the room (offer them snacks, shake hands with a few of the youth), make sure to ask them the opening questions and have them write down and share their answers.
2. When all of the questions have been answered, ask the youth to examine their hands, clothing, and shoes

for glitter. Ask them to write down the different colors of glitter, where on their bodies they found the glitter, and how they think they "contracted" it.

3. After the youth have finished noting their thoughts, split them into groups and assign each group to a different area of the room. Tell them they are "Disease Transmission Detectives" in search of the sources of the glitter. Make sure one group is in an area near where one of the food extracts was sprayed (some groups may be closer or farther away). Ask the youth to note their observations on the paper provided.
4. When all of the groups seem to have completed step 3, ask them to rotate to an area they have not been to before. Again, instruct them to make observations and write them down.
5. Continue the rotations until each group has inspected the entire area. As they finish up their observations, they can come back together into a large group to share their observations.

Sharing, Processing, and Generalizing

Follow the lines of thinking developed by the youth as they share and compare their thoughts and observations. If necessary, use more-targeted questions as prompts to get to particular points. Specific questions might include:

1. **Assuming that the glitter or the scents in the air were disease-causing organisms, where and how did you come into contact with them, and how might you have prevented making contact? Please explain.**
2. **How do you think a cold that one of your friends or family members has might infect other people? Please explain.**
3. **What are some things you might be able to do to lower your risk of catching your friend's or family member's cold? Please explain.**

Concept and Term Introduction

At this point, volunteers need to ensure that the concepts and terms **airborne transmission, disease, direct contact, indirect contact, infectious disease, microorganism/microbe, pathogen, symptoms,** and **zoonotic disease** have been introduced. (**Note:** The goal is to have the youth develop these concepts through their own exploration and define the terms using their own words.)

Concept Application

First:

- Ask the youth where the risks of being infected by a "pathogen" (glitter or airborne scent) were the greatest, and why? Ask them to explain.
- Ask participants to determine strategies that could help prevent or control the spread of the "pathogens" they encountered.

Next:

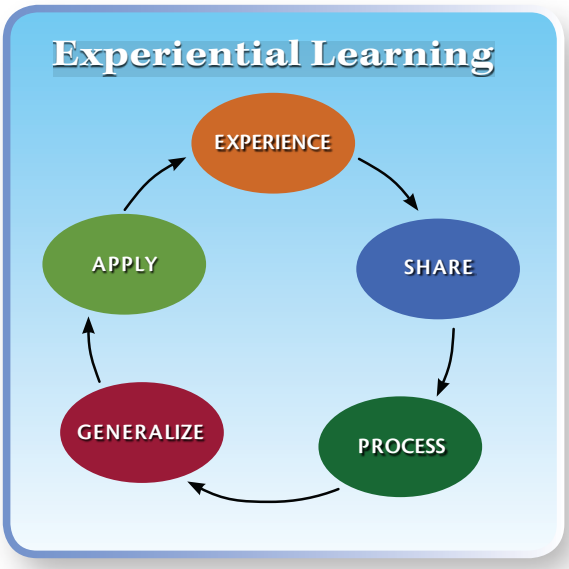
- Ask participants to brainstorm ways that 4-H Animal Science projects they are involved in or know about have the potential to allow contraction and spread of diseases.
- Ask participants to develop ideas for different management strategies that could be implemented for their 4-H Animal Science projects to reduce the risk of contracting and spreading diseases.

Reference

Department of Microbiology, Mount Sinai Hospital, Toronto, Canada. 1999-2007. FAQ: Methods of disease transmission. Available online: http://microbiology.mtsinai.on.ca/faq/transmission.shtml

APPENDIX

The activities in this curriculum were designed around inquiry and experiential learning. Inquiry is a learner-centered approach in which individuals are problem solvers investigating questions through active engagement, observing and manipulating objects and phenomena, and acquiring or discovering knowledge. Experiential learning (EL) is a foundational educational strategy used in 4-H. In it, the learner has an experience phase of engagement in an activity, a reflection phase in which observations and reactions are shared and discussed, and an application phase in which new knowledge and skills are applied to real-life settings. In 4-H, an EL model that uses a five-step learning cycle is most commonly used. These five steps—Experiencing, Sharing, Processing, Generalizing, and Application—are part of a recurring process that helps build learner understanding over time.



For more information on inquiry, EL, and the five-step learning cycle, please visit the University of California Science, Technology, and Environmental Literacy Workgroup's Experiential Learning Web site, http://www.experientiallearning.ucdavis.edu/.

For More Information

You will find related information in other publications, slide sets, CD-ROMs, and videos from UC ANR.

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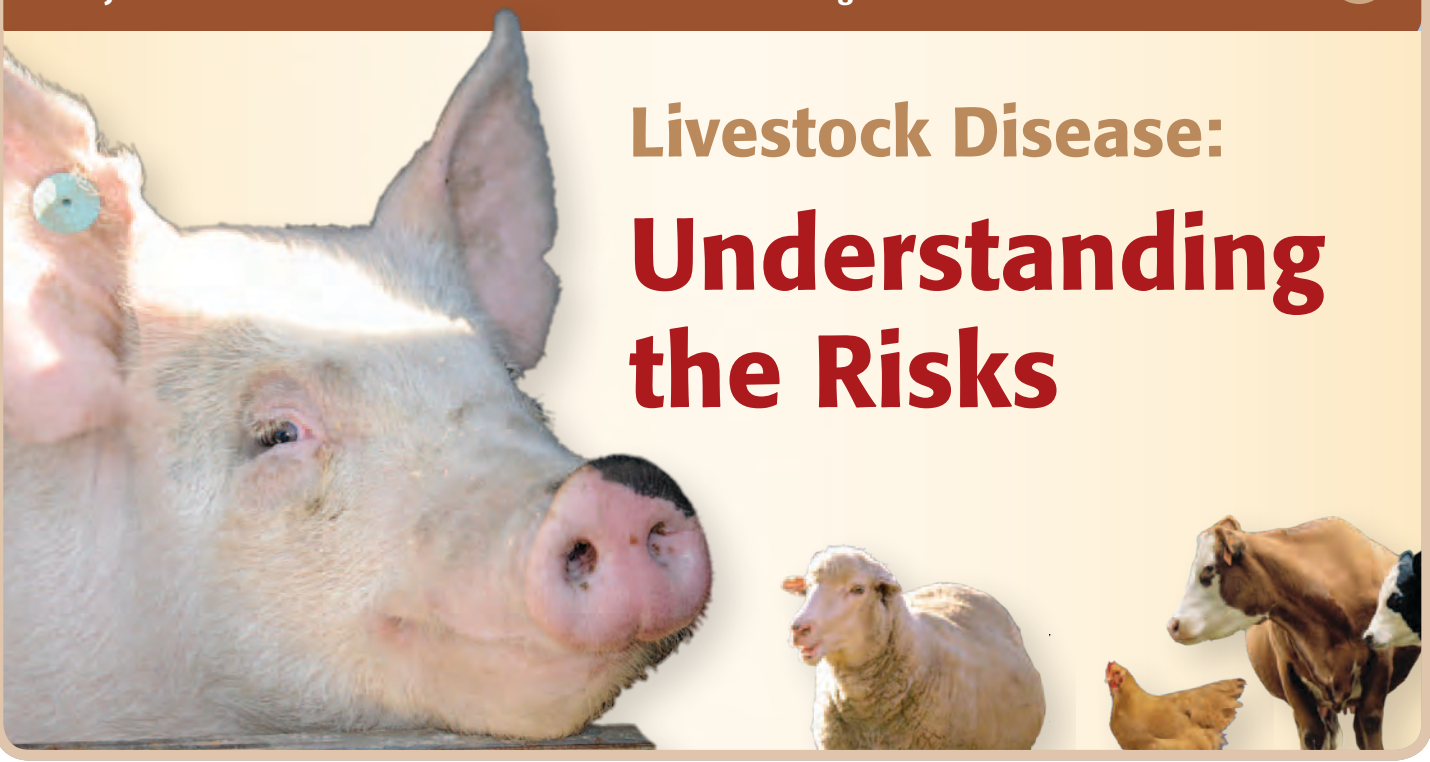

Livestock Disease:

Understanding the Risks

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Activity 1

Understanding and Assessing Risks

Subject Overview and Background Information

In any situation or environment, there is always the chance that an organism will get infected with a disease. This is considered the **disease transmission risk.** Infectious diseases can be spread by a variety of means. One means is through **direct contact,** which involves physical contact between an ill person or animal and a healthy person or animal. A brief moment of contact can allow pathogens to travel from one organism to the next. **Indirect contact** occurs when an uninfected person or animal touches the contaminated surface of an inanimate (non-living) object. For humans, this might be doorknobs, tabletops, or handrails; for domesticated animals, it could be a food dish, a watering dish, or housing materials (e.g., bedding). Any inanimate objects (e.g., clothing, vehicles, shoes, equipment) that can transmit a disease from one animal to another (or human) are called **fomites** (pronounced *fo*-mites).

Airborne transmission is a means of contamination for some diseases. Microbes travel from one person or animal to another through the air and can infect others through their respiratory tract (nose, windpipe, and lungs). For example, if airborne pathogens are released when a sick person or animal coughs or sneezes in an enclosed room, pathogens can be carried via air currents and uncontaminated individuals who are in the same room may be at risk of catching the illness by breathing in the contaminated air.

Fecal-oral transmission refers to the spread of pathogens that affect the digestive system of humans or other animals. These microorganisms enter the body of an uninfected individual through the mouth by means of food or water that has been contaminated by the feces of an infected individual.

Many diseases are spread by **vectors** (any organism that carries and transmits a disease but does not have the disease itself is a vector). Insects are common disease vectors. For example, mosquitoes can carry the pathogens that cause malaria, West Nile virus, and encephalitis. Because vectors are mobile, they can increase the range of a disease, spreading it to new areas.

One way to try to reduce the risk of transmitting or catching a disease is to conduct a **disease transmission risk assessment.** This type of risk assessment evaluates where and how a disease can possibly be spread among humans and animals.

Activity Concepts and Vocabulary

- **Airborne transmission:** Exchange of pathogens that are carried by the air, as pollen and dust.
- **Bio-security:** Precautions taken to protect a living thing (e.g., humans, animals, or plants) from attack or interference due to biological organisms that have the potential to cause the harm. A less formal definition for bio-security is "Keeping the bad bugs off the farm."
- **Direct contact:** Physical contact between an ill person or animal and a healthy person or animal.
- **Disease transmission risk:** The relative likelihood, depending on the situation or environment you or your animal is in, that the animal will catch a disease.
- **Disease transmission risk assessment:** A formal process for evaluating the likelihood that a disease will spread or infect either humans or animals, or both.
- **Fecal-oral transmission:** The entry of disease-causing organisms into the body when an animal eats food or water that is contaminated with the feces of an infected animal. These organisms, which multiply

and leave the infected animal through its feces, also increase the chances that it will infect another animal.

- **Fomites** (pronounced: *fo*-mites): Any non-living (inanimate) object that can transmit a disease pathogen (e.g., clothing, shoes, equipment, etc.).
- **Indirect contact:** When an uninfected person or animal touches the contaminated surface of an inanimate object (e.g., a food dish or tabletop) that has previously come into contact with an infected person or animal.
- **Vector** (pronounced: *vek*-tor): An organism (such as an insect) that carries disease-causing microorganisms from one host animal to another.

Life Skills

- **Head:** Learning to learn, keeping records, critical thinking.
- **Heart:** Cooperation, communication, sharing.
- **Hands:** Teamwork, self-motivation, contribution to group effort.
- **Health:** Disease prevention.

California Educational Content Standards

- Third Grade:
  - ✓ Life Sciences and Investigation and Experimentation – 3a, 3c, 5e
- Fourth Grade:
  - ✓ Life Sciences – 3b, 3d
- Fifth Grade:
  - ✓ Life Sciences – 2a
- Sixth Grade:
  - ✓ Investigation and Experimentation – 7e

Subject Links

Science and Language Arts.

Purpose of Activity

The purpose of this activity is to have youth learn about risks associated with some common diseases of farm animals. Youth will determine the different risks associated with the diseases and why they are considered risks and will develop ways to reduce the risks.

The youth will also be given a *Risk Assessment Tool* that can be used to assess their project animal's risk of contracting a disease.

Overview of Activity

Both humans and animals can contract diseases. Some diseases might affect a wide variety of species; others might only affect one species or a few. No matter what disease it is, however, it is important to assess the risks that people or animals will contract it. Once the risks have been identified, it is easier to prevent or reduce the chances that anyone will get sick or transmit the disease elsewhere.

This activity focuses on a few diseases that farm animals may contract. By reviewing the different descriptions provided in the activity, youth will have an opportunity to analyze a variety of risks associated with these diseases. They will also be provided with a *Risk Assessment Tool* that they can use on their own animals.

Time Required

60 minutes.

Suggested Grouping

Pairs or small groups of 3 to 4.

Materials Needed

(* = *Materials provided in curriculum*)

- * *Common Farm Animal Diseases (See appendix)*
- * *Common Farm Animal Diseases: Ways to Reduce Risks (See appendix)*
- * *Disease Risk Worksheet (See appendix)*
- * *Disease Risk Worksheet Samples 1–4 (See appendix)*
- * *Risk Assessment Tool (See appendix)*
- Flip chart paper
- Pencils, pens, or markers

Getting Ready

- Make enough copies of the *Common Farm Animal Diseases* handout to give one to each group.

- Make enough copies of the blank *Disease Risk Worksheet.* Groups will probably need more than one.
  - ✓ **Volunteer Tip:** Instead of using the *Disease Risk Worksheet,* volunteers can create the table on the white board or flip chart paper.
- Make enough copies of the *Risk Assessment Tool* to give one to each youth.
- Prepare the flip chart paper so each group has one sheet. Make sure there are enough pencils, pens, or markers for each youth to have one.

Opening Questions

1. **What does the term "risk" mean to you?** Ask the youth to write their thoughts and ideas on the paper provided.
2. **What do you think of when you hear the word "disease?" What do you think are some ways a disease can spread from one person or animal to another?** Ask the youth to write their thoughts and ideas on the paper provided.
3. **What do you think are some types of risks associated with catching illnesses (e.g., colds or flu)? When are some times we are at risk for catching a disease or illness? What are some things we can do to lower these risks?** Ask the youth to write their thoughts and ideas on the paper provided.
4. **When and how do you think you can tell that animals are at risk for catching a disease? What do you know about different diseases that animals can get? What are some things we can do to lower an animal's risk of catching a disease?** Ask the youth to write their thoughts and ideas on the paper provided.

Procedure (Experiencing):

1. Distribute one *Common Farm Animal Diseases* handout and the *Disease Risk Worksheet* to each group.
2. Designate someone in each group to read the disease description while the others listen quietly and jot down notes about the description on the *Disease Risk Worksheet* or flip chart paper. (**Note:** Switch roles with each disease description.)
3. After reading the disease description, have the youth fill out the *Disease Risk Worksheet.* First they should determine how the disease is transmitted. Then they should explain what the risks are that an animal will contract the disease. Finally, have them list different ways you can reduce the risk that an animal will contract the disease.
4. Once a group has finished filling out the *Disease Risk Worksheet,* pass another disease description to the group along with a new *Disease Risk Worksheet.*
5. If time allows, repeat the previous steps until each group has had the opportunity to assess each disease on the *Common Farm Animal Diseases* handout. They should fill out a new *Disease Risk Worksheet* for each disease.
6. Once all groups are done, have each group share the results from their worksheets.
7. Next, distribute the *Common Farm Animal Diseases: Ways to Reduce Risks* handouts. Have the youth compare the information on these to what they wrote on their *Disease Risk Worksheets.* Was anything missing? Was there anything that they wrote on their worksheets that was not mentioned on the handouts?

Sharing, Processing, and Generalizing

Follow the lines of thinking developed by the youth as they share and compare their thoughts and observations. If necessary, use more targeted questions as prompts to get to particular points. Specific questions might include:

1. **What risks are similar between the different diseases? What, if any, differences did you notice?**
   - ✓ **Volunteer Tip:** Hand-copy the *Disease Risk Worksheet* on a sheet of flip chart paper and fill in the boxes as each group shares their worksheet results. This will allow the youth to see similarities and differences for each disease.

2. **What patterns, if any, do you notice among the diseases? Please explain.**

Concept and Term Introduction

At this point, volunteers need to ensure that the concepts and terms **airborne transmission, direct contact, disease transmission risk, disease transmission risk assessment, fecal-oral transmission, fomites, indirect contact,** and **vector** have been introduced. (**Note:** The goal is to have the youth develop these concepts through their own exploration and define the terms using their own words.)

Concept Application

1. Pass a copy of the *Risk Assessment Tool* out to each individual. Review this tool with the youth and make sure they understand the different components of the tool and how to use it.
2. Ask the youth to review the tool and see if there are any additional risk factors they would like to add to the tool. If so, have them discuss these new additions at the next meeting.

References

5M Enterprises Ltd. Marek's Disease. ThePoultrySite.com. http://www.thepoultrysite.com/diseaseinfo/90/mareks-disease

5M Enterprises Ltd. Swine dysentery (SD). ThePigSite.com. http://www.thepigsite.com/pighealth/article/361/swine-dysentery-sd

Atchison Animal Clinic. Reference and treatment guide for club lamb fungus. http://www.atchisonanimalclinic.com/html/club_lamb_fungus.html

California Department of Food and Agriculture. Club Lamb Fungus (Ringworm). http://www.cdfa.ca.gov/AHFSS/Animal_Health/pdfs/Club_lamb_fungus_disease.pdf

Department of Primary Industries, Parks, Water and Environment. Weeds, pests, and diseases. http://www.dpiw.tas.gov.au/inter.nsf/WebPages/CART-6PTVYH?open#Treatment

Luginbuhl, J. M. Gastrointestinal parasite management of meat goats. http://www.cals.ncsu.edu/an_sci/extension/animal/meatgoat/MGWormer.htm

Theodore, K. J. If your chickens breathe, they've been exposed to Mareks: Mareks Disease. http://www.shagbarkbantams.com/page9.htm

Wright, S. Controlling coccidiosis. http://www.moredun.org.uk/feature-article.asp?ref=110

Activity 2

Risk Assessment: A Picture Says a Thousand Words

Subject Overview and Background Information

When performing a **bio-security risk assessment** of your premises and practices, it is important to assess the risk that you will be infected by a disease, the risk that your animals will be infected by a disease, and the risk that the disease will be transmitted to other animals or humans. For example:

If you are working with animals, how likely is it that you are going to come into direct contact with the animals? If the likelihood is high, protective clothing (e.g., gloves, coveralls) might be recommended.

- If you are cleaning a stall or pen, what is the likelihood that you will come into contact with fecal matter? If the chances are high, you might want to consider shoe covers and goggles in addition to gloves and coveralls.
- Is the barn where your animal is housed well ventilated? If not, a mask that covers your nose and mouth might be recommended.

In addition to these assessments, there are a number of **hygiene** practices you should follow as a general rule:

- Change the animals' food and water regularly, and keep your animals' feeders and waterers clean.
- After working with your animals, sanitize your hands as well as shoes, clothing, and any equipment you used, to help reduce your risk of exposure.
- Overall, be alert about your surroundings and the levels of sanitation there.

Activity Concepts and Vocabulary

- **Bio-security:** Precautions taken to protect a living thing (e.g., humans, animals, or plants) from attack or interference due to biological organisms that have the potential to cause the harm. A less formal definition for bio-security is "Keeping the bad bugs off the farm."
- **Hygiene** (pronounced: *hahy*-jeen): A condition that is conducive to the preservation of health (e.g., cleanliness) or a practice that enhances that condition.
- **Risk assessment:** The examinatinon and evaluation of the potential hazards associated with a given situation.

Life Skills

- **Head:** Learning to learn, keeping records, critical thinking, problem solving.
- **Heart:** Cooperation, communication, sharing.
- **Hands:** Teamwork, self-motivation, contributions to group effort.
- **Health:** Disease prevention.

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- Third Grade:
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- Fifth Grade:
  - ✓ Investigation and Experimentation – 6g
- Sixth Grade:
  - ✓ Investigation and Experimentation – 7e

Subject Links

Science and Language Arts.

Purpose of Activity

The purpose of this activity is to have youth observe different animal picture stories and, through the use of the *Risk Assessment Tool,* determine what risks the animals may face.

Overview of Activity

We are constantly in contact with and exposed to organisms that can cause diseases. Our goal is to try to reduce the chances of infection, and the first step toward that goal is awareness. There are many things we do every day and many situations in the environment that can increase our chances of getting sick. Simple awareness of your actions and your surrounding environment can promote good health for both you and your animals.

Another important tool to keep us healthy is the ability to assess the risks of contracting an illness in a given environment. Where are different risks the greatest? When are we taking excessive risks? Which risks are worth taking? Who or what can carry and pass on a disease, and how might a person reduce or prevent that risk?

This activity provides youth with an opportunity to practice their observational and risk assessment skills through the use of pictographic stories and a *Risk Assessment Tool.* Once they have practiced and improved their skills they will have the opportunity to assess what risks their own project animals might face.

Time Required

60 minutes.

Suggested Grouping

Pairs or small groups of 3 to 4.

Materials Needed

(* = *Materials provided in curriculum*)

- * *Animal Stories: Sheep Story, Swine Story,* and *Dairy Cattle Story (See appendix)*
- * *Animal Story Risk Worksheet (See appendix)*
- * *Risk Assessment Tool (See appendix)*
- Flip chart paper
- Pencils, pens, or markers

Getting Ready:

- Make enough copies of the *Animal Stories* so that every group can assess at least one. Cut the stories as shown into "pages."
- Make enough copies of the *Animal Story Risk Worksheet* to give each group one.
- Make enough copies of the *Risk Assessment Tool* to give each youth one.
- Make enough copies of the *Animal Story Risk Worksheet* to give each youth one (this will be used after the activity; see *Concept Application* on page 8).
- Make sure each group has flip chart paper and enough pencils, pens, or markers to give each youth one.

Opening Questions

1. **When you become ill, how might you determine where, when, or how you got sick?** Ask the youth to write their thoughts and ideas on the paper provided.
2. **What do you think are some situations that increase the chances that you will get sick?** Ask the youth to write their thoughts and ideas on the paper provided.
3. **What are some ways you can think of to reduce the chances of getting sick?** Ask the youth to write their thoughts and ideas on the paper provided.
4. **When your animal becomes ill, how might you determine where, when, or how it got sick?** Ask the youth to write their thoughts and ideas on the paper provided.
5. **What are some situations that you think might increase the likelihood of your animal getting sick?** Ask the youth to write their thoughts and ideas on the paper provided.
6. **What are some ways you think you could reduce the chances of your animal getting sick?** Ask the youth to write their thoughts and ideas on the paper provided.

Procedure (Experiencing)

1. Provide each group with the first cut-up page of their *Animal Story.* The group should read the story, look at the picture, and record important findings on their *Animal Story Risk Worksheet.* While reading the story and observing the picture, have the youth use the *Risk Assessment Tool* to help them determine what potential risks are shown in the picture.
2. When a group has completed the first cut-up page, have them return it and give them the second cut-up page. Have them read the story and observe the picture, compare it with the *Risk Assessment Tool,* and record important findings on their *Animal Story Risk Worksheet.*
3. Continue this procedure until every group has observed and assessed all of the pages of their *Animal Story.*
4. If there is enough time, give groups a different *Animal Story* and repeat steps 1 through 3.
5. Have each group share their story, their observations, and the findings that they recorded on their *Animal Story Risk Worksheet.*

Sharing, Processing, and Generalizing

Follow the lines of thinking developed by the youth as they share and compare their thoughts and observations. If necessary, use more targeted questions as prompts to get to particular points. Specific questions might include:

1. **What were you looking for while observing the Animal Stories?** Ask the youth to write their thoughts and ideas on the paper provided.
2. **Were there any similarities between the stories? If so, what were they? Were there any differences? If so, what were they?** Ask the youth to write their thoughts and ideas on the paper provided.
3. **How did you determine whether or not there was a potential risk?** Ask the youth to write their thoughts and ideas on the paper provided.
4. **Can you see any themes that are common to all of the stories? If so, what are they?** Ask the youth to write their thoughts and ideas on the paper provided.
5. **Provide the youth with the *Disease Risk Worksheet Samples 1–4.* Ask them to compare the information on the *Animal Story Risk Worksheet* they used for their stories with the samples.** What, if any, new ideas did they discover from the worksheets?

Concept and Term Introduction

At this point, volunteers need to ensure that the concepts and terms **bio-security, risk assessment,** and **hygiene** have been introduced. (**Note:** The goal is to have the youth develop these concepts through their exploration and define the terms using their own words.)

Concept Application

1. If participating youth have a project animal, encourage them to use the *Risk Assessment Tool* to assess the environment to which their animal is exposed. Have them use the *Animal Story Risk Worksheet* to fill in potential risks that they have found.
2. If you raise market animals, consider determining the following:
   - ✓ What might I need to change about the way I raise and care for my animal to reduce bio-security risks?
   - ✓ What might I do to decrease bio-security risks the next time I transport my animal?
   - ✓ What are some changes I could make to reduce risks to bio-security when I take my animal to a fair or show?
3. Provide youth with copies of the appendix *Common Farm Animal Diseases* and *Common Farm Animal Diseases: Ways to Reduce Risks* so they can use them to help reduce risks when raising their project animals.

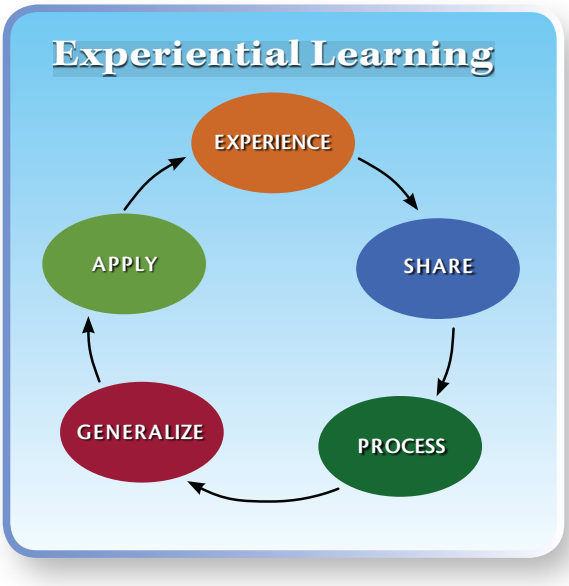
References

Montana's Official State Website. Montana animal biosecurity information. Mt.gov. http://liv.mt.gov/liv/ah/biosecurity/bio.asp

The University of Vermont. Animal biosecurity. http://www.uvm.edu/~ascibios/?Page=animal.html&SM=submenuanimal.html

APPENDIX

The activities in this curriculum were designed around inquiry and experiential learning. Inquiry is a learner-centered approach in which individuals are problem solvers investigating questions through active engagement, observing and manipulating objects and phenomena, and acquiring or discovering knowledge. Experiential learning (EL) is a foundational educational strategy used in 4-H. In it, the learner has an experience phase of engagement in an activity, a reflection phase in which observations and reactions are shared and discussed, and an application phase in which new knowledge and skills are applied to real-life settings. In 4-H, an EL model that uses a five-step learning cycle is most commonly used. These five steps—Experiencing, Sharing, Processing, Generalizing, and Application—are part of a recurring process that helps build learner understanding over time.



For more information on inquiry, EL, and the five-step learning cycle, please visit the University of California Science, Technology, and Environmental Literacy Workgroup's Experiential Learning Web site, http://www.experientiallearning.ucdavis.edu/.

Common Farm Animal Diseases

Swine Dysentery

Swine dysentery (SD) is a disease that is caused by bacteria and is very expensive to treat. This disease usually affects pigs that that weigh 12 to 75 kg (26 to 165 lb). Sows and piglets can be infected, but boars and gilts are more common.

Pigs can carry and release the SD bacteria in their feces over extended periods of time. Healthy pigs can accidentally eat infected feces found in their feed, water, or bedding. The bacteria can survive outside of a pig for up to 8 weeks if the environment is cool and damp.

One way SD is transmitted is through introduction of an infected animal into an existing herd of healthy animals. The disease can also be transmitted to healthy pigs through **fomites**—objects such as vehicles, clothing, or shoes that have come into contact with the SD bacteria and so can pass along the disease. Swine dysentery can also be transmitted to pigs by other types of animals. Birds, flies, mice, and dogs can act as **vectors,** carrying the SD bacteria in their feces and infecting pigs without being harmed themselves.

When a pig becomes infected, the first symptom is watery diarrhea. Pigs with SD will eat less, lose weight, grow more slowly, and become dehydrated. If the animal is under stress or has a change in its diet, the symptoms can get worse. The diarrhea may become black and bloody. Although death caused by SD is rare, it has been known to happen in severe cases.

Marek's Disease

Marek's Disease (MD) is a viral illness that affects chickens. The disease is found worldwide and typically infects chickens 3 to 30 weeks of age.

Chickens typically contract MD through their respiratory (breathing) system. The virus that causes the illness spreads easily via wind, animals, and fomites (e.g., vehicles, clothing, or shoes). Once a bird is infected with the virus, it will have the disease for the rest of its life and will constantly spread the MD virus through dander (small dandruff-like scales) from the base of its feathers. The virus can survive at moderate temperatures for more than a year and may be resistant to certain types of disinfectants.

There are three different forms of MD, each with specific symptoms. One form is *neurological MD,* which affects the nervous system and can cause short-term or long-term paralysis of the bird's legs or wings as well as eye abnormalities such as paleness or lesions (wounds). A second form, called *visceral MD,* affects internal organs, causing tumors in different parts of the body such as the heart, muscles, and lungs. A third form is known as *cutaneous MD* because it causes tumors (growths) in feather follicles (the part of the bird's skin where feathers form).

Other symptoms of MD may include weight loss and unthriftiness (e.g., lowered egg production). Marek's Disease can be fatal, and birds may or may not show signs of the illness upon death.

Club Lamb Fungus

Club Lamb Fungus is caused by a fungus and is contagious to sheep, humans, and other animals. The disease is spread by spores that are released by the fungus and it infects other animals or humans through direct contact with infected animals or indirect contact via contaminated bedding or housing or other fomites (e.g., trucks, trailer, or grooming tools). The fungal spores can survive in the environment for a long time, often several years.

Sheep commonly contract Club Lamb Fungus through direct and indirect contact at fairs, shows, and sales events. The disease is also easily transmitted when sheep are shorn, since any nicks or cuts can allow the fungus to easily enter the skin. Humans typically are infected through contact with infected sheep.

Symptoms of Club Lamb Fungus usually begin as small circular sores on the head, neck, and back of the animal that grow larger over time. Initially these sores are raised and red; in later stages they grow larger and appear crusty or scaly. Recovery from Club Lamb Fungus

takes 8 to 16 weeks, during which time the animal remains contagious. Contact your veterinarian about fungicides that can be applied to the skin to reduce the spread of the disease.

Coccidiosis

Coccidiosis is an intestinal disease caused by a microscopic parasite that can infect a variety of animals, including goats, sheep, birds, cattle, cats, dogs, and even humans. However, strains of coccidiosis that affect one type of animal (e.g., dogs) will not affect another (e.g., goats). The parasite can survive for extended periods of up to one year outside of a host animal and thrives in cool, dark, moist environments.

The parasite that causes coccidiosis is transmitted from an infected animal to a healthy animal through food or water that has been contaminated with the infected animal's feces. Most animals that are infected with coccidia do not show signs of the disease. However, young animals and those that are under a lot of stress tend to show symptoms. Symptoms may range from mild, watery diarrhea in mild cases to severe, bloody diarrhea accompanied with weight loss, loss of appetite, and dehydration. Severe cases can cause death.

Common Farm Animal Diseases: Ways to Reduce Risks

Swine Dysentery

Some best practices to prevent the spread of SD include

- Preventing a pig's food, water, and bedding from becoming contaminated; keeping food and water fresh; and making certain that the animal's bedding is clean and dry and that the pen, barn, or shed is clean and disinfected.
- Knowing the health history of new pigs when they enter your herd. New pigs should be separated from the rest of the herd for at least 21 days to make sure they don't have any illnesses that could spread to your healthy animals.
- Isolating sick animals from the rest of the herd until the illness can be diagnosed.
- Preventing contact with other swine herds.
- Reducing any unnecessary handling or movement of the pigs to avoid the spread of fecal matter.
- Preventing any overcrowding of pigs in holding areas or pens.
- Wearing clean, disinfected clothing and shoes when working with pigs.
- Cleaning and disinfecting all equipment after you work with your animals; disinfecting vehicles when entering and leaving the farm.
- Washing your hands or changing gloves when you go from working with one pig to working with another.
- Carefully observing your animals, checking on them frequently for any unusual physical symptoms or abnormal behaviors.

Marek's Disease

Some best practices to prevent the spread of MD include

- Purchasing birds that that have been properly vaccinated against MD and are free of the disease.
- Isolating new birds for a specified period of time (contact your veterinarian for an appropriate interval) to make sure they do not have any diseases that might spread to your healthy animals.
- Keeping your birds' enclosure clean and disinfected.
- Preventing contact with other birds and animals.
- Carefully observing your birds, checking on them frequently for any unusual physical symptoms or abnormal behaviors.
- Wearing clean, disinfected clothing and shoes when working with birds.
- Cleaning and disinfecting all equipment after you work with your animals; disinfecting vehicles when entering and leaving the farm.
- Washing your hands or changing gloves when you go from working with one animal to working with another.

Club Lamb Fungus

Some best practices to prevent the spread of Club Lamb Fungus include

- Purchasing sheep that do not have the infection.
- Isolating new sheep for a period of time before allowing them to join the rest of the flock.
- Limiting movement and preventing contact with other sheep.
- Reducing the stocking density (the number of animals kept in an area).
- If an animal is infected, separating it from other sheep.
- Keeping a clean, dry, disinfected facility (fungi grow well in a moist environment).
- Allowing animals to spend time in the sunlight. Warmth will help keep them dry and reduce the spores' ability to survive.
- Carefully observing your sheep, checking on them frequently for any unusual physical symptoms or abnormal behaviors.
- Wearing clean, disinfected clothing and shoes when working with your animals.
- Cleaning and disinfecting all equipment with a fungicide after you work with your animals;

disinfecting vehicles when entering and leaving the farm.

- Washing your hands or changing gloves when you go from working with one animal to working with another.

If you are showing your sheep at a fair or exhibition,

- Examine your animal when you first arrive. If your sheep has cuts or scratches on its skin, remove it from the fair.
- Do not show sheep that have been in contact with animals infected with Club Lamb Fungus.
- Use disposable gloves when handling your animal.
- Keep your animal's bedding clean and dry.
- Limit direct contact with other animals.
- Clean and disinfect all washing, grooming, and shearing equipment after each use.
- Isolate your animal(s) for a period after you return from the fair to make certain they did not contract any diseases while there.

Coccidiosis

Some best practices to prevent the spread of coccidiosis include

- Isolating new animals for a specified period of time (contact your veterinarian for an appropriate interval) before allowing them to join other animals.
- Limiting movement and preventing contact with other animals.
- Reducing the stocking density (the number of animals kept in an area).
- If an animal is infected, separating it from others.
- Keeping a clean, dry, disinfected facility.
- Raising all water troughs and feed buckets off of the ground to help prevent contamination; making certain that food and water are fresh.
- Carefully observing your animals, checking on them frequently for any unusual physical symptoms or abnormal behaviors.
- Wearing clean, disinfected clothing and shoes when working with your animals.
- Cleaning and disinfecting all equipment after you work with your animals; disinfecting vehicles when entering and leaving the farm.
- Washing your hands or changing gloves when you go from working with one animal to working with another.
- Contacting your veterinarian if your animal shows any physical signs of coccidiosis. Certain drugs are effective in treating the disease.

Disease Risk Worksheet

Animal: _____ **Disease:** _____ **Type of Disease:** _____

(e.g., bacteria, virus, parasite, fungus)

List ways the disease is transmitted.	**What are the risks?** (please explain)	**Explain ways to reduce risks to animals and/or humans.**
1. (*For example*, Indirect transmission of a pathogen)	(*For example*, The animal can contract the pathogen by touching an object.)	(*For example*, Sanitize scales between use; sanitize trailers between trips.)
2.		
3.		
4.		
5.		

(Volunteer's Guide)

Disease Risk Worksheet (Sample 1)

Animal: Swine

Disease: Swine Dysentery

Type of Disease: Bacterial

(e.g., bacteria, virus, parasite, fungus)

List ways the disease is transmitted.	What are the risks? *(please explain)*	Explain ways to reduce risks to animals and/or humans.
1. This disease is spread through the feces of infected animals. Infected pigs can shed the bacteria in the feces for long periods of time. So there is a high risk of catching the disease when healthy swine are exposed to other swine. whether it is through the introduction of a new swine to the herd or through transportation or contact with swine from other facilities/herds.	Contact with the feces of infected swine.	• Control for fecal contamination by having a manure management protocol. • Obtain dysentery free pigs: quarantine new pigs for at least 21 days. • Prevent movement or contact with other swine herds. • Don't house the animals close together. • Reduce any unnecessary handling or movement of pigs.
2. The bacteria can be easily picked up by these items. absorbed. and transferred to healthy swine.	Fomites: vehicles. equipment. bedding. clothing. shoes etc.	• Fomites: vehicles. equipment. bedding. clothing. shoes. etc. • Wear clean and disinfected clothing and shoes when working. • Clean and disinfect all equipment between each animal: disinfect vehicles all vehicles when entering and leaving the farm. • Change bedding as often as possible.
3. Fecal matter that carries the bacteria can contaminate food and water. Healthy pigs can eat and drink this contaminated food and water. becoming infected with the disease.	Contaminated food and water	• Maintain a clean and disinfected facility. • Elevate food and water containers to prevent fecal contamination. • Change all water and food as often as possible.
4. Other animals can be vectors of the disease. shedding the bacteria in their feces without being infected themselves.	Animal vectors: Birds. flies. dogs. and mice.	• Prevent movement or contact with outside animals. • Remove. clean. and disinfect any area/equipment in contact with fecal matter.

(Volunteer's Guide)

Disease Risk Worksheet (Sample 2)

Animal: Chickens

Disease: Marek's Disease

Type of Disease: Virus

(e.g., bacteria, virus, parasite, fungus)

List ways the disease is transmitted.	**What are the risks?** *(please explain)*	**Explain ways to reduce risks to animals and/or humans.**
1. This disease is spread by the particles from feathers and can be easily spread via the wind. The wind spread it to everywhere and to everything. It can directly infect animals as well as deposit the virus on fomites and other animals that can come in contact with a healthy flock. Once an animal is infected. it will carry and spread the disease for life.	Wind	• Maintain a clean and disinfected facility. • Obtain birds that are disease free and have been vaccinated against Marek's Disease: quarantine new birds. • Prevent movement or contact with other birds and animals. • Don't house animals closely together. • Reduce unnecessary handling or movement of birds. • Separate young birds from adults until 5 months of age.
2. The virus can easily attach to these items and passed to a healthy flock of birds.	Fomites: vehicles. equipment. bedding. clothing. shoes. food. water. etc.	• Maintain a clean and disinfected facility. • Wear clean and disinfected clothing and shoes when working. • Clean and disinfect all equipment between each animal. • Disinfect vehicles all vehicles when entering and leaving the farm. • Change food. water. and bedding as often as possible.
3. The virus can easily attach to the coat of animals and transferred to a healthy flock of birds.	Animal vectors	• Maintain a clean and disinfected facility. • Prevent any movement or contact with outside animals.

(Volunteer's Guide)

Disease Risk Worksheet (Sample 3)

Animal: Sheep

Disease: Club Lamb Fungus

Type of Disease: Fungus

(e.g., bacteria, virus, parasite, fungus)

List ways the disease is transmitted.	**What are the risks?** *(please explain)*	**Explain ways to reduce risks to animals and/or humans.**
1. This fungus can easily survive in the environment for many years and can be passed by direct or indirect contact with infected animals. This fungus also affects other animals and humans so they can also infect healthy sheep. They can easily enter the animal through its skin, hair follicles, and cuts.	Contact with infected animals and humans	• Maintain clean and disinfected facility. • Obtain disease free sheep; quarantine new sheep. • Prevent movement or contact with other sheep herds and other animals. • Don't house the animals close together. • Reduce any sharp edges or wires in the facility.
2. The bacteria can be easily picked up by these different fomites and pass to healthy swine.	Fomites: vehicles, equipment, food, water, bedding, clothing, shoes, etc.	• Wear clean and disinfected clothing and shoes when working. • Clean and disinfect all equipment with a fungicide between each animal. • Disinfect vehicles all vehicles when entering and leaving the farm. • Change water, food, and bedding as often as possible.
3. The spores of the fungus can easily survive in humid and dark areas for many years.	Environmental conditions	• Provide enough sunlight for animals. • Reduce humid and dark areas.
4. Since the fungus can survive for many years, an animal can become infected if housed in an area that housed infected animals in the past.	Housing area	• Designate housing areas as areas only housing healthy animals and areas only housing infected animals. • Disinfect all housing areas with a fungicide as often as possible.
5. At a fair, animals are in close proximity and even in contact with other animals, which can increase the chance of a healthy animal becoming infected. Equipment is shared between animals, from stalls to grooming equipment, which increases the chances of being infected. Traveling and the fair environment can also cause the animal stress, lowering its defenses against diseases and infections.	Fairs	• Do not share equipment, stalls, water and feed buckets. • Disinfect washing, grooming, and shearing equipment between each animal. • Separate animals that are exhibited at a fair from the main farm flock. • Wash and clip animals as little or as late a possible because the wool protects the animal from fungal infections. • Reduce stress with limited travel, rest, proper nutrition and care.

(Volunteer's Guide)

Disease Risk Worksheet (Sample 4)

Animal: Goats, Sheep, Birds, Cattle, Dogs

Disease: Coccidiosis

Type of Disease: Parasite

(e.g., bacteria, virus, parasite, fungus)

List ways the disease is transmitted.	**What are the risks?** *(please explain)*	**Explain ways to reduce risks to animals and/or humans.**
1. This parasite is spread through the feces of infected animals. It is impossible to completely get rid of the parasite. However, just because an animal has the parasite doesn't mean the animal is diseased. Only when there is a high parasite load and the animal's immune system is suppressed that the animal begins to show symptoms.	Eating the feces of infected swine	• Maintain a clean and disinfected facility. • Control for fecal contamination by having a manure management protocol. • Obtain disease free animals; quarantine new animals. • Prevent movement or contact with other animal herds. Don't house animals close together. • Reduce unnecessary handling/movement; reduce stress.
2. The bacteria can be easily picked up by fomites and passed to healthy swine.	Fomites: vehicles, equipment, bedding, clothing, shoes, etc.	• Maintain a clean and disinfected facility. • Wear clean and disinfected clothing and shoes when working. • Clean and disinfect all equipment between each animal. • Disinfect vehicles all vehicles when entering and leaving the farm. • Change bedding as often as possible.
3. Fecal matter that carries the bacteria can contaminate food and water. Healthy animals can eat this contaminated food and water, becoming infected with the disease.	Contaminated food and water	• Maintain a clean and disinfected facility. • Elevate food and water containers to prevent fecal contamination. • Change all water and food as often as possible.
4. Housing animals in crowded conditions can cause a lot of stress on the animal. This can increase the parasite load and decrease the animal's defense system against diseases.	Intensive husbandry systems and high stocking density	• Maintain a clean and disinfected facility. • Reduce stress. • Prevent overcrowding. • Have a less intensive facility.
5. The parasite thrives in these conditions and can survive in these conditions for more than one year.	Cool, dark, moist environmental conditions	• Maintain a clean and disinfected facility. • Try to maintain a dry and warm facility. • Clean up any damp and moist areas as often as possible. • Allow the animal to be exposed to natural sunlight.

Risk Assessment Tool for Project Animals

Risk factors	Low risk	✔	Moderate risk	✔	High risk	✔
ANIMAL						
Contact with other species (wild and domesticated)	never or seldom		occasionally		frequent	
Quarantine procedures for introduction of new animals	quarantine procedures always used		qarantine procedures sometimes used		quarantine procedures never used	
Vaccinations	all recommended vaccinations		some recommended vaccinations		no recommended vaccinations	
Vaccination status	all current		some current		none	
HUMAN						
Non-owner human contact	never or seldom		occasionally		frequent	
Clothing	protective clothing; only worn in barn; cleaned after each use		protective clothing; only worn in the barn		no specific clothing when working with animals	
Footwear	footwear only worn in barn; disinfected after each use		footwear worn only in barn; cleaned after each use		no specific footwear; footwear not cleaned after each use	
Hand washing	always was hands before and after contact with animals		occasionally wash hands before or after contact with animals		rarely wash hands before or after contact with animals	
HOUSING & TOOLS						
Housing (same species)	animal housed individually		animal housed in small group		animal housed in large group	
Bedding	clean and dry		soiled and/or damp		foul and/or wet	
Vermin and vector control	no visible signs of vector or vermin		some visible signs of vector and vermin		many visible signs of vector and vermin	
Climate (heat, cold, moisture)	minimal exposure to extremes		sometimes exposed to extremes		frequently exposed to extremes	
Air flow	adequate ventilation		some ventilation		no ventilation	
Tools, equipment, vehicles	cleaned and sanitized after each use		cleaned sometimes		rarely or never cleaned	
FOOD AND WATER						
Food quality	food is clean and fresh		food is clean; not fresh		food is moldy, dirty or spoiled	
Water quality	clean water; circulated		clean water; standing		dirty water	
Food and water access	individual food and water		shared food and water		group food and water; many animals	
TRANSPORTATION						
Transportation frequency	rarely or never transported		transported sometimes		transported frequently	
Transportation with animals	always transported alone		only transported with animals from same farm		transported with animals from different farms	

Animal Stories || Sheep Story

Sheep Story, Page 1

Jack decided he wanted to join a 4-H sheep project. His parents and older siblings were already a part of the club and were really excited for him. His parents owned a sheep barn and their sheep just had lambs. Jack wanted to raise a newborn animal for a show. A friend of Jack's older sister had an extra lamb from her sheep breeding project so she gave the lamb to Jack to raise.

Sheep Story, Page 2

Jack housed his new lamb in his parents' barn. When the new lamb first arrived at the housing area, it did not interact with the other sheep. After a few days, however, it moved among the other sheep without any apparent hesitation.

Sheep Story, Page 3

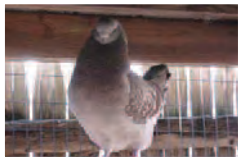
After a few more months, Jack's lamb, now a sheep, was ready to go to a show. Since only a few sheep were going from his club, his parents volunteered to transport all them together in their trailer. It was going to be a long trip and Jack was worried about his sheep. His parents promised him that all the sheep would be just fine.

Sheep Story, Page 4

When Jack got to the fair, he was really excited. There were so many people and so many animals everywhere! He got his sheep out of the trailer and went to the area where they house sheep.

Sheep Story, Page 5

Jack tried looking for a pen to house his sheep, but all of the pens were occupied to the fullest. He asked a volunteer at the show for help and she said the last place available was a pen that already had one sheep and one goat in it. Jack was really happy that he got the last spot and gladly accepted the pen with another sheep and a goat.



Sheep Story, Page 6

Jack noticed that the pen was a little dirty, so he changed the bedding and refilled the water bowl in the pen. After he refilled the food bowl, pigeons immediately flew into the pen and started eating the food. Jack had to wave his arms and shoo the birds to get them away.

Sheep Story, Page 7

It is time for the auction! Jack takes his sheep out of the pen, cleans him up, and leads him to the place where the auction will occur. His parents wave to him from behind the fence and wish him good luck.

Animal Stories || Swine Story

Swine Story, Page 1

Sara learned from her friends at school that doing a swine project was a fun experience and a good way to make some money. She heard about a nearby ranch that did some swine breeding on the side, and convinced her parents to take her to buy a piglet or two. Her parents already had three pigs but thought that Sara would learn a lot by raising her own pig.

Swine Story, Page 2

Sara and her family considered her 4-H project hogs as pets. Once the pigs had made themselves at home, they became another part of the family. Even Sara's little brother Sam liked to go out and see what the pigs were up to.

Swine Story, Page 3

One thing Sara decided to do with her hogs was to take them to different shows so she could practice her showmanship and gain some experience. Because other people in her 4-H group were going to the shows too, they decided it would be easiest to haul their animals together.

Swine Story, Page 4

In the washing area at a show, Sara washed her pig up nice and clean to get him ready for showing. It wasn't so bad for her to get a little wet because it was so hot outside. Her pig didn't seem to mind the scrubdown either.

Swine Story, Page 5

After washing down her pig, Sara went to clean his pen and set it up for him.

Swine Story, Page 6

At the show, Sara's hog was housed with someone else's animal. Here you can see the hogs resting in between shows, waiting for their next meal.

Swine Story, Page 7

It's showtime! Sara gets ready for the show. She takes her pig out of the pen, cleans and wipes it down, and takes it to the arena. Here, Sara is in the arena with her pig, which is being judged.

Swine Story, Page 8

After a long day at the show, it was time to go home. Sara had to find another trailer for her pig because the one her pig had come in originally had already left. Luckily, one of Sara's neighbors was also at the fair and had room for her pig. Sara helped clean the trailer before they put the pigs in.

Animal Stories || Dairy Cattle Story

Dairy Cattle Story, Page 1

Jamie went to visit her friend who was showing her cow at a 4-H fair. After watching the show, Jamie became really interested in the 4-H dairy cattle project and wanted to participate in it. She went to a commercial breeder and picked out a Jersey calf to take home.

Dairy Cattle Story, Page 2

Jamie named her new calf Wonka and decided to take the best care of her, with the goal of taking her to fairs in the future. Jamie's parents also raise dairy cattle calves and allowed Jamie to put her calf in a pen with the other calves. Here, Jamie is seen feeding Wonka milk out of a bottle.

Dairy Cattle Story, Page 3

Once Wonka reached one year of age, Jamie decided it was time for the heifer to go to her first fair. Jamie's neighbor Kim was going to the same fair with her calf, Fluffy, and had a trailer to transport the calf. Jamie asked Kim if she had enough room to take Wonka, too. Even though Kim's trailer was small, there was enough room for both of them. Wonka entered the trailer first, followed by Fluffy.

Dairy Cattle Story, Page 4

It took a long time to get to the fair, so once they arrived, Jamie took Wonka out of the trailer and immediately to the washing area. Jamie wanted to clean Wonka and cool her down before the show. There were other cows already tied to the wash rack, waiting for a hose. Since it was probably going to take a while to get a hose, Jamie tied Wonka next to the other cows on the wash rack and went looking for Wonka's pen.

Dairy Cattle Story, Page 5

Due to the number of cattle entered in the show, Wonka was assigned to be housed with Holstein cows. Jamie used the tools in the pen to put in new bedding, filled the water bowl with clean water, and put in new food. After cleaning the pen, Jamie headed back to the washing area to wash down Wonka.

Dairy Cattle Story, Page 6

Jamie and several other contestants waited as they watched youth from another project show their Holsteins.

Dairy Cattle Story, Page 7

After a long and exciting day at the fair, it was time to go home. Jamie loaded Wonka first and she laid down in the back of the trailer. Kim then loaded Fluffy. Fluffy looked back and "posed" for this photo before the 4-Hers closed the trailer and headed home.

Animal Story Risk Worksheet

Name: _____

Animal: _____

	What are the risks? (Please list.)	**Why are they risks?** *(Please explain.)*	**Explain ways to reduce these risks.**
	(For example: indirect transmission of a pathogen)	(For example: the animal can contract the pathogen by touching an object)	(For example: sanitize equipment between use; sanitize trailers between trips)
1.			
2.			
3.			
4.			

For More Information

You will find related information in other publications, slide sets, CD-ROMs, and videos from UC ANR.

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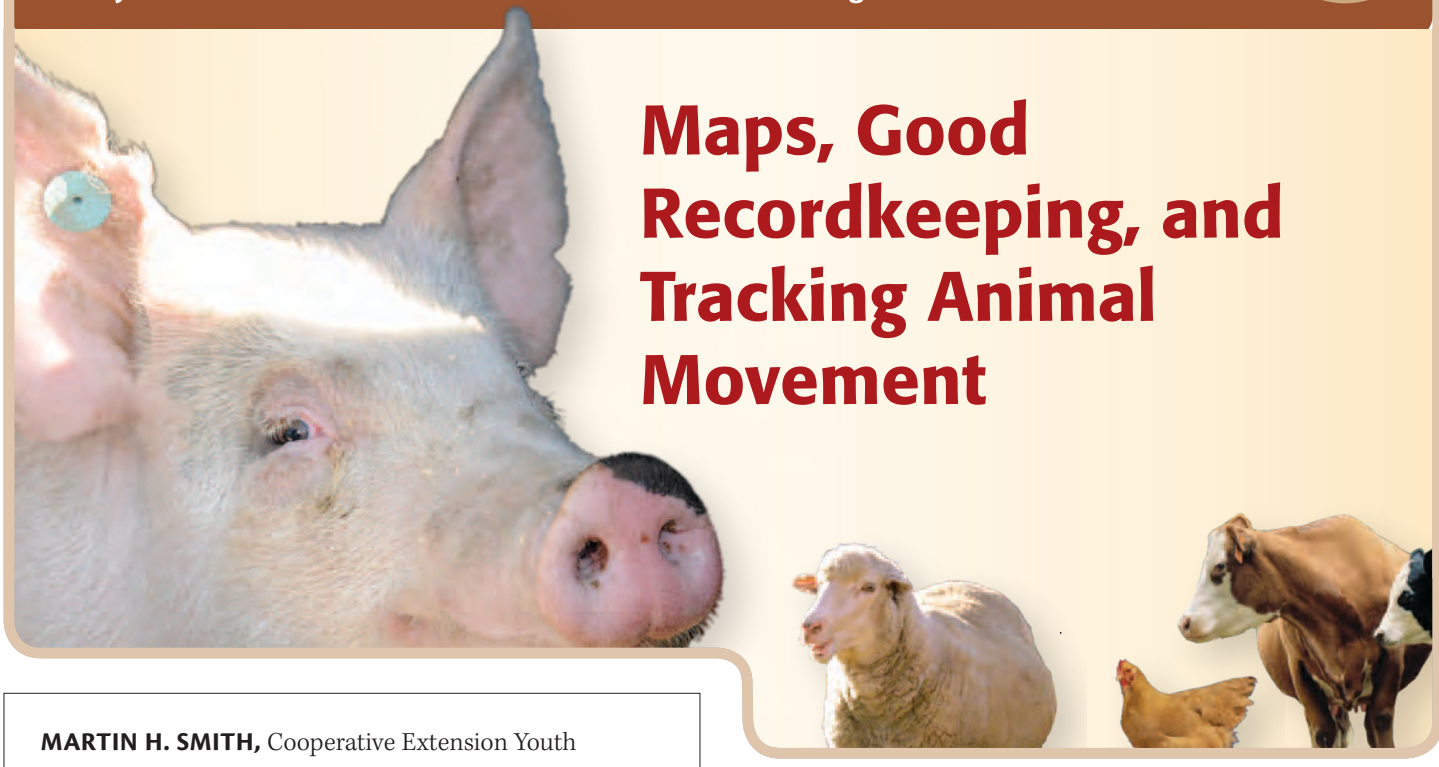
BIO-SECURITY in 4-H Animal Science

A Project Curriculum ◆ Volunteer Guide for 4-H Youth Ages 9–11

3A



Maps, Good Recordkeeping, and Tracking Animal Movement

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Curriculum Overview

Animal Science projects are a cornerstone of the 4-H Youth Development Program. Many 4-H youth enroll in these projects, and the majority focus on the rearing and husbandry of market animals, including poultry, ruminants, and swine.

The activities in Module 1 of this curriculum teach youth how contagious diseases spread among livestock. Module 2 focuses on recognizing and addressing disease risks that are present at home or at any given fair or livestock event. Modules 3A and 3B (choose one or the other for your group) have activities that address the issue of tracking animal movement, including the use of Global Positioning System (GPS) technology in 3B.

PRE-ACTIVITY

Where in the World Is Tuolumne County?

Subject Overview and Background Information

How do you read and find a **point** on a map? What you should look for first are the vertical and horizontal lines on the map. The vertical lines (running up and down) are called **longitude** lines and the horizontal lines (running left to right) are called **latitude** lines. One longitude line in particular, known as the **Prime Meridian** (or the Greenwich Meridian [pronounced *gren*-itch], because it runs through Greenwich, England), divides the earth into the Eastern and Western **Hemispheres.** The latitude line that divides world maps into the Northern and Southern Hemispheres is called the **equator.**

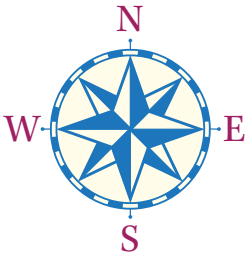
The earth is a **sphere,** and **cartographers** divide its area into 360 degrees (360°) of longitude, running 180° to the west and 180° to the east from the Prime Meridian (0° longitude). North-south measurements begin with 0° latitude at the equator and go up to 90° north at the North Pole and down to 90° south at the South Pole. N or S must be written to distinguish north from south latitude, and E or W must always be written to distinguish east from west longitude.

A point on a map where a longitude and a latitude line **intersect** (cross) is called a **coordinate.** For example, the general coordinates for Paris, France, are 48°N, 2°E. The first part of the coordinate shows degrees (°) latitude, indicating the relationship of that location to the equator (N or S). The second part of the coordinate shows degrees longitude, indicating the relationship of that location to the Prime Meridian (E or W). Together, these determine the point of your location. By knowing different coordinates, you can use maps or Global Positioning System (GPS) and Geographic Information System (GIS) technologies to identify any point on the globe.

While maps are useful for finding different points or locations, they are also useful because they provide directions to help you find your way from one point to another. When looking at a map, the first things you should determine are the **cardinal directions** (north, south, east, and west) by looking at the map's **compass rose.** This will help you determine your **orientation** on the map. Next, find the **scale** of the map. This gives you a reference for the actual distance from one map point to another. The scale will be different depending on the type of map you use. Looking at a **legend** will help you determine what the different symbols on a map represent.

Activity Concepts and Vocabulary

- **Cardinal directions:** The cardinal directions are north, south, east, and west. North and south are determined by the position of the North and South Poles. East and west are determined by the earth's rotation.
- **Cartographer** (pronounced kahr-tog-ruh-fer): A person who develops maps.
- **Compass rose:** A circular symbol that is found on a map and indicates the directions of north, south, east, and west.



- **Coordinate** (pronounced koh-awr-dn-it): A set of numbers used to determine the position of a point on a map.
- **Equator:** A horizontal (east-west) line at 0° latitude that divides the earth into equal Northern and Southern Hemispheres.
- **Hemisphere:** One half of a sphere or globe.
- **Intersection:** The point where two lines (longitude and latitude) cross each other on a map.

- **Latitude:** The horizontal lines running left to right on a map, and measuring north-to-south position.
- **Legend:** A table or chart describing the meaning of symbols on a map.
- **Longitude:** The vertical lines running up and down on a map and measuring east-to-west position.
- **Orientation:** The correct relationship to a specific direction with respect to the reference points on a compass.
- **Point:** A point is the intersection of a latitude line and a longitude line.
- **Prime Meridian (Greenwich Meridian):** The vertical (north-south) line at 0° longitude that divides the earth into equal Eastern and Western Hemispheres.
- **Scale:** A reference that designates what distance on a map corresponds to a given distance in the real world (e.g., "├────────┤= 1 mile").
- **Sphere:** An object that is a round solid figure; the shape of a globe or planet.

Life Skills

- **Head:** Critical thinking, problem solving, learning to learn, planning/organizing, wise use of resources.
- **Heart:** Communication, cooperation, sharing.
- **Hands:** Contributions to a group effort, teamwork.
- **Health:** Self-discipline, self-esteem.

California Educational Content Standards

- Third Grade:
  - ✓ Investigation and Experimentation – 5c
- Fourth Grade:
  - ✓ Investigation and Experimentation – 6b
- Fifth Grade:
  - ✓ Investigation and Experimentation – 6g
- Sixth Grade:
  - ✓ Investigation and Experimentation – 7f

Subject Links

Science, Math, and Language Arts.

Purpose of Activity

To understand the coordinate system and learn how to use a map by focusing on scaling and directions.

Overview of Activity

This activity is separated into two parts. Part 1 introduces youth to coordinates, latitude, and longitude. Youth will discover the importance of latitude and longitude lines on a map and learn how to use these lines to determine coordinates of a point. Part 2 will address the concepts of scaling and direction. By looking at different maps, youth will learn how to interpret information on a map and will also learn how different types of maps are helpful in different situations. This will link to the use of mapping with GPS technologies. (If you have access to GPS devices for participants to use, try using Module 3B [ANR Publication 3441] instead of this one.)

Time Required

40 to 60 minutes.

Suggested Grouping

Pairs or small groups of 3 to 4.

Materials Needed

(* = *Materials provided in curriculum*)

- * *Simple Map of California (See appendix)*
- * *Detailed Map of California (See appendix)*
- * *Map of United States (See appendix)*
- Rulers
- Pencils, pens, or markers
- Flip chart paper

Getting Ready

- Make enough copies of the *Simple Map of California* so half of the groups can receive a copy.
- Make enough copies of the *Detailed Map of California* so each group has a copy.
- Make enough copies of the *Map of United States* so each group has a copy.
- Make sure you have enough rulers for each group.

- Make sure you have enough flip chart paper and pencils, pens, or markers for each youth.

Opening Questions

1. **If you are trying to describe the specific location of an object in your bedroom (e.g., on a bookshelf, in a drawer) to someone, what do you think are some useful ways to do this?** Please write your responses on the flip chart paper provided.
2. **If your friend is traveling by car or bicycle to a place he or she has never been, describe what he or she might need to know and how you might go about giving him or her directions.** Please write your thoughts and ideas on the flip chart paper provided.
3. **If you were going on a trip to a new place, how might you find out how to get there?** Please write your responses on the flip chart paper provided.
4. **What are some things you know about maps and the information you can find on them?** Please write your responses on the flip chart paper provided.

PART 1: Procedure (Experiencing)

1. Divide the group of youth in half. Within each half, have the youth work in small groups of 3 or 4 individuals.
2. Distribute the *Simple Map of California* to half of the youth; pass out the *Detailed Map of California* to the other half of the group.
3. Have each small group of 3 or 4 describe in as much detail as they can the location of the following cities in relation to each other. Please ask them to write their responses on the flip chart paper provided.
   - ✓ San Francisco and Sacramento
   - ✓ Sacramento and Fresno
   - ✓ Fresno and San Francisco

PART 1: Sharing, Processing, and Generalizing

Follow the lines of thinking developed by the youth as they share and compare their thoughts and observations. If necessary, use more targeted questions as prompts to get to particular points. Specific questions might include:

1. **Ask the different small groups to share how they described the location of one of the cities in relation to the other.**
2. **Which small group's description do you think is the most useful? Why?**

PART 2A: Procedure (Experiencing)

1. Pass out the *Map of the United States* to each group.
2. Ask the youth to find the major city closest to each of these two points: 123°W, 38°N and 118°W, 34°N.
   - ✓ **Volunteer Tip:** The correct answers are San Francisco and Los Angeles.
3. Noting the scale on the map (usually at the bottom near the legend), have the youth use the rulers to estimate the distance between the two cities.

PART 2A: Sharing, Processing, and Generalizing

Follow the lines of thinking developed by the youth as they share and compare their thoughts and observations. If necessary, use more targeted questions as prompts to get to particular points. Specific questions might include:

1. **How did you find these points**? Please explain.
2. **What do you know about the horizontal and vertical lines and the points where they cross?**
   - ✓ Volunteer Tip: Listen for the terms latitude, longitude, and coordinates.
3. **How did you figure out the distance? What does one inch on this map represent?**

4. **If you were traveling from the first point to the second, in which direction would you be traveling?** Have them explain their method.
   ✓ **Volunteer Tip:** The correct answer is southeast.

PART 2B: Procedure (Experiencing)

1. Pass out copies of the *Detailed Map of California* to each group that previously had the *Simple Map of California*.
2. Have the youth find the same two points/cities on this map (123°W, 38°N and 118°W, 34°N) as on the previous map.
3. Noting the scale on this map, have them again estimate the distance between the two points.

PART 2B: Sharing, Processing, and Generalizing

Follow the lines of thinking developed by the youth as they share and compare their thoughts and observations. If necessary, use more targeted questions as prompts to get to particular points. Specific questions might include:

1. **What is different about this map compared to the previous map? Please describe.**
2. **Which map do you think made it easier to use to find the distance between these two cities? Please explain why.**

Concept and Term Introduction

At this point, volunteers need to ensure that the concepts and terms **cardinal directions** (north, south, east, west), **cartographer, compass rose, coordinate, equator, intersection, latitude, longitude, orientation, point, Prime Meridian,** and **scale** have been introduced. (**Note:** The goal is to have the youth develop these concepts through their own exploration and define the terms using their own words.)

Concept Application

1. Record the location of all fairs, shows, and exhibitions you attend with your animal during the year in your record book.
2. Using the *Detailed Map of California* provided in this activity or some other detailed map of California, identify the latitude and longitude of each fair, show, and exhibition you attend with your animal during the year. Record this information in your record book.
3. Using the cardinal directions (north, south, east, and west) as well as the scale on the map, determine the direction and distance each fair, show, or exhibition is from your home. Record this information in your record book.

References

Answers.com. (2009). Cardinal direction. WikiAnswers.com. http://www.answers.com/topic/cardinal-direction

Davidson, R. (2002–2008). Reading topographic maps. Geographic coordinates. http://www.map-reading.com/ch4-1.php#fig4-4

Rosenberg, M. Map scale – Measuring distance on a map. http://geography.about.com/cs/maps/a/mapscale.htm

Thoen, B. (1999-2002). Origins of the compass rose. http://www.gisnet.com/notebook/comprose.html

Wikipedia. Map. http://en.wikipedia.org/wiki/Maps

ACTIVITY

Tracking Your Animal's Movement from Fair to Fair

IMPORTANT NOTE: Please note that Activity in Modules 3A and 3B is essentially the same, so you should choose to do one or the other. The only difference between these activities is that Activity in Module 3B is designed to use GPS units to locate fairs and do a traceback. We recommend that you try Activity in Module 3B (publication 8441) if you have GPS units readily available.

Subject Overview and Background Information

4-H Animal Science projects are potential **bio-security** risks. The majority of 4-H Animal Science projects focus on the rearing, husbandry, and, in many cases, showing and marketing of live animals, including poultry, ruminants, and swine. In most cases, 4-H members house their animals at home or in shared facilities, meet collectively as a club once or more every month, and convene in larger groups on exhibition days and at county or state fairs. Because backyard flocks and herds serve as potential vectors of disease, these public venues represent a significant bio-security risk.

Maintaining records of animal movement is critical to helping prevent the spread of disease. If an animal at a fair or show were to be infected with a disease, access to information that accurately describes the animal's movements would be very useful for a step known as a **traceback.** In a traceback, you can see where the animal has traveled and determine which other animals may have been exposed to the disease and may have become infected.

Activity Concepts and Vocabulary

- **Bio-security:** Precautions taken to protect a living thing (e.g., humans, animals, or plants) from attack or interference due to biological organisms that have the potential to cause them harm. A less formal definition for bio-security is "Keeping the bad bugs off the farm."
- **Direct contact:** Physical contact between an ill person or animal and a healthy person or animal.
- **Indirect contact:** When an uninfected person or animal touches the contaminated surface of an inanimate object (e.g., a food dish or tabletop) that has previously come into contact with an infected person or animal.
- **Traceback:** The process of tracking the places where an animal has been.

Life Skills

- **Head:** Keeping records, critical thinking, problem solving, decision making.
- **Heart:** Sharing, cooperation, communication.
- **Hands:** Contributions to group effort, teamwork.
- **Health:** Disease prevention, personal safety.

California Educational Content Standards

- Third Grade:
  - ✓ Investigation and Experimentation – 5c, 5e
- Fourth Grade:
  - ✓ Investigation and Experimentation – 6c
- Fifth Grade:
  - ✓ Investigation and Experimentation – 6g, 6h
- Sixth Grade:
  - ✓ Investigation and Experimentation – 7b, 7f

Subject Links

Science and Language Arts.

Purpose of Activity

To understand the importance of assessing and managing the factors that increase the risk of disease transmission, as well as how a good strategy for keeping accurate records can help with your traceback efforts when you need to locate the source and site of infection in the event of a disease outbreak.

Overview of Activity

In this activity, youth will simulate travel to different fairs with project animals. Through this experience, they will develop an understanding of how the act of taking their animals to multiple fairs or shows increases their risk of exposure to disease. They will also understand how important it is for them to keep accurate records to assist in traceback efforts.

Time Required

60 minutes.

Suggested Grouping

5 small groups or pairs.

Materials Needed

(* = *Materials provided in curriculum*)

- * *Longitude/Latitude Degree Cards (See appendix)*
- * *Coordinates for Homes and Fairs (See appendix)*
- * *Home* and *Fair Name Labels (See appendix)*
- Something to hold down the labels (rocks, tape etc.)
- Colored paper (8½ x 11 inch sheets of construction paper in blue, purple, green, red, and orange)
- * *Tracking Sheets*
- * *Volunteers: Tracking Sheets Key*
- * *Detailed Map of California*
- * *Animal Contact Record Sheet* (Concept Application)
- Five medium or large plastic cups
- Flip chart paper
- Pencils, pens, or markers
- A clipboard for each group (optional)

Getting Ready

- Copy and cut the *Home* and *Fair Name Labels* and *Longitude/Latitude Degree Cards*.
- Make enough copies of *Coordinates for Homes and Fairs* sheet so each group has a copy.
- Cut colored construction paper into 16 squares for all five colors, and then crumple the squares to form wads.
- Make enough copies of the *Animal Contact Record Sheet* so each youth has at least one copy of the sheet (Concept Application).
- Make sure you have enough flip chart paper and pencils, pens, or markers for each group.
- Identify a large area (e.g., school playground, gymnasium, multi-purpose room) where youth can construct a map of California. Using the *Longitude/Latitude Degree Cards* (held down by rocks, tape, etc. if necessary) and a copy of the *Detailed Map of California*, construct a large map of California. (**Note:** If possible, the map should be at least the size of a basketball court.) Once the *Longitude/Latitude Degree Cards* have been arranged, place the *Home* and *Fair Name Labels* at the appropriate points on the large map using the *Coordinates for Homes and Fairs* handout (appendix) and the *Detailed Map of California* as guides.
- Divide the youth into 5 pairs or 5 groups of 2 to 4 youth and designate each group with a color (blue, purple, green, red, and orange).
- Provide each group with a copy of the *Detailed Map of California.*
- Provide each group with *Tracking Sheets.* Each *Tracking Sheet* has a designated color. Provide a copy of the *Tracking Sheet* to each group according to color.

Opening Questions

1. **When considering disease, disease spread, risk assessment, and bio-security, how might these concepts relate to you personally with respect**

to your Animal Science projects? Please write your responses on the flip chart paper provided.

2. **If it were your job to be a health inspector, what information do you believe would be important for you to know in order to monitor or control disease spread?** Please write your responses on the flip chart paper provided.

Procedure (Experiencing)

Once the large map has been created, ask the youth to review their *Tracking Sheets*. Have all participants identify their "home" on the large map, their animal's identification (the color of their paper wads), the number of rounds, and the number of steps per round. Have them take note of the coordinates that are given to them and the data that are left for them to record (the name of the fair and the other "animals" [colors] present at the fair).

✓ **Volunteer Tip:** It is important that the person facilitating this activity keep track of the different rounds and the number of colored pieces of paper that are exchanged between groups throughout the activity.

Round 1

1. Standing near their home city, ask the youth to locate Fair 1 on their *Detailed Map of California* using the coordinates provided on their *Tracking Sheet.*
   ✓ **Note:** Find the county fair closest to the coordinates provided.
2. Ask the youth to find this fair's location on the large map and visit it, taking with them their cups full of wads of colored paper.
3. When each group has reached this fair, ask them to exchange wads of colored paper with any other groups at the same fair. They should exchange 1 wad of their colored paper with each group.
4. Ask the youth to fill in the appropriate information on their *Tracking Sheet* and then return home.
5. Once everyone has reached their home, have the Volunteer draw one color at random. Tell the youth that the animals with this color were infected with a disease that is passed from animal to animal via **direct** or **indirect** contact. Ask the youth to do a traceback using their *Tracking Sheets.* Their goal is to identify where and when their animal (color) came into contact with the infected animal(s).
6. **Discussion:** In addition to the animals that were identified as being sick, were any other animals infected? If so, which animals are they? Where were they infected? Ask the youth to explain. If the animals were not infected, ask the youth to explain why.
7. This is the end of Round 1. Ask each group to remove any wads of paper that are not of their original color and return those to their appropriate groups before they proceed to Round 2.

Round 2

1. Standing near their home city, ask the youth to locate Fair 1 on their *Detailed Map of California* using the coordinates provided on their *Tracking Sheet.*
   ✓ **Note:** Find the county fair closest to the coordinates provided.
2. Ask the youth to find this fair's location on the large map and visit it, taking with them their cups full of wads of colored paper.
3. When each group has reached this fair, ask them to exchange wads of colored paper with any other groups at the same fair. They should exchange 3 wads of their colored paper with each group.
4. Ask the youth to fill in the appropriate information on their *Tracking Sheet* and then return home.
5. Next, ask the youth to locate Fair 2 on their *Detailed Map of California* using the coordinates provided on their *Tracking Sheet.*
   ✓ **Note:** Find the county fair closest to the coordinates provided.
6. Taking with them all of the wads of colored paper they collected from Fair 1 as well as their own colored pieces, ask the youth to locate Fair 2 and visit it.

7. When each group has reached the location of Fair 2, ask them to exchange wads of their own colored paper, plus any other-colored pieces they collected from Fair 1, with other groups at the same fair. They should give each group at that location 1 wad of paper of each color that they have in their cup.
8. Ask the youth to record the appropriate information on their *Tracking Sheet* and return home. Make sure that when they return home they still have colored pieces that they collected from Fair 1 and Fair 2.
9. Announce that the animals with the color ORANGE have been infected with a disease that is passed from animal to animal via **direct** or **indirect** contact. Ask the youth to do a traceback using their *Tracking Sheets.* Their goal is to identify where and when their animal (color) came into contact with infected animals.
10. Using their *Tracking Sheets,* have them return to their last fair. Once they have reached their last fair, have them discuss with other groups at the fair where and when their animal (color) came into contact with the infected animal. If there are no other groups at the fair, the members of the one group there can discuss this among themselves.
11. Starting from their last fair, have them repeat step 10 until they have done a traceback to all the fairs they have visited for this round. They should end at their home.
12. **Discussion:** Have the groups share information about whose animals were infected, where they became infected, and how they got infected. Then have them work as an entire group to brainstorm ideas on different ways their animal could have been infected.
13. This is the end of Round 2. Ask each group to remove any wads of colored paper that are not of their original color and return those to their appropriate groups. Then proceed to Round 3.

Round 3

1. Standing near their home city, ask the youth to locate their Fair 1 on their *Detailed Map of California* using the coordinates provided on their *Tracking Sheet.*
   ✓ **Note:** Find the county fair closest to the coordinates provided.
2. Ask the youth to find this fair's location on the large map and visit it, taking with them their cups full of wads of colored paper.
3. When each group has reached this fair, ask them to exchange wads of colored paper with any other groups at the same fair. They should exchange 5 wads of their colored paper with each group.
4. Ask the youth to fill in the appropriate information on their *Tracking Sheet* and then return home.
5. Ask the youth to take all of the wads of colored paper they collected from Fair 1 as well as their own colored pieces, and then to locate Fair 2 and visit it.
   ✓ **Note:** Find the county fair closest to the coordinates provided.
6. When each group has reached the location of this fair, ask them to exchange wads of their own colored paper, plus any other-colored pieces they collected from Fair 1 with other groups at the Fair 2. They should give each group 3 wads of paper of each color that they have in their cup.
7. Ask the youth to record the appropriate information on their *Tracking Sheet* and then return home. Make sure that when they return home they still have colored pieces that they collected from Fair 1 and Fair 2.
8. Ask the youth to locate Fair 3 on their *Detailed Map of California* using the coordinates provided.
   ✓ **Note:** Find the county closest to the coordinates provided.
9. Taking with them their own colored pieces and all of the colors they collected from Fair 1 and Fair 2, ask the youth to locate Fair 3 on the large map and visit it.
10. When each group has reached the fair, ask them to exchange their own colored pieces of paper, plus any other-colored pieces they collected from Fair 1 and Fair 2, with other groups at the same fair. They should give each other 1 wad of each color that they have in their cup.

11. Ask the youth to record the appropriate information on their *Tracking Sheet,* and then return home. Make sure that when they return home they still have colored pieces that they collected from Fair 1, Fair 2, and Fair 3.
12. Announce that animals with the color RED were found to be infected with a disease that is passed from animal to animal via **direct** or **indirect** contact. Ask the youth to do a traceback using their *Tracking Sheets.* Their goal is to identify where and when their animal (color) came into contact with infected animals.
13. Have them return to their last fair using their *Tracking Sheets.* Once they have reached their last fair, have them discuss with other groups at the fair where and when their animal (color) came into contact with the infected animal. If there are no other groups at the fair, the members of the one group there can discuss this among themselves.
14. Starting from their last fair, have them repeat step 13 until they have done a traceback to all the fairs they have visited for this round. They should end at their home.
15. **Discussion:** Have the groups share information about whose animals were infected, where they became infected, and how they got infected. Then as an entire group, brainstorm ideas on different ways their animal could have been infected.
16. This is the end of Round 3. Ask each group to remove any wads of colored paper that are not of their original color and return those to their appropriate groups.

Sharing, Processing, and Generalizing

Follow the lines of thinking developed by the youth as they share and compare their thoughts and observations. If necessary, use more targeted questions as prompts to get to particular points. Specific questions/prompts might include:

1. **Compare the data on the *Tracking Sheets* from Rounds 1, 2, and 3. What do you conclude from the information you recorded? Why were more colors present in one round than in another? What do you think the colored pieces of paper represented?**
   - ✓ **Volunteer Tip:** They represent contacts, direct or indirect, with other animals. Consult *Volunteer's Key* if necessary.
2. **This activity is staged. How might this play out if you and other members were actually transporting your animals to different fairs? Please explain your thoughts and ideas.**

Concept and Term Introduction

At this point, volunteers need to ensure that the concepts and terms **bio-security, direct contact, indirect contact,** and **traceback** have been introduced. (**Note:** The goal is to have the youth develop these concepts through their exploration and define the terms using their own words.)

Concept Application

1. Provide the youth with the worksheet *Animal Contact Record Sheet.* This worksheet is to be used at their farm or on their property or at any club meeting, fair, show, or exhibition where the youth might transport and house their animals. Have the youth make observations and complete the worksheet as accurately as possible.
2. Have the youth discuss their completed worksheets and the possible risks to which their project animal may have been exposed. Then discuss different ways to reduce the risks.
   - ✓ **Volunteer Tip:** Have the youth write the risks on flip chart paper or a white board, and then have a group discussion of possible ways to reduce the risk.

References

Baha'i Computer and Communication Association. Look-up latitude and longitude – USA. http://www.bcca.org/misc/qiblih/latlong_us.html#CALIFORNIA

Bailey, DeVonn (2004). Benefits and costs associated with an animal identification system for cattle in the United States. Western Center for Risk Management Education. http://ucce.ucdavis.edu/files/filelibrary/1524/24478.pdf

California Department of Food and Agriculture. Fairs and expositions. http://www.cdfa.ca.gov/fe/

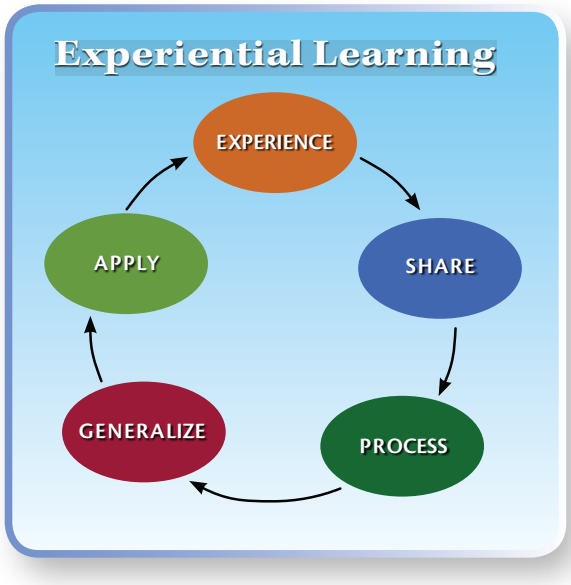
The Ohio State University Extension. Bio-security for youth livestock exhibitors. http://ohioline.osu.edu/vme-fact/0007.html

Wallace, D. (2001). "Bio-security" and "biocontainment" for livestock in 2001. Extension Ag Update, University of Illinois Extension. http://www.urbanext.uiuc.edu/agupdate/0111_article1.html

What Is GIS? GIS.com. http://www.gis.com/whatisgis/index.html

APPENDIX

The activities in this curriculum were designed around inquiry and experiential learning. Inquiry is a learner-centered approach in which individuals are problem solvers investigating questions through active engagement, observing and manipulating objects and phenomena, and acquiring or discovering knowledge. Experiential learning (EL) is a foundational educational strategy used in 4-H. In it, the learner has an experience phase of engagement in an activity, a reflection phase in which observations and reactions are shared and discussed, and an application phase in which new knowledge and skills are applied to real-life settings. In 4-H, an EL model that uses a five-step learning cycle is most commonly used. These five steps—Experiencing, Sharing, Processing, Generalizing, and Application—are part of a recurring process that helps build learner understanding over time.

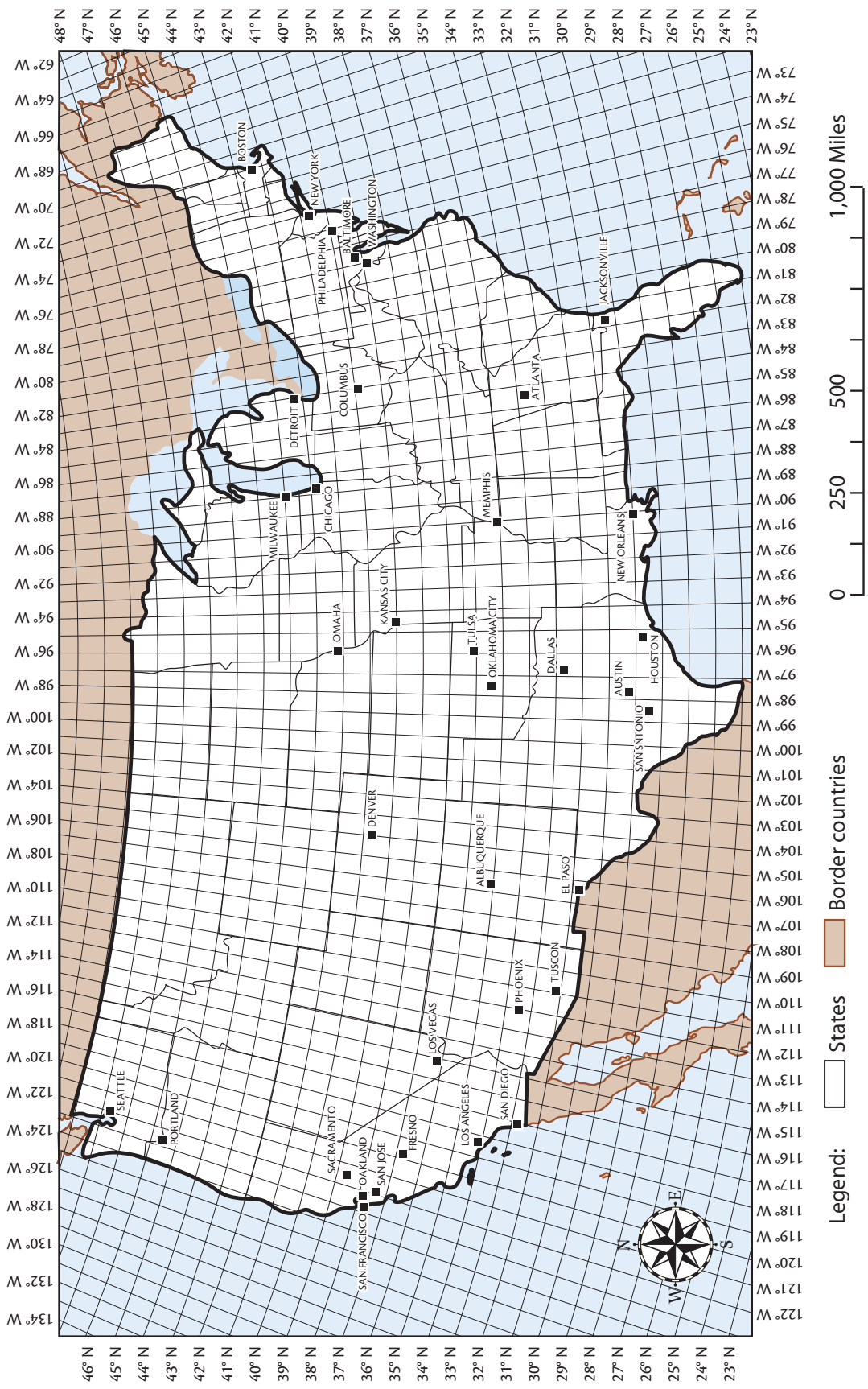


For more information on inquiry, EL, and the five-step learning cycle, please visit the University of California Science, Technology, and Environmental Literacy Workgroup's Experiential Learning Web site, http://www.experientiallearning.ucdavis.edu/.

SIMPLE MAP OF CALIFORNIA

DETAILED MAP OF CALIFORNIA

MAP OF UNITED STATES



Longitude/Latitude Degree Cards

124°W	123°W	122°W
121°W	120°W	119°W
118°W	117°W	116°W
115°W		43°N

42°N	41°N	40°N
39°N	38°N	37°N
36°N	35°N	34°N
33°N	32°N	31°N

Coordinates for Homes and Fairs

(Note: These coordinates are approximations.)

Home	Coordinates
Monterey	Latitude: 36° N Longitude: 122° W
Sacramento	Latitude: 39° N Longitude: 121° W
San Diego	Latitude: 33° N Longitude: 117° W
San Luis Obispo	Latitude: 35° N Longitude: 121° W
Santa Cruz	Latitude: 37° N Longitude: 122° W

Fair	Coordinates
Amador County Fair	Latitude: 38° N Longitude: 121° W
Butte County Fair	Latitude: 40° N Longitude: 122° W
El Dorado County Fair	Latitude: 39° N Longitude: 120° W
Fresno County Fair	Latitude: 36° N Longitude: 119° W
Los Angeles County Fair	Latitude: 34° N Longitude: 119° W
Merced County Fair	Latitude: 37° N Longitude: 121° W
San Bernardino County Fair	Latitude: 35° N Longitude: 116° W
San Diego County Fair	Latitude: 33° N Longitude: 117° W
Santa Barbara County Fair and Exposition	Latitude: 35° N Longitude: 120° W
Sonoma-Marin County Fair	Latitude: 38° N Longitude: 123° W
Tehama District Fair	Latitude: 40° N Longitude: 123° W
Yuba-Sutter Fair	Latitude: 39° N Longitude: 121° W

Home Name Labels

Monterey

Sacramento

San Diego

San Luis Obispo

Santa Cruz

Fair Name Labels

Merced County Fair

Fresno County Fair

Santa Barbara County Fair and Exposition

San Bernardino County Fair

Fair Name Labels

Los Angeles County Fair

Yuba-Sutter Fair

Sonoma-Marin County Fair

El Dorado County Fair

Fair Name Labels

Amador County Fair

Butte County Fair

San Diego County Fair

Tehama District Fair

BLUE Tracking Sheet

Home: San Diego

- ***Color:*** Blue
- ***Latitude:*** 33° N
- ***Longitude:*** 117° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1: San Bernardino County Fair	35° N	116° W	7/20/05		1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1: San Bernardino County Fair	35° N	116° W	7/25/06		3 wads of paper to each group at the fair
FAIR 2 Los Angeles County Fair	34° N	119° W	8/02/06		1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Merced County Fair	37° N	121° W	8/05/07		5 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/17/07		3 wads of paper of each color to each group at the fair
FAIR 3 San Bernardino County Fair	35° N	116° W	8/25/07		1 wad of paper of each color to each group at the fair

GREEN Tracking Sheet

Home: San Louis Obispo

- ***Color:*** Green
- ***Latitude:*** 35° N
- ***Longitude:*** 121° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1: Fresno County Fair	36° N	119° W	7/20/05		1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	7/25/06		3 wads of paper to each group at the fair
FAIR 2 Los Angeles County Fair	34° N	119° W	8/02/06		1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	8/05/07		5 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/17/07		3 wads of paper of each color to each group at the fair
FAIR 3 San Bernardino County Fair	35° N	116° W	8/25/07		1 wad of paper of each color to each group at the fair

ORANGE Tracking Sheet

Home: Monterey

- ***Color:*** Orange
- ***Latitude:*** 36° N
- ***Longitude:*** 122° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Merced County Fair	37° N	121° W	7/20/05		1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	7/25/06		3 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/02/06		1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Merced County Fair	37° N	121° W	8/05/07		5 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/17/07		3 wads of paper of each color to each group at the fair
FAIR 3 San Bernardino County Fair	35° N	116° W	8/25/07		1 wad of paper of each color to each group at the fair

PURPLE Tracking Sheet

Home: Sacramento

- ***Color:*** Purple
- ***Latitude:*** 39° N
- ***Longitude:*** 121° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Yuba-Sutter Fair	39° N	121° W	7/20/05		1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Yuba-Sutter Fair	39° N	121° W	7/20/05		3 wads of paper to each group at the fair
FAIR 2 Merced County Fair	37° N	121° W	8/02/06		1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Merced County Fair	37° N	121° W	8/05/07		5 wads of paper to each group at the fair
FAIR 2 Los Angeles County Fair	34° N	119° W	8/17/07		3 wads of paper of each color to each group at the fair
FAIR 3 San Bernardino County Fair	35° N	116° W	8/25/07		1 wad of paper of each color to each group at the fair

RED Tracking Sheet

Home: Santa Cruz

- ***Color:*** Red
- ***Latitude:*** 37° N
- ***Longitude:*** 122° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	7/20/05		1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Yuba-Sutter Fair	39° N	121° W	7/25/06		3 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/02/06		1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	8/05/07		5 wads of paper to each group at the fair
FAIR 2 Stay Home			8/17/07		3 wads of paper of each color to each group at the fair
FAIR 3 Yuba-Sutter Fair	39° N	121° W	8/25/07		1 wad of paper of each color to each group at the fair

VOLUNTEERS: BLUE Tracking Sheet KEY

Home: San Diego

- ***Color:*** Blue
- ***Latitude:*** 33° N
- ***Longitude:*** 117° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 San Bernardino County Fair	35° N	116° W	7/20/05	none	1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 San Bernardino County Fair	35° N	116° W	7/25/06	none	3 wads of paper to each group at the fair
FAIR 2 Los Angeles County Fair	34° N	119° W	8/02/06	green	1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Merced County Fair	37° N	121° W	8/05/07	purple, orange	5 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/17/07	green, orange	3 wads of paper of each color to each group at the fair
FAIR 3 San Bernardino County Fair	35° N	116° W	8/25/07	orange, purple, green	1 wad of paper of each color to each group at the fair

VOLUNTEERS: GREEN Tracking Sheet KEY

Home: San Louis Obispo

- ***Color:*** Green
- ***Latitude:*** 35° N
- ***Longitude:*** 121° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Fresno County Fair	36° N	119° W	7/20/05	none	1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	7/25/06	orange	3 wads of paper to each group at the fair
FAIR 2 Los Angeles County Fair	34° N	119° W	8/02/06	blue	1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	8/05/07	red	5 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/17/07	blue, orange	3 wads of paper of each color to each group at the fair
FAIR 3 San Bernardino County Fair	35° N	116° W	8/25/07	purple, orange, blue	1 wad of paper of each color to each group at the fair

VOLUNTEERS: ORANGE Tracking Sheet KEY

Home: Monterey

- ***Color:*** Orange
- ***Latitude:*** 36° N
- ***Longitude:*** 122° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Merced County Fair	37° N	121° W	7/20/05	none	1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	7/25/06	green	3 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/02/06	red	1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Merced County Fair	37° N	121° W	8/05/07	purple, blue	5 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/17/07	green, blue	3 wads of paper of each color to each group at the fair
FAIR 3 San Bernardino County Fair	35° N	116° W	8/25/07	blue, green, purple	1 wad of paper of each color to each group at the fair

VOLUNTEERS: PURPLE Tracking Sheet KEY

Home: Sacramento

- ***Color:*** Purple
- ***Latitude:*** 39° N
- ***Longitude:*** 121° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Yuba-Sutter Fair	39° N	121° W	7/20/05	none	1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Yuba-Sutter Fair	39° N	121° W	7/20/05	red	3 wads of paper to each group at the fair
FAIR 2 Merced County Fair	37° N	121° W	8/02/06	none	1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Merced County Fair	37° N	121° W	8/05/07	orange, blue	5 wads of paper to each group at the fair
FAIR 2 Los Angeles County Fair	34° N	119° W	8/17/07	none	3 wads of paper of each color to each group at the fair
FAIR 3 San Bernardino County Fair	35° N	116° W	8/25/07	blue, green, orange	1 wad of paper of each color to each group at the fair

VOLUNTEERS: RED Tracking Sheet KEY

Home: Santa Cruz

- Color: Red
- Latitude: 37° N
- Longitude: 122° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	7/20/05	none	1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Yuba-Sutter Fair	39° N	121° W	7/25/06	purple	3 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/02/06	orange	1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	8/05/07	green	5 wads of paper to each group at the fair
FAIR 2 Stay Homer			8/17/07		3 wads of paper of each color to each group at the fair
FAIR 3 Yuba-Sutter Fair	39° N	121° W	8/25/07	none	1 wad of paper of each color to each group at the fair

Animal Contact Record Sheet

Animal: _____

Location of potential contacts (check all that apply):

- ❑ Home _____
- ❑ Fair:_____
- ❑ Show: _____
- ❑ Exhibition: _____
- ❑ Direct contact with other animals? __ Yes __ No

If yes, contact during:

❑ Transportation

Animal species	Number of animals
a._____	a._____
b._____	b._____
c._____	c._____
d._____	d._____

If yes, contact during:

❑ Housing

Animal species	Number of animals
a._____	a._____
b._____	b._____
c._____	c._____
d._____	d._____

If yes, contact during:

❑ Competition

Animal species	Number of animals
a._____	a._____
b._____	b _____
c._____	c._____
d._____	d._____

If yes, contact during:

❑ Other (please indicate) _____

Animal species	Number of animals
a._____	a._____
b._____	b._____
c._____	c._____
d._____	d._____

- ❑ Indirect contact with other animals: __ Yes __ No

If yes, check all that apply:

- ❑ Non-owner human contact
- ❑ Troughs/containers
- ❑ Footwear
- ❑ Wash rack
- ❑ Show arena or exercise area
- ❑ Shared food and water
- ❑ Clothing
- ❑ Tools/equipment
- ❑ Vehicles
- ❑ Barn or holding pen
- ❑ Other (please specify) _____

For More Information

You will find related information in other publications, slide sets, CD-ROMs, and videos from UC ANR.

To order products or download free publications, visit our online catalog at http://anrcatalog.ucdavis.edu. You can also place orders by mail, phone, or FAX, or request a printed catalog of publications, slide sets, CD-ROMs, and videos from

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BIO-SECURITY in 4-H Animal Science

A Project Curriculum ◆ Volunteer Guide for 4-H Youth Ages 9–11

3B

Maps, GPS, Good Recordkeeping, and Tracking Animal Movement

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Curriculum Overview

Animal Science projects are a cornerstone of the 4-H Youth Development Program. Many 4-H youth enroll in these projects, and the majority focus on the rearing and husbandry of market animals, including poultry, ruminants, and swine.

The activities in Module 1 of this curriculum teach youth how contagious diseases spread among livestock. Module 2 focuses on recognizing and addressing disease risks that are present at home or at any given fair or livestock event. Modules 3A and 3B (choose one or the other for your group) have activities that address the issue of tracking animal movement, including the use of Global Positioning System (GPS) technology in 3B.

PRE-ACTIVITY

Where in the World Is Tuolumne County?

Subject Overview and Background Information

How do you read and find a ***point*** on a map? What you should look for first are the vertical and horizontal lines on the map. The vertical lines (running up and down) are called ***longitude*** lines and the horizontal lines (running left to right) are called ***latitude*** lines. One longitude line in particular, known as the ***Prime Meridian*** (or the Greenwich Meridian [pronounced *gren*-itch], because it runs through Greenwich, England), divides the earth into the Eastern and Western ***Hemispheres.*** The latitude line that divides world maps into the Northern and Southern Hemispheres is called the ***equator.***

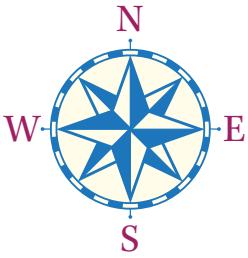
The earth is a **sphere,** and **cartographers** divide its area into 360 degrees (360°) of longitude, running 180° to the west and 180° to the east from the Prime Meridian (0° longitude). North-south measurements begin with 0° latitude at the equator and go up to 90° north at the North Pole and down to 90° south at the South Pole. N or S must be written to distinguish north from south latitude, and E or W must always be written to distinguish east from west longitude.

A point on a map where a longitude and a latitude line **intersect** (cross) is called a **coordinate.** For example, the general coordinates for Paris, France, are 48°N, 2°E. The first part of the coordinate shows degrees (°) latitude, indicating the relationship of that location to the equator (N or S). The second part of the coordinate shows degrees longitude, indicating the relationship of that location to the Prime Meridian (E or W). Together, these determine the point of your location. By knowing different coordinates, you can use maps or Global Positioning System (GPS) and Geographic Information System (GIS) technologies to identify any point on the globe.

While maps are useful for finding different points or locations, they are also useful because they provide directions to help you find your way from one point to another. When looking at a map, the first things you should determine are the **cardinal directions** (north, south, east, and west) by looking at the map's **compass rose.** This will help you determine your **orientation** on the map. Next, find the **scale** of the map. This gives you a reference for the actual distance from one map point to another. The scale will be different depending on the type of map you use. Looking at a **legend** will help you determine what the different symbols on a map represent.

Activity Concepts and Vocabulary

- **Cardinal directions:** The cardinal directions are north, south, east, and west. North and south are determined by the position of the North and South Poles. East and west are determined by the earth's rotation.
- **Cartographer** (pronounced kahr-tog-ruh-fer): A person who develops maps.
- **Compass rose:** A circular symbol that is found on a map and indicates the direction of north, south, east, and west.



- **Coordinate** (pronounced koh-awr-dn-it): A set of numbers used to determine the position of a point on a map.
- **Equator:** A horizontal (east-west) line at 0° latitude that divides the earth into equal Northern and Southern Hemispheres.
- **Hemisphere:** One half of a sphere or globe.
- **Intersection:** The point where two lines (longitude and latitude) cross each other on a map.

- **Latitude:** The horizontal lines running left to right on a map, and measuring north-to-south position.
- **Legend:** A table or chart describing the meaning of symbols on a map.
- **Longitude:** The vertical lines running up and down on a map and measuring east-to-west position.
- **Orientation:** The correct relationship to a specific direction with respect to the reference points on a compass.
- **Point:** A point is the intersection of a latitude line and a longitude line.
- **Prime Meridian (Greenwich Meridian):** The vertical (north-south) line at 0° longitude that divides the earth into equal Eastern and Western Hemispheres.
- **Scale:** A reference that designates what distance on a map corresponds to a given distance in the real world (e.g., "├────┤ = 1 mile").
- **Sphere:** An object that is a round solid figure; the shape of a globe or planet.

Life Skills

- **Head:** Critical thinking, problem solving, learning to learn, planning/organizing, wise use of resources.
- **Heart:** Communication, cooperation, sharing.
- **Hands:** Contributions to a group effort, teamwork.
- **Health:** Self-discipline, self-esteem.

California Educational Content Standards

- Third Grade:
  - ✓ Investigation and Experimentation – 5c
- Fourth Grade:
  - ✓ Investigation and Experimentation – 6b
- Fifth Grade:
  - ✓ Investigation and Experimentation – 6g
- Sixth Grade:
  - ✓ Investigation and Experimentation – 7f

Subject Links

Science, Math, and Language Arts.

Purpose of Activity

To understand the coordinate system and learn how to use a map by focusing on scaling and directions.

Overview of Activity

This activity is separated into two parts. Part 1 introduces youth to coordinates, latitude, and longitude. Youth will discover the importance of latitude and longitude lines on a map and learn how to use these lines to determine coordinates of a point. Part 2 will address the concepts of scaling and direction. By looking at different maps, youth will learn how to interpret information on a map and will also learn how different types of maps are helpful in different situations. This will link to the use of mapping with GPS technologies. (If you do not have access to GPS devices for participants to use, try using Module 3A [ANR Publication 3440] instead of this one.)

Time Required

40 to 60 minutes.

Suggested Grouping

Pairs or small groups of 3 to 4.

Materials Needed

(* = *Materials provided in curriculum*)

- * *Simple Map of California (See appendix)*
- * *Detailed Map of California (See appendix)*
- * *Map of United States (See appendix)*
- Rulers
- Pencils, pens, or markers
- Flip chart paper

Getting Ready

- Make enough copies of the *Simple Map of California* so half of the groups can receive a copy.
- Make enough copies of the *Detailed Map of California* so each group has a copy.
- Make enough copies of the *Map of United States* so each group has a copy.
- Make sure you have enough rulers for each group.

- Make sure you have enough flip chart paper and pencils, pens, or markers for each youth.

Opening Questions

1. **If you are trying to describe the specific location of an object in your bedroom (e.g., on a bookshelf, in a drawer) to someone, what do you think are some useful ways to do this?** Please write your responses on the flip chart paper provided.
2. **If your friend is traveling by car or bicycle to a place he or she has never been, describe what he or she might need to know and how you might go about giving him or her directions.** Please write your thoughts and ideas on the flip chart paper provided.
3. **If you were going on a trip to a new place, how might you find out how to get there?** Please write your responses on the flip chart paper provided.
4. **What are some things you know about maps and the information you can find on them?** Please write your responses on the flip chart paper provided.

PART 1: Procedure (Experiencing)

1. Divide the group of youth in half. Within each half, have the youth work in small groups of 3 or 4 individuals.
2. Distribute the *Simple Map of California* to half of the youth; pass out the *Detailed Map of California* to the other half of the group.
3. Have each small group of 3 or 4 describe in as much detail as they can the location of the following cities in relation to each other. Please ask them to write their responses on the flip chart paper provided.
   - ✓ San Francisco and Sacramento
   - ✓ Sacramento and Fresno
   - ✓ Fresno and San Francisco

PART 1: Sharing, Processing, and Generalizing

Follow the lines of thinking developed by the youth as they share and compare their thoughts and observations. If necessary, use more targeted questions as prompts to get to particular points. Specific questions might include:

1. **Have the different small groups share how they described the location of the cities in relation to the other.**
2. **Which description do you think is the most useful? Why?**

PART 2A: Procedure (Experiencing)

1. Pass out the *Map of the United States* to each group.
2. Ask the youth to find the major city closest to each of these two points: 123°W, 38°N and 118°W, 34°N.
   - ✓ **Volunteer Tip:** The correct answers are San Francisco and Los Angeles.
3. Noting the scale on the map (usually at the bottom near the legend), have the youth use the rulers to estimate the distance between the two cities.

PART 2A: Sharing, Processing, and Generalizing

Follow the lines of thinking developed by the youth as they share and compare their thoughts and observations. If necessary, use more targeted questions as prompts to get to particular points. Specific questions might include:

1. **How did you find these points**? Please explain.
2. **What do you know about the horizontal and vertical lines and the points where they cross?**
   - ✓ **Volunteer Tip:** Listen for the terms latitude, longitude, and coordinates.
3. **How did you figure out the distance? What does one inch on this map represent?**

4. **If you were traveling from the first point to the second, in which direction would you be traveling?** Have them explain their method.
   ✓ **Volunteer Tip:** The correct answer is southeast.

PART 2B: Procedure (Experiencing)

1. Pass out copies of the *Detailed Map of California* to each group that previously had the *Simple Map of California.*
2. Have the youth find the same two points/cities on this map (123°W, 38°N and 118°W, 34°N) as on the previous map.
3. Noting the scale on this map, have them again estimate the distance between the two points.

PART 2B: Sharing, Processing, and Generalizing

Follow the lines of thinking developed by the youth as they share and compare their thoughts and observations. If necessary, use more targeted questions as prompts to get to particular points. Specific questions might include:

1. **What is different about this map compared to the previous map? Please describe.**
2. **Which map do you think made it easier to use to find the distance between these two cities? Please explain why.**

Concept and Term Introduction

At this point, volunteers need to ensure that the concepts and terms **cardinal directions** (north, south, east, west), **cartographer, compass rose, coordinate, equator, intersection, latitude, longitude, orientation, point, Prime Meridian,** and **scale** have been introduced. (**Note:** The goal is to have the youth develop these concepts through their own exploration and define the terms using their own words.)

Concept Application

1. Record the location of all fairs, shows, and exhibitions you attend with your animal during the year in your record book.
2. Using the *Detailed Map of California* provided in this activity or some other detailed map of California, identify the latitude and longitude of each fair, show, and exhibition you attend with your animal during the year. Record this information in your record book.
3. Using the cardinal directions (north, south, east, and west) as well as the scale on the map, determine the direction and distance each fair, show, or exhibition is from your home. Record this information in your record book.

References

Answers.com. (2009). Cardinal direction. WikiAnswers.com. http://www.answers.com/topic/cardinal-direction

Davidson, R. (2002–2008). Reading topographic maps. Geographic coordinates. http://www.map-reading.com/ch4-1.php#fig4-4

Rosenberg, M. Map scale – Measuring distance on a map. http://geography.about.com/cs/maps/a/mapscale.htm

Thoen, B. (1999-2002). Origins of the compass rose. http://www.gisnet.com/notebook/comprose.html

Wikipedia. Map. http://en.wikipedia.org/wiki/Maps

ACTIVITY (GPS)

Tracking Your Animal's Movement from Fair to Fair with GPS

IMPORTANT NOTE: Please note that Activity in Modules 3A and 3B is essentially the same, so you should choose to do one or the other. The only difference between these activities is that Activity in Module 3B is designed to use GPS units to locate fairs and do a traceback. We recommend that you try Activity in Module 3B (this publication) if you have GPS units readily available. **Note:** If you want to review your GPS skills beforehand, try the ***GPS*** *Practice Activity: Find This!* on page 13.

Subject Overview and Background Information

4-H Animal Science projects are potential **bio-security** risks. The majority of 4-H Animal Science projects focus on the rearing, husbandry, and, in many cases, showing and marketing of live animals, including poultry, ruminants, and swine. In most cases, 4-H members house their animals at home or in shared facilities, meet collectively as a club once or more every month, and convene in larger groups on exhibition days and at county or state fairs. Because backyard flocks and herds serve as potential vectors of disease, these public venues represent a significant bio-security risk.

One way to track animal movement is through **Global Positioning System (GPS)** technology. By picking up signals from satellites that are in orbit around the earth, a GPS unit can tell you the location, traveling speed, time, and direction of an object (e.g., a person, animal, or vehicle). A good understanding of the principles of GPS and the basics of how to use a GPS unit can be very useful in tracking the movement of animals. The data produced by the GPS unit can be input into a **Geographical Information System (GIS)** database. GIS is computer software that displays geographical information for easy viewing and analysis. An animal owner can use GIS to show where an animal's movements have taken it. If that animal were to be infected with a disease, access to this kind of data on the animal's movements would be very useful for a step known as a **traceback.** In a traceback, you can see where the animal has traveled and determine which other animals may have been exposed to the disease and may have become infected.

Activity Concepts and Vocabulary

- **Bio-security:** Precautions taken to protect a living thing (e.g., humans, animals, or plants) from attack or interference due to biological organisms that have the potential to cause them harm. A less formal definition for bio-security is "Keeping the bad bugs off the farm."
- **Direct contact:** Physical contact between an ill person or animal and a healthy person or animal.
- **Geographical Information System (GIS)**: Computer software that displays geographical information for easy viewing and analysis.
- **Global Positioning System (GPS):** A navigational system that uses signals from satellites orbiting the earth to determine the position of an object.
- **Indirect contact:** When an uninfected person or animal touches the contaminated surface of an inanimate object (e.g., a food dish or tabletop) that has previously come into contact with an infected person or animal.
- **Traceback:** The process of tracking the places where an animal has been.

Life Skills

- **Head:** Keeping records, critical thinking, problem solving, decision making.
- **Heart:** Sharing, cooperation, communication.
- **Hands:** Contributions to group effort, teamwork.
- **Health:** Disease prevention, personal safety.

California Educational Content Standards

- Third Grade:
  - ✓ Investigation and Experimentation – 5c, 5e
- Fourth Grade:
  - ✓ Investigation and Experimentation – 6c
- Fifth Grade:
  - ✓ Investigation and Experimentation – 6g, 6h
- Sixth Grade:
  - ✓ Investigation and Experimentation – 7b, 7f

Subject Links

Science and Language Arts

Purpose of Activity

To understand the importance of assessing and managing the factors that increase the risk of disease transmission, as well as how a good strategy for keeping accurate records can help with your traceback efforts when you need to locate the source and site of infection in the event of a disease outbreak.

Overview of Activity

In this activity, youth will simulate travel to different fairs with project animals. Through this experience, they will develop an understanding of how the act of taking their animals to multiple fairs or shows increases their risk of exposure to disease. They will also understand how important it is for them to keep accurate records to assist in traceback efforts.

Time Required

60 minutes.

Suggested Grouping

5 small groups or pairs.

Materials Needed

(* = *Materials provided in curriculum*)

- * *Longitude/Latitude Degree Cards (See appendix)*
- * *Coordinates for Homes and Fairs (See appendix)*
- * *Home* and *Fair Name Labels (See appendix)*
- Something to hold down the labels (rocks, tape etc.)
- Colored paper (8½ x 11 inch sheets of construction paper in blue, purple, green, red, and orange)
- * *Tracking Sheets (See appendix)*
- * *Volunteers: Tracking Sheets Key (See appendix)*
- * *Detailed Map of California (See appendix)*
- * *Animal Contact Record Sheet* (Concept Application) *(See appendix)*
- * *Basics on GPS (See appendix)*
- Five medium or large plastic cups
- GPS tracking device
- Flip chart paper
- Pencils, pens, or markers
- A clipboard for each group (optional)

Getting Ready

- Copy and cut the *Home* and *Fair Name Labels* and *Longitude/Latitude Degree Cards*.
- Make enough copies of *Coordinates for Homes and Fairs* sheet so each group has a copy.
- Cut colored construction paper into 16 squares for all five colors, and then crumple the squares to form wads.
- Make enough copies of *Basics on GPS* for each group.
- Make enough copies of the *Animal Contact Record Sheet* so each youth has at least one copy of the sheet (Concept Application).
- Identify a large area (e.g., school playground, gymnasium, multi-purpose room) where youth can construct a map of California. Using the *Longitude/Latitude Degree Cards* (held down by rocks, tape, etc. if necessary) and a copy of the *Detailed Map of California*, construct a large map of California. (**Note:** If possible, the map should be at least the size

of a basketball court.) Once the *Longitude/Latitude Degree Cards* have been arranged, place the *Home* and *Fair Name Labels* at the appropriate points on the large map using the *Coordinates for Homes and Fairs handout* (appendix) and the *Detailed Map of California* as guides.

- Make sure you have enough flip chart paper and pencils, pens, or markers for each group.
- Divide the youth into 5 pairs or 5 groups of 2 to 4 youth and designate each group with a color (blue, purple, green, red, and orange).
- Provide each group with a copy of the *Detailed Map of California.*
- Provide each group with *Tracking Sheets.* Each *Tracking Sheet* has a designated color. Provide a copy of the *Tracking Sheet* to each group according to color.
- Provide each group with a GPS tracking device

Opening Questions

1. **When considering disease, disease spread, risk assessment, and bio-security, how might these concepts relate to you personally with respect to your Animal Science projects?** Please write your responses on the flip chart paper provided.
2. **If it were your job to be a health inspector, what information do you believe would be important for you to know in order to monitor or control disease spread?** Please write your responses on the flip chart paper provided.

IMPORTANT NOTE: For youth who are unfamiliar with the use of GPS units, please have them read and review *Basics on GPS (see appendix)* BEFORE they continue to the Procedure (Experiencing), below.

Procedure (Experiencing)

Once the large map has been created, ask the youth to review their *Tracking Sheets.* Have all participants identify their "home" on the large map, their animal's identification (the color of their paper wads), the number of rounds, and the number of steps per round. Have them take note of the coordinates that are given to them and the data that are left for them to record (the name of the fair and the other "animals" [colors] present at the fair).

✓ **Volunteer Tip:** It is important that the person facilitating the activity keep track of the different rounds and the number of colored pieces of paper that are exchanged between groups throughout the activity.

Round 1

1. Standing near their home city, ask the youth to each mark their home and enter in HOME in their GPS unit.
2. Ask the youth to look at their *Tracking Sheet (with GPS)* and find their first fair.
3. Then ask the youth to locate this fair on the large map. Have them walk to their first fair, each one taking along their GPS tracking device, *Tracking Sheet,* and cup filled with wads of colored paper.
4. When each group has reached its first fair, ask the groups to mark the location of the fair and enter the fair's name into their GPS unit.
5. Then ask them to exchange their wads of colored paper with any or all other groups at the same fair. They should give each other group 1 wad of their colored paper.
6. Ask the youth to fill in the information on their *Tracking Sheet.*
7. Have them return home using the GPS unit. (**Note:** GPS units are not accurate enough to reliably show separate locations in a confined area, so the goal in this step of the exercise is to get close to home.) Once they have reached their home, have them select "Stop Navigation."
8. Once everyone has reached their home, have the Volunteer draw one color at random. Tell the youth that the animals with this color were infected with a disease that is passed from animal to animal via **direct** or **indirect** contact. Ask the youth to do a traceback using their GPS unit. Their goal is to

identify where and when their animal (color) came into contact with the infected animal(s).

9. Using their GPS unit for practice, they should find the fair they went to and use the GPS compass page or map page to try to get back to the fair.
10. Once they have reached the fair, have them discuss with other groups at the fair where and when their animal (color) came into contact with the infected animal(s). If there are no other groups at the fair, have the one group discuss this among themselves.
11. **Discussion:** Ask the youth (all groups) if they were able to use their GPS units to trace back to their last fair. If they had any difficulty with this task, have each group share their difficulties among themselves and then brainstorm ideas as a group on how to make the task easier. In addition to the animals that were identified as being sick, were any other animals infected? If so, which animals, and where were they infected? Have the youth explain their answers. If those animals were not infected, ask the youth to explain why not.
12. This is the end of Round 1. Ask each group to check their cups and remove any colored wads of paper that are not of their original color and to return those to their appropriate groups before they proceed to Round 2.
13. Reset all of the GPS units by deleting the waypoints.

Round 2

1. Standing near their home city, ask the youth to each mark their home and enter HOME in their GPS unit.
2. Ask the youth to look at their *Tracking Sheet (with GPS)* and find their first fair.
3. Then ask the youth to locate this fair on the large map. Have them walk to their first fair, each one taking with them their GPS tracking device, *Tracking Sheet,* and cup filled with wads of colored paper.
4. When each group has reached its first fair, ask the groups to mark the location of the fair and enter the fair name into their GPS unit.
5. Then ask them to exchange their wads of colored paper with any or all other groups at the same fair. They should give each other group 3 wads of paper of each color that they have in their cup.
6. Ask the youth to fill in the information for that fair on their *Tracking Sheet.*
7. Once they are done filling in their *Tracking Sheet,* have them return home. (**Note:** Youth can either use the GPS unit to return home or just walk back to their home label.)
8. Next, ask the youth to look at their *Tracking Sheet (with GPS)* and find their second fair.
9. Then ask the youth to locate this fair on the large map. Have them walk to their second fair, each one taking with them their GPS tracking device, *Tracking Sheet,* and cup filled with wads of colored paper.
10. When each group has reached its second fair, ask the groups to mark the location of the fair and enter the fair's name into their GPS unit.
11. Then ask them to exchange their wads of colored paper with any or all other groups at the same fair. They should give each other group 1 wad of each color that they have in their cup.
12. Ask the youth to fill in the information for that fair on their *Tracking Sheet* and then return home. Make sure that when they return home they still have colored pieces that they collected from Fair 1 and Fair 2.
13. Announce that the animals with the color ORANGE have been infected with a disease that is passed from animal to animal via **direct** or **indirect** contact. Ask the youth to do a traceback using their GPS unit. Their goal is to identify where and when their animal (color) came into contact with the infected animal(s).
14. Using their GPS unit for practice, have them find the last fair they went to, and then, using the GPS compass page or map page, have them try to get back to their last fair.
15. Now have them return to their last fair using the GPS unit instead. (**Note:** The GPS units are not entirely accurate on such a small scale, so the actual goal is

to get close to the fair.) When they have reached their last fair, have them select "Stop Navigation."

16. Now that they have reached their last fair, have them talk with other groups at the fair about where and when their animal (color) may have come into contact with the infected animal(s). If there are no other groups at the fair, youth in the one group there can discuss this among themselves.
17. Next, starting from the last fair where they were, have them repeat steps 15 and 16 until they have done a traceback to all of the fairs they visited for this round. The final step in their traceback should be their home. (**Note:** Once the youth are comfortable with finding a waypoint with their GPS unit, they can skip the GPS step and just walk to their last fair.)
18. **Discussion:** Ask the entire group if they were able to use their GPS units to traceback to all of their fairs. If any youth had any difficulty with this task, have them tell about their difficulties and then let the entire group brainstorm ideas on how to make the task easier. Then have the individual groups tell whose animals from among their group got infected, where they got infected, and how they got infected. Then as an entire group, have the youth brainstorm ideas on different ways their animals could have gotten infected.
19. This is the end of Round 2. Ask each group to check their cups and remove any wads of colored paper that are not of their original color and to return those to their appropriate groups before they proceed to Round 3.
20. Reset all of the GPS units by deleting the waypoints.

Round 3

1. Standing near their home city, ask the youth to each mark their home and enter HOME in their GPS unit.
2. Ask the youth to look at their *Tracking Sheet (with GPS)* and find their first fair.
3. Then ask the youth to locate this fair on the large map. Have them walk to their first fair, each on taking with them their GPS tracking device, *Tracking Sheet,* and cup filled with wads of colored paper.
4. When each group has reached its first fair, ask the groups to mark the location of the fair and enter the fair's name into their GPS unit.
5. Then ask them to exchange their wads of colored paper with any or all other groups at the same fair. They should give each other group 5 wads of paper of each color that they have in their cup.
6. Ask the youth to fill in the information for that fair on their *Tracking Sheet.*
7. Once they are done filling in their *Tracking Sheet,* have them return home.
8. Next, ask the youth to look at their *Tracking Sheet (with GPS)* and find their second fair.
9. Then ask the youth to locate this fair on the large map. Have them walk to their second fair, each one taking with them their GPS tracking device, *Tracking Sheet,* and cup filled with wads of colored paper.
10. When each group has reached its second fair, ask the groups to mark the location of the fair and enter the fair's name into their GPS unit.
11. Then ask them to exchange their wads of colored paper with any or all other groups at the same fair. They should give each other group 3 wads of paper of each color that they have in their cup.
12. Ask the youth to fill in the information for that fair on their *Tracking Sheet* and then return home. Make sure that when they return home they still have colored pieces that they collected from Fair 1 and Fair 2.
13. Next, ask the youth to look at their *Tracking Sheet (with GPS)* and find their third fair.
14. Then ask the youth to locate this fair on the large map. Have them walk to their third fair, each one taking with them their GPS tracking device, *Tracking Sheet,* and cup filled with wads of colored paper.
15. When each group has reached its third fair, ask the groups to mark the location of the fair and enter the fair's name into their GPS unit.
16. Then ask them to exchange their wads of colored paper with any or all other groups at the same fair. They should give each other group 1 wad of paper of each color that they have in their cup.

17. Ask the youth to fill in the information for that fair on their *Tracking Sheet* and then return home. Make sure that when they return home they still have colored pieces they collected from Fair 1, Fair 2, and Fair 3.
18. Announce that the animals with the color RED were infected with a disease that is passed from animal to animal via **direct** or **indirect** contact. Ask the youth to do a traceback using their GPS unit. Their goal is to identify where and when their animal (color) came into contact with the infected animal(s).
19. Now have them return to their last fair using the GPS unit. (**Note:** The GPS units are not entirely accurate on such a small scale, so the goal is to get close to the fair). When they have reached their last fair, have them select "Stop Navigation." (**Note:** Once the youth are comfortable with finding a waypoint with their GPS unit, they can skip the GPS step and just walk to their last fair.)
20. Once they have reached their last fair, have them discuss with other groups at the fair where and when their animal (color) came into contact with the infected animal(s). If there are no other groups at the fair, youth in the one group there can discuss this among themselves.
21. Next, starting from the last fair where they were, have them repeat steps 19 and 20 until they have done a traceback to all the fairs they visited for this round. The final step in their traceback should be their home. (**Note:** If the youth are comfortable with finding a waypoint with their GPS unit, they can just walk to their last fair.)
22. **Discussion:** Ask the entire group if they were able to use their GPS units to traceback to all of their fairs. If any youth had any difficulty with this task, have them tell about their difficulties and then let the entire group brainstorm ideas on how to make the task easier. Then have the individual groups tell whose animals in their group got infected, where they got infected, and how they got infected. Then as an entire group, have the youth brainstorm ideas on different ways their animals could have gotten infected.
23. This is the end of Round 3. Ask each group to check their cups and remove any wads of colored paper that are not of their original color and return those to their appropriate groups.
24. Reset all of the GPS units by deleting the waypoints.

Sharing, Processing, and Generalizing

Follow the lines of thinking developed by the youth as they share and compare their thoughts and observations. If necessary, use more targeted questions as prompts to get to particular points. Specific questions might include:

1. **Compare the data on the *Tracking Sheets* from Rounds 1, 2, and 3. What do you conclude from the information you recorded? Why were more colors present in one round than in another? What do you think the colored pieces of paper represented?**
   - ✓ **Volunteer Tip:** They represent contacts, direct or indirect, with other animals. Consult *Volunteer's Key* if necessary.
2. **This activity is staged. How might this play out if you and other members were actually transporting your animals to different fairs? Please explain your thoughts and ideas.**

Concept and Term Introduction

At this point, volunteers need to ensure that the concepts and terms **bio-security, direct contact, indirect contact, Global Positioning System,** and **traceback** have been introduced. (**Note:** The goal is to have the youth develop these concepts through their exploration and define the terms using their own words.)

Concept Application

1. Provide the youth with the worksheet *Animal Contact Record Sheet.* This worksheet is to be used at their farm or on their property or at any club meeting, fair, show, or exhibition where the youth might

transport and house their animals. Have the youth make observations and complete the worksheet as accurately as possible.

2. Have the youth discuss their completed worksheets and the possible risks to which their project animal may have been exposed. Then discuss different ways to reduce the risks.
   - ✓ **Volunteer Tip:** Have the youth write the risks on flip chart paper or a white board, and then have a group discussion of possible ways to reduce the risk.

References

Baha'i Computer and Communication Association. Look-up latitude and longitude – USA. http://www.bcca.org/misc/qiblih/latlong_us.html#CALIFORNIA

Bailey, DeVonn (2004). Benefits and costs associated with an animal identification system for cattle in the United States. Western Center for Risk Management Education. http://ucce.ucdavis.edu/files/filelibrary/1524/24478.pdf

California Department of Food and Agriculture. Fairs and expositions. http://www.cdfa.ca.gov/fe/

Garmin. (2005). eTrexLegend personal navigator owner's manual and reference guide. Olathe, KS: Garmin International, Inc.

Garmin. What is GPS? http://www8.garmin.com/aboutGPS/

How Stuff Works. How GPS receivers work. http://www.howstuffworks.com/gps1.htm

The Ohio State University Extension. Bio-security for youth livestock exhibitors. http://ohioline.osu.edu/vme-fact/0007.html

Tuxen, Karin, and Maggi Kelly. 2007. Introduction to Global Positioning Systems (GPS) exercise. Geospatial Imaging and Informatics Facility, UC Berkeley.

Wallace, D. (2001). "Bio-security" and "bio-containment" for livestock in 2001. Extension Ag Update, University of Illinois Extension. http://www.urbanext.uiuc.edu/agupdate/0111_article1.html

What Is GIS? GIS.com. http://www.gis.com/whatisgis/index.html

GPS Practice Activity: Find This!

Time Required

45 to 60 minutes.

Suggested Grouping

Small groups of 3 to 5 youth.

Materials Needed

(* = *Materials provided in curriculum*)

- * *Basics on GPS (See appendix)*
- GPS units
- Small objects (i.e., paper clips, rubber bands, beads, etc.)

Getting Ready

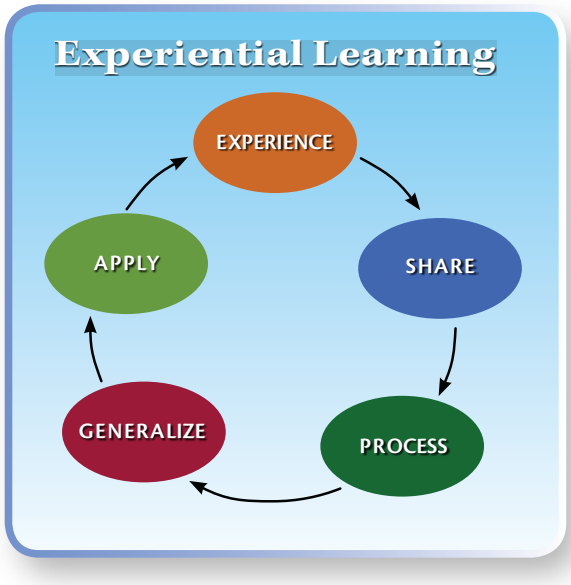
- Divide the group into small groups.
- Make sure there are enough GPS units for each group.
- Make sure there are enough small objects for each group to find.
- Make sure that each group takes a *Basics on GPS* worksheet.

Procedure (Experiencing)

1. Give each group a GPS unit and a small object.
2. Taking the GPS unit with them, have each group hide their small object.
3. Have them mark the point where they hid the object.
4. Have them create a unique name for the waypoint they just marked.
   - ✓ **Note:** Remind them not to use the object's name as a name for the waypoint.
5. Once each group has completed step 4, gather together as one big group.
6. Have the groups trade GPS units with each other. Make sure you remember which group switched with which.
7. Now the goal is for each group to find another group's object. They can use the Navigation Page and Map Page to help them find the object.
8. Once a group has found their object, have them select "Stop Navigation."
9. The group can then pick up the found object and go back to the main group.
10. Once every group has found an object, check to make sure each has the correct object.
11. Delete the waypoints from each GPS unit.
    - ✓ **Note:** If you have any trouble with any of these steps, please refer to the worksheet *Basics on GPS.*

APPENDIX

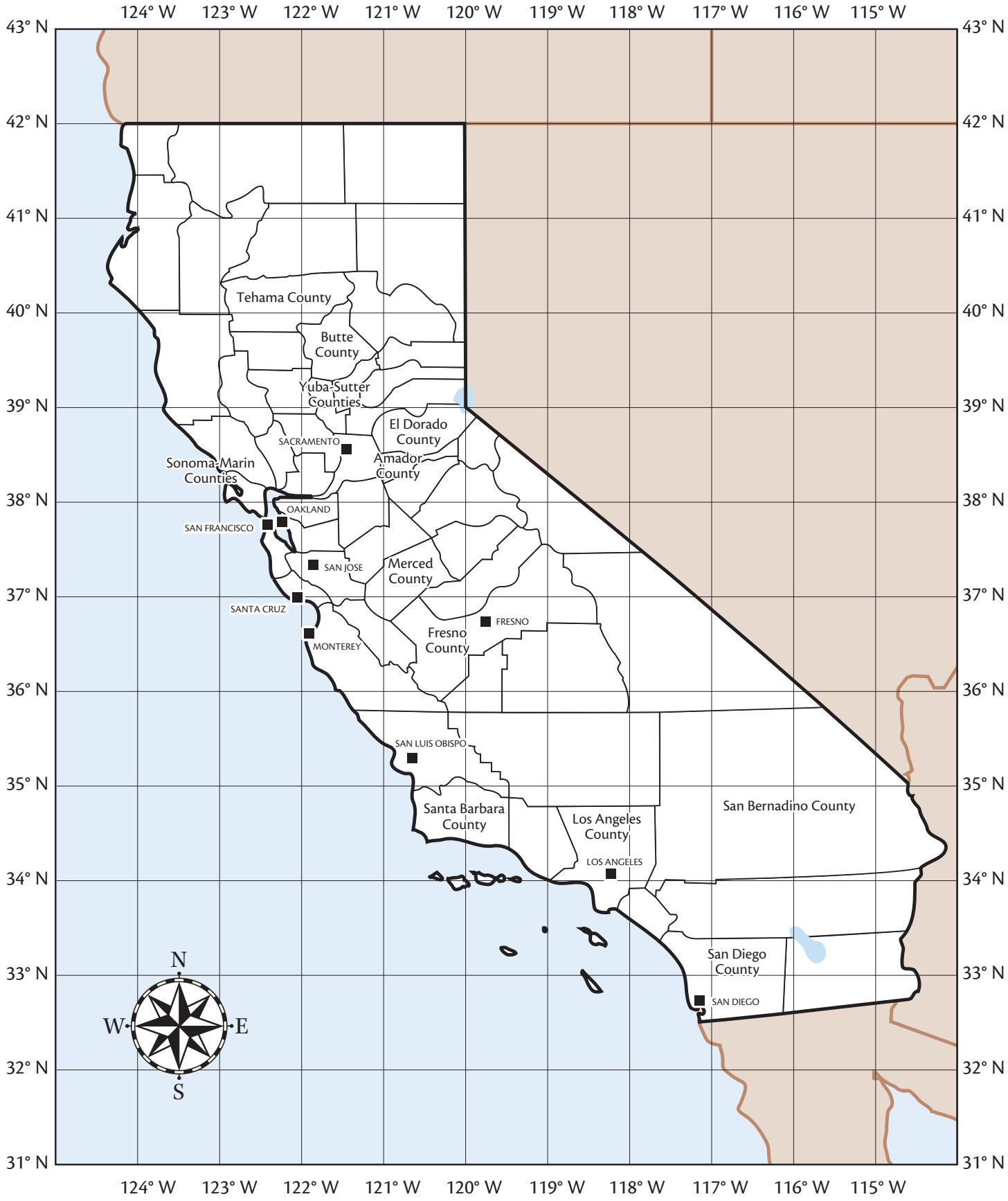
The activities in this curriculum were designed around inquiry and experiential learning. Inquiry is a learner-centered approach in which individuals are problem solvers investigating questions through active engagement, observing and manipulating objects and phenomena, and acquiring or discovering knowledge. Experiential learning (EL) is a foundational educational strategy used in 4-H. In it, the learner has an experience phase of engagement in an activity, a reflection phase in which observations and reactions are shared and discussed, and an application phase in which new knowledge and skills are applied to real-life settings. In 4-H, an EL model that uses a five-step learning cycle is most commonly used. These five steps—Experiencing, Sharing, Processing, Generalizing, and Application—are part of a recurring process that helps build learner understanding over time.



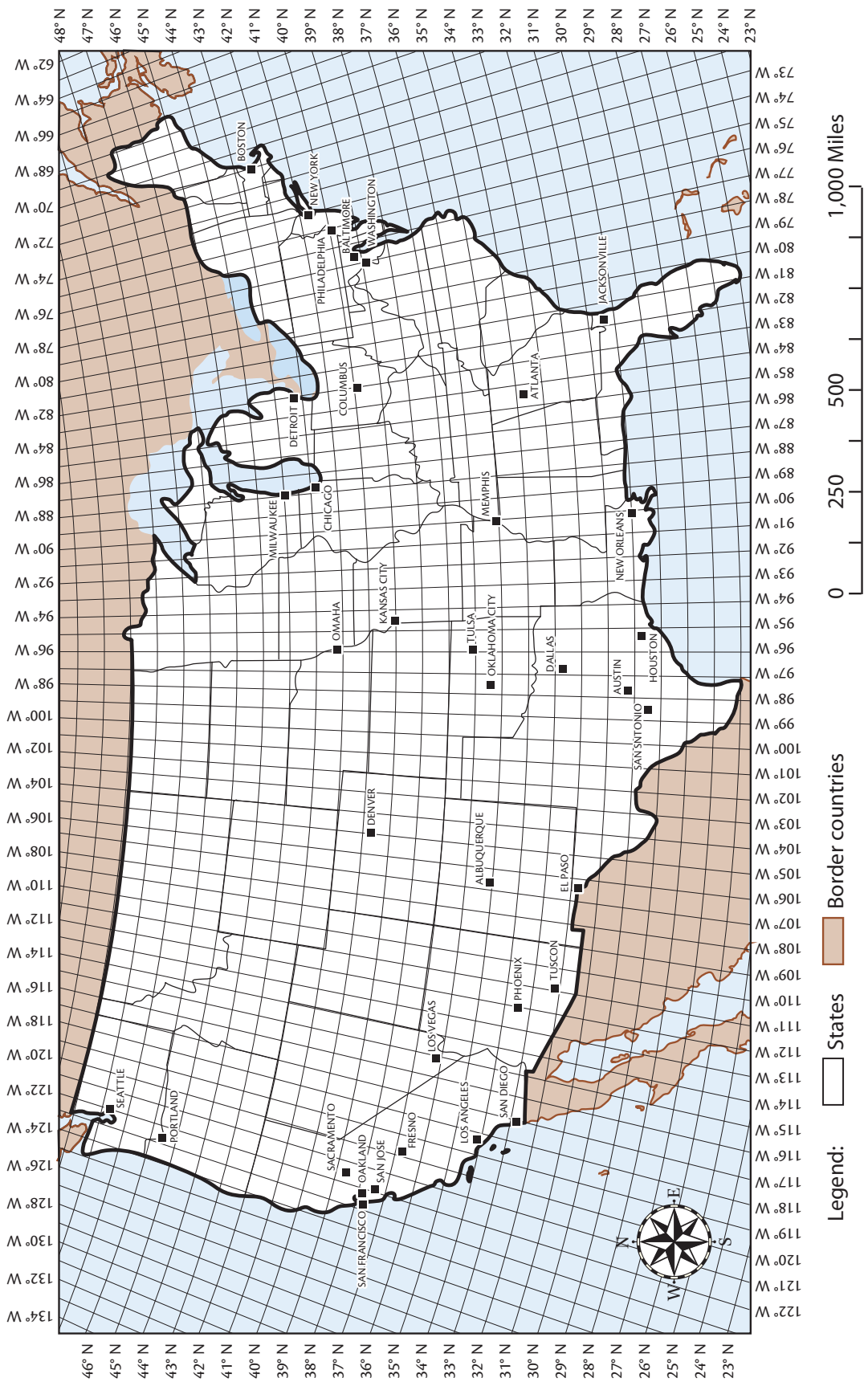
For more information on inquiry, EL, and the five-step learning cycle, please visit the University of California Science, Technology, and Environmental Literacy Workgroup's Experiential Learning Web site, http://www.experientiallearning.ucdavis.edu/.

SIMPLE MAP OF CALIFORNIA

DETAILED MAP OF CALIFORNIA



MAP OF UNITED STATES



Longitude/Latitude Degree Cards

124°W	123°W	122°W
121°W	120°W	119°W
118°W	117°W	116°W
115°W		43°N

42°N	41°N	40°N
39°N	38°N	37°N
36°N	35°N	34°N
33°N	32°N	31°N

Coordinates for Homes and Fairs

(Note: These coordinates are approximations.)

Home	Coordinates
Monterey	Latitude: 36° N Longitude: 122° W
Sacramento	Latitude: 39° N Longitude: 121° W
San Diego	Latitude: 33° N Longitude: 117° W
San Luis Obispo	Latitude: 35° N Longitude: 121° W
Santa Cruz	Latitude: 37° N Longitude: 122° W

Fair	Coordinates
Amador County Fair	Latitude: 38° N Longitude: 121° W
Butte County Fair	Latitude: 40° N Longitude: 122° W
El Dorado County Fair	Latitude: 39° N Longitude: 120° W
Fresno County Fair	Latitude: 36° N Longitude: 119° W
Los Angeles County Fair	Latitude: 34° N Longitude: 119° W
Merced County Fair	Latitude: 37° N Longitude: 121° W
San Bernardino County Fair	Latitude: 35° N Longitude: 116° W
San Diego County Fair	Latitude: 33° N Longitude: 117° W
Santa Barbara County Fair and Exposition	Latitude: 35° N Longitude: 120° W
Sonoma-Marin County Fair	Latitude: 38° N Longitude: 123° W
Tehama District Fair	Latitude: 40° N Longitude: 123° W
Yuba-Sutter Fair	Latitude: 39° N Longitude: 121° W

Home Name Labels

Monterey

Sacramento

San Diego

San Luis Obispo

Santa Cruz

Fair Name Labels

Merced County Fair

Fresno County Fair

Santa Barbara County Fair and Exposition

San Bernardino County Fair

Fair Name Labels

Los Angeles County Fair

Yuba-Sutter Fair

Sonoma-Marin County Fair

El Dorado County Fair

Fair Name Labels

Amador County Fair

Butte County Fair

San Diego County Fair

Tehama District Fair

BLUE Tracking Sheet

Home: San Diego

- ***Color:*** Blue
- ***Latitude:*** 33° N
- ***Longitude:*** 117° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1: San Bernardino County Fair	35° N	116° W	7/20/05		1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1: San Bernardino County Fair	35° N	116° W	7/25/06		3 wads of paper to each group at the fair
FAIR 2 Los Angeles County Fair	34° N	119° W	8/02/06		1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Merced County Fair	37° N	121° W	8/05/07		5 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/17/07		3 wads of paper of each color to each group at the fair
FAIR 3 San Bernardino County Fair	35° N	116° W	8/25/07		1 wad of paper of each color to each group at the fair

GREEN Tracking Sheet

Home: San Louis Obispo

- ***Color:*** Green
- ***Latitude:*** 35° N
- ***Longitude:*** 121° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1: Fresno County Fair	36° N	119° W	7/20/05		1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	7/25/06		3 wads of paper to each group at the fair
FAIR 2 Los Angeles County Fair	34° N	119° W	8/02/06		1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	8/05/07		5 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/17/07		3 wads of paper of each color to each group at the fair
FAIR 3 San Bernardino County Fair	35° N	116° W	8/25/07		1 wad of paper of each color to each group at the fair

ORANGE Tracking Sheet

Home: Monterey

- ***Color:*** Orange
- ***Latitude:*** 36° N
- ***Longitude:*** 122° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Merced County Fair	37° N	121° W	7/20/05		1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	7/25/06		3 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/02/06		1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Merced County Fair	37° N	121° W	8/05/07		5 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/17/07		3 wads of paper of each color to each group at the fair
FAIR 3 San Bernardino County Fair	35° N	116° W	8/25/07		1 wad of paper of each color to each group at the fair

PURPLE Tracking Sheet

Home: Sacramento

- ***Color:*** Purple
- ***Latitude:*** 39° N
- ***Longitude:*** 121° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Yuba-Sutter Fair	39° N	121° W	7/20/05		1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Yuba-Sutter Fair	39° N	121° W	7/20/05		3 wads of paper to each group at the fair
FAIR 2 Merced County Fair	37° N	121° W	8/02/06		1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Merced County Fair	37° N	121° W	8/05/07		5 wads of paper to each group at the fair
FAIR 2 Los Angeles County Fair	34° N	119° W	8/17/07		3 wads of paper of each color to each group at the fair
FAIR 3 San Bernardino County Fair	35° N	116° W	8/25/07		1 wad of paper of each color to each group at the fair

RED Tracking Sheet

Home: Santa Cruz

- ***Color:*** Red
- ***Latitude:*** 37° N
- ***Longitude:*** 122° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	7/20/05		1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Yuba-Sutter Fair	39° N	121° W	7/25/06		3 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/02/06		1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	8/05/07		5 wads of paper to each group at the fair
FAIR 2 Stay Home			8/17/07		3 wads of paper of each color to each group at the fair
FAIR 3 Yuba-Sutter Fair	39° N	121° W	8/25/07		1 wad of paper of each color to each group at the fair

VOLUNTEERS: BLUE Tracking Sheet KEY

Home: San Diego

- ***Color:*** Blue
- ***Latitude:*** 33° N
- ***Longitude:*** 117° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 San Bernardino County Fair	35° N	116° W	7/20/05	none	1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 San Bernardino County Fair	35° N	116° W	7/25/06	none	3 wads of paper to each group at the fair
FAIR 2 Los Angeles County Fair	34° N	119° W	8/02/06	green	1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Merced County Fair	37° N	121° W	8/05/07	purple, orange	5 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/17/07	green, orange	3 wads of paper of each color to each group at the fair
FAIR 3 San Bernardino County Fair	35° N	116° W	8/25/07	orange, purple, green	1 wad of paper of each color to each group at the fair

VOLUNTEERS: GREEN Tracking Sheet KEY

Home: San Louis Obispo

- ***Color:*** Green
- ***Latitude:*** 35° N
- ***Longitude:*** 121° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Fresno County Fair	36° N	119° W	7/20/05	none	1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	7/25/06	orange	3 wads of paper to each group at the fair
FAIR 2 Los Angeles County Fair	34° N	119° W	8/02/06	blue	1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	8/05/07	red	5 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/17/07	blue, orange	3 wads of paper of each color to each group at the fair
FAIR 3 San Bernardino County Fair	35° N	116° W	8/25/07	purple, orange, blue	1 wad of paper of each color to each group at the fair

VOLUNTEERS: ORANGE Tracking Sheet KEY

Home: Monterey

- ***Color:*** Orange
- ***Latitude:*** 36° N
- ***Longitude:*** 122° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Merced County Fair	37° N	121° W	7/20/05	none	1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	7/25/06	green	3 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/02/06	red	1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Merced County Fair	37° N	121° W	8/05/07	purple, blue	5 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/17/07	green, blue	3 wads of paper of each color to each group at the fair
FAIR 3 San Bernardino County Fair	35° N	116° W	8/25/07	blue, green, purple	1 wad of paper of each color to each group at the fair

VOLUNTEERS: PURPLE Tracking Sheet KEY

Home: Sacramento

- ***Color:*** Purple
- ***Latitude:*** 39° N
- ***Longitude:*** 121° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Yuba-Sutter Fair	39° N	121° W	7/20/05	none	1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Yuba-Sutter Fair	39° N	121° W	7/20/05	red	3 wads of paper to each group at the fair
FAIR 2 Merced County Fair	37° N	121° W	8/02/06	none	1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Merced County Fair	37° N	121° W	8/05/07	orange, blue	5 wads of paper to each group at the fair
FAIR 2 Los Angeles County Fair	34° N	119° W	8/17/07	none	3 wads of paper of each color to each group at the fair
FAIR 3 San Bernardino County Fair	35° N	116° W	8/25/07	blue, green, orange	1 wad of paper of each color to each group at the fair

VOLUNTEERS: RED Tracking Sheet KEY

Home: Santa Cruz

- Color: Red
- Latitude: 37° N
- Longitude: 122° W

Round 1

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	7/20/05	none	1 wad of paper to each group at the fair

Round 2

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Yuba-Sutter Fair	39° N	121° W	7/25/06	purple	3 wads of paper to each group at the fair
FAIR 2 Fresno County Fair	36° N	119° W	8/02/06	orange	1 wad of paper of each color to each group at the fair

Round 3

Name of the Fair	Latitude	Longitude	Date	Animals (colors) present	Wads of paper exchanged
FAIR 1 Santa Barbara County Fair and Exposition	35° N	120° W	8/05/07	green	5 wads of paper to each group at the fair
FAIR 2 Stay Homer			8/17/07		3 wads of paper of each color to each group at the fair
FAIR 3 Yuba-Sutter Fair	39° N	121° W	8/25/07	none	1 wad of paper of each color to each group at the fair

Animal Contact Record Sheet

Animal: _____

Location of potential contacts (check all that apply):

- ❑ Home _____
- ❑ Fair:_____
- ❑ Show: _____
- ❑ Exhibition: _____
- ❑ Direct contact with other animals? __ Yes __ No

If yes, contact during:

❑ Transportation

Animal species	Number of animals
a._____	a._____
b._____	b._____
c._____	c._____
d._____	d._____

If yes, contact during:

❑ Housing

Animal species	Number of animals
a._____	a._____
b._____	b._____
c._____	c._____
d._____	d._____

If yes, contact during:

❑ Competition

Animal species	Number of animals
a._____	a._____
b._____	b _____
c._____	c._____
d._____	d._____

If yes, contact during:

❑ Other (please indicate) _____

Animal species	Number of animals
a._____	a._____
b._____	b._____
c._____	c._____
d._____	d._____

- ❑ Indirect contact with other animals: __ Yes __ No

If yes, check all that apply:

- ❑ Non-owner human contact
- ❑ Troughs/containers
- ❑ Footwear
- ❑ Wash rack
- ❑ Show arena or exercise area
- ❑ Shared food and water
- ❑ Clothing
- ❑ Tools/equipment
- ❑ Vehicles
- ❑ Barn or holding pen
- ❑ Other (please specify) _____

Basics on GPS

How to use a GPS unit (for **Garmin eTrexLegend** only)

GPS Button Functions

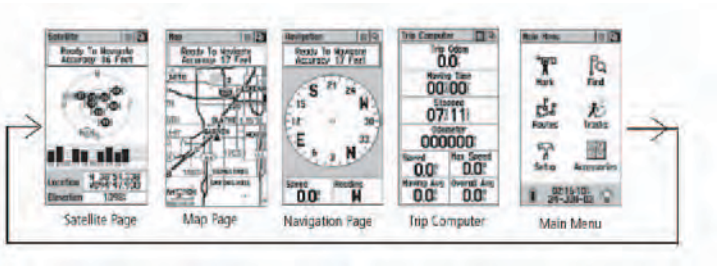
Turning on the GPS Unit

1. Press and hold the **POWER** button, located on the right side on the unit. It is the second button with a light bulb.
2. The first screen you will see is the **Satellite Page.** Be patient! It may take a couple of minutes for your unit to locate the satellites, and you must have at least 4 active satellites before you use the unit. Look for four dark bars at the bottom of the screen. Also, the unit will also display the message "Ready to Navigate." Now you can use the GPS unit.

Main Pages

The GPS unit has five main pages:

1. **Satellite Page:** Provides information on the satellites.
2. **Map Page:** Shows where you move.
3. **Navigation Page:** Provides a compass to help guide you to where you want to go.
4. **Trip Computer:** Provides trip and navigation data.



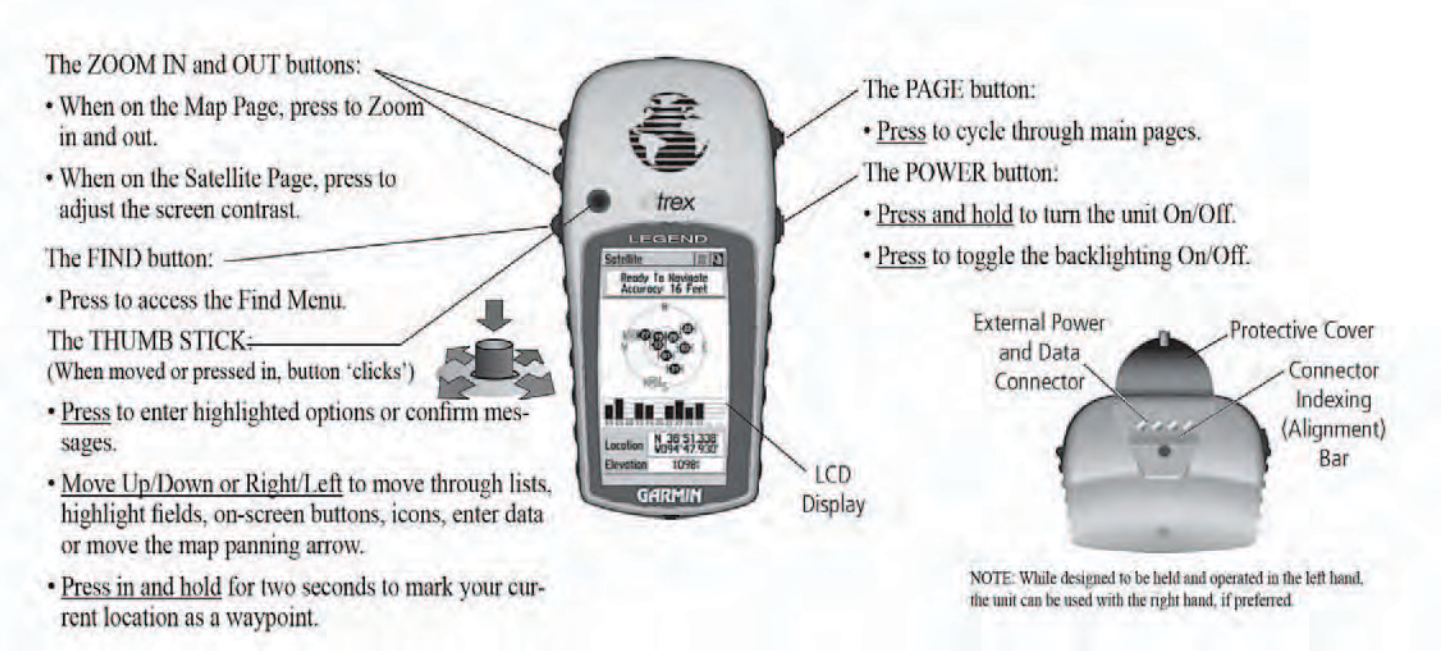
5. **Main Menu:** Provides additional features and settings.

You can navigate between these pages by pressing the **PAGE BUTTON** (the top button on the right side of the unit).

All five main pages show the **Option Menu** and **Main Page Menu.** They are small icons in the upper right-hand corner of each screen. Use the **THUMB STICK** on the front of the unit to choose either the **Option Menu** (left icon) or the **Main Page Menu** (right icon).

1. **Option Menu:** Provides additional features that allow you to customize the unit.
2. **Main Page Menu:** This allows you to directly go to a Main Page of your choice.

To exit either of these menus, move the **THUMB STICK** either left or right.



Mark and Name a Waypoint

3. A *waypoint* is a specific geographical location defined by its latitude and longitude and is used for navigational purposes.
4. When you are at a desired location (e.g., a treasure you buried in your backyard) and you want to mark it as a new waypoint, press and hold the **THUMB STICK** (located on the front of the unit). (Note: The coordinates of the point you are marking will appear at the bottom of the **Satellite Page** and the **Waypoint Page.**) You can always mark a point, regardless of which screen you are using.
5. When you press the **THUMB SITCK** to mark your desired point, the **Waypoint Page** will appear. Name your waypoint by moving the **THUMB STICK** up to highlight the number that appears on the flag. Push down on the **THUMB STICK** and a keyboard will appear; select the numbers or letters you want to name your waypoint and then click **OK.** Your waypoint is now marked and labeled; you will automatically return to the **Waypoint Page.**
6. Now click **OK** at the bottom of the **Waypoint Page** to exit.

Return to a Waypoint

1. Press the **FIND** button located on left side of the unit. There is a picture of a big magnifying glass below it.
2. Highlight and click **"Waypoints"** using the **THUMB STICK.**
3. Select and click **"By Name."** A list of waypoints will appear.
4. Scroll down to the waypoint you want to find. Select and click that waypoint. The **Waypoint Page** for that specific point will now be displayed.
5. Select and click the **GOTO** button. This will send you to the **Navigation Page,** which will direct you to the waypoint. All you have to do is follow the arrow. (**Hint:** Walk slowly. The arrow might point to a building, but watch the distance to the point!)
6. You can also use the **Map Page** (remember: You get there by pushing the **PAGE BUTTON** [top right side of the unit] to help you navigate to your waypoint). This screen shows you your position, the waypoint you want to go to, and a line showing the shortest path.
7. **Hint:** It may or may not be possible to take the shortest path, due to buildings!
8. **Another Hint:** The **ZOOM IN** and **ZOOM OUT** buttons are located on the left side of the unit. They may be helpful if you are using the **Map Page.**
9. You can move between the **Map Page** and **Navigation Page** to help return you to the point of interest. This is accomplished by using either the **PAGE BUTTON** or the **Main Page Menu.**

Stop Navigation

1. Once you have reached your last destination, select and click the **Options Menu** and then select and click **"Stop Navigation."** This will end your navigation to your selected waypoint. Now you can look for another waypoint.

Deleting Waypoints

2. Press the **FIND** button located on left side of the unit (with a big magnifying glass nearby).
3. Highlight and click **"Waypoints."**
4. Select and click **"By Name."** A list of waypoints will appear.
5. Click the **Options Menu** and select and click **"Delete All."**
6. "Do you really want to delete all waypoints?" will appear on the screen. Select and click **"Yes."**

A Few Important Notes:

- **For those GPS units without an electronic compass, your direction of travel will only be updated if you are moving.**
- **Depending on your GPS unit model, the accuracy/offset/error may not appear on the same page as the Satellite Page.** You may have to look elsewhere on the unit to view and record its accuracy!

- If your unit's accuracy is not precise enough or is inconsistent, wait a minute or so, or move around a bit in the general area of where your point is. If this yields no adequate improvement, you may have to either (a) calibrate your unit's compass, (b) replace your unit's batteries, or (c) go to a place nearby with less signal interference and thus greater accuracy.

For More Information

You will find related information in other publications, slide sets, CD-ROMs, and videos from UC ANR.

To order products or download free publications, visit our online catalog at http://anrcatalog.ucdavis.edu. You can also place orders by mail, phone, or FAX, or request a printed catalog of publications, slide sets, CD-ROMs, and videos from

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