University of California
Division of Agriculture and Natural Resources

ANR Publication 8510 | July 2014
http://anrcatalog.ucanr.edu
UC PEER REVIEWED

MARTIN H. SMITH, associate specialist in Cooperative Extension, School of Veterinary Medicine, UC Davis; CHERYL L. MEEHAN, staff research associate, School of Veterinary Medicine, UC Davis; and JENNIFER TECHANUN, junior specialist, School of Veterinary Medicine, UC Davis. Contributing student authors: KATRINA CASTANEDA, JENNA HARRIGAN, and JULIA LEMBRIKOVA, UC Davis.

Partially funded through a grant from the Wells Fargo Foundation.

Pre-Harvest Food Safety in 4-H Animal Science

# Part 3: Raising and Protecting a Healthy Animal

## OVERVIEW AND BACKGROUND INFORMATION

**Raising animals and producing animal products** for sale to market can be a very rewarding but challenging experience. Today, most food products on the shelf of the local supermarket are human-managed productions. The process of **food harvesting** is vital because it affects public food safety. Proper **management** is an essential part of good herd health as well. The World Health Organization (WHO) advises that pre-harvest food safety is an essential element of any sustainable animal production and integrated food safety system.

The goal of **pre-harvest food safety** is to reduce public health risks along the entire food supply chain. We accomplish this by educating those who raise food animals, teaching everyone in the food supply chain methods for **prevention** of **disease transmission,** and reaching out to consumers by educating them about how to prevent foodborne illnesses. Pre-harvest food safety includes preventing foodborne pathogens from entering and infecting livestock that will be used for human consumption. Specific precautions and procedures taken during a food animal's life will help ensure the safety of the food for human consumption. Such precautions may include treating animals with antibiotics, proper waste management, regulating temperatures to suit specific species, and having fresh food and water readily available. By following these precautions, one can prevent the transmission of foodborne illnesses and at the same time create a safer environment for the animal. If an animal is suspected to have an illness, it should be **quarantined** for a period of time to make sure it is in good health before harvesting it or its products for human consumption.

**Self-assessment** on the part of the food animal producer is very important. Before an animal is acquired, careful self-assessment to identify the food animal project best suited for the 4-H member is important. Self-assessment includes researching the space and housing available for the animal, determining how much time and labor the youth can realistically expect to be able to commit, finding out what types of feed are available, and a number of other factors. Each species, and even individual breeds within a single species, presents its own unique set of needs.

Pre-harvest food safety is a form of **bio-security** that must be taken seriously. These practices are most effective when done with consistency and accuracy. Not only animal assessment and self-assessment (**Disease Transmission Risk Assessment**) are important, though; record-keeping that is kept current is also critical. Good records ensure that an owner is familiar with the diseases that are common to each animal, as well as the measures he or she needs to take in order to ensure that no disease is transmitted to humans or animals. Many animals are susceptible to disease, so the main focus of pre-harvest food safety is to prevent diseased food products from being passed along for human consumption.

## 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 (or, in less formal terms, "Keeping the bad bugs off the farm").
- **Direct transmission:** Physical contact between an ill person or animal and a healthy person or animal that leads to the transmission of a disease.
- **Indirect transmission:** The transfer of pathogens to an uninfected person or animal through contact with the contaminated surface of an inanimate object (e.g., a food dish; the floor of a transport trailer).
- **Disease Transmission Risk Assessment:** An evaluation of the chance or likelihood that a disease will spread or will infect humans or animals.
- **Management:** The act or manner of handling, direction, or control of an animal's care.
- **Pathogen:** A disease-causing organism.
- **Pre-harvest Food Safety:** The reduction of risks associated with pathogens' effects on the livestock and poultry that enter the human food supply, with the potential to adversely affect human health.
- **Prevention:** Keeping something from occurring or happening.
- **Quarantine:** Isolation of infected animals to keep them away from others and so prevent the spread of disease.
- **Self-assessment:** Determination, by an individual, of what his or her animal's needs are and what the individual is capable of doing to raise an animal.

## Life Skills

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

**Subject Links:** Science, Language Arts

## Next-Generation Science Standards (NGSS) Crosscutting Concepts

- Cause and Effect: Events have causes, sometimes simple, sometimes multi-faceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.
- Scale, Proportion, and Quantity: In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.

## Purpose of Activity

The purpose of this activity is to have youth learn the requirements for raising a healthy animal for harvest. An additional goal is to have youth learn the importance of protecting their animals, pre-harvest, from interactions with wildlife by demonstrating various ways their animals might contract diseases from these interactions and compromise their health.

## Overview of Activity

This outdoor activity focuses on the components necessary to raise a healthy pre-harvest animal, including the importance of providing adequate space for the animal as well as the prevention of disease. The youth will simulate the daily life of an animal by going to and from different parts of their home as four groups of animals. In this way they will learn about **indirect contact**. After each round of the activity, the space available for the youth will be reduced, eventually reaching the point where there is so little space available that **direct contact** is unavoidable. The youth will have a chance to get an idea of what feels comfortable for an animal. Once the leader announces which group is infected or wild and which group has been vaccinated, the youth will get a better idea of their risks of being infected and what they can do to prevent this infection.

**Time Required:** 35–40 minutes

**Suggested Grouping:** 4 small groups

## Materials Needed

*(* = Materials provided in curriculum)*

- * *Activity Stations: Bedding, Grooming, Water, Food*
- * *Group Cup Labels: A, B, C, D*
- * *Group's Station Letters: A, B, C, D*
- * *Letter Pieces: A, B, C, D*
- * *Blank Pieces*
- * *Recording Sheets*
- * *Set-up Map*
- Chalk (**Volunteer Tip:** If you would like to make this an indoor activity, you can find an appropriate substitute for the chalk, such as yarn, tape, paper bags, etc.)
- 8 plastic cups
- Flipchart paper
- Writing utensils
- Tape

## Getting Ready

- Refer to the *Setup Map* to help set up this activity. Using your chalk, draw a large rectangle.
  - » (**Volunteer Tip:** If you have about 12 youth, there will be 4 groups of 3 youth, so you should outline a 12' × 12' rectangle. If you have about 20 youth, there will be 4 groups of 5, so a 20' × 20' rectangle will be better.)
- Take the 4 labels for *Activity Stations: Bedding, Grooming, Water, Food* and place one on the middle of each sideline of the rectangle.
- Make at least 2 copies of the *Letter Pieces*. Cut out the pieces and fold each one inward so the letters are not visible. Then place a few of each letter in each of 4 plastic cups. Place a cup on the middle of each side of the rectangle.
- Place each *Group's Station Letters* on each corner of the rectangle.
- Cut out the *Group Cup Labels*. Tape them onto the remaining 4 cups. Place these 4 cups at the corner of the rectangle that corresponds to each group's station letters.
- Cut out the *Blank Pieces* and fold them.
- Cut the *Recording Sheets* on the dotted line.
- Explain the procedure, the *Letter Pieces,* and the *Recording Sheet*s before you divide the youth into groups. The letter pieces that the groups pick up at each station represent one of the four animals each group represents.

### Opening Questions:

1. **What do you think are ways you get sick? How can you protect yourself from getting sick?** Ask the youth to share their ideas verbally or write their thoughts and ideas on the flip chart paper provided.
2. **What do you think are ways animals get sick? How can you protect animals from getting sick?** Ask the youth to share their ideas verbally or write their thoughts and ideas on the flip chart paper provided.

## Procedure (Experiencing)

### Round 1

1. Before starting Round 1, put all *Blank Pieces* in the *Bedding* cup. Place the *Lettered Pieces* in the *Water, Food,* and *Grooming* cups.
2. Divide the youth into 4 groups and assign each group a letter (A, B, C, or D). Each group represents one animal.
3. Distribute the appropriate *Recording Sheets* to each group based on their letter assignment. Ask the youth to look at the *Recording Sheet's* example row and make sure they understand how to use the *Recording Sheets.*
4. Have each group stand at the corner that corresponds to their group letter. Have the members of each group lock arms with each other.
5. With arms locked and as a group, have Groups A, B, and C go to each of the 4 Activity Stations. Have Group D go to all of the Activity Stations EXCEPT Grooming. At each station, ask the youth to pick up one folded slip of paper for their group from the cup, one group at a time, and bring it back to their corner to place in their group's cups. Once they have collected all their slips and returned to their corners, have them open up the folded slips they collected during this round and write down the information on their *Recording Sheet*.
   - (**Leader Tip:** If the youth ask about the *Blank Piece* and how to record it, just tell them to leave that space blank. **Note:** By locking arms, the youth simulate a higher stocking density.)
6. Discard all of the *Letter Pieces* the groups have collected from each station during this round.

### Round 2

1. Use the chalk to reduce the size of the activity area by at least 50% and realign all of the cups and stations to fit this reduced size.
2. Before you start Round 2, put all *Blank Pieces* in the *Food* cup. Place the *Lettered Pieces* in the *Water, Bedding,* and *Grooming* cups.
3. With arms locked and as a group, have Groups A, B, and C go to all 4 Activity Stations. Have Group D go to all of the Activity Stations EXCEPT Grooming. At each station, ask the youth to pick up one folded slip of paper for their group from the cup, one group at a time, and bring it back to their corner to place in their group's cups. Once in their corners, have them open up the pieces of paper they collected during this round and write down the information on their *Recording Sheet*.
   - (**Leader Tip:** If the youth ask about the *Blank Piece* and how to record it, just tell them to leave that space blank. **Note:** The blank piece of paper represents a potential pathogen-free interaction.)
4. Discard all of the *Letter Pieces* the groups have collected from each station during this round.

### Round 3

1. Use the chalk to reduce the size of the activity area again by at least 50%, and realign all of the cups and stations to fit this reduced size.
2. Before you start Round 3, put all the *Blank Pieces* into the *Grooming* cup. Place the *Lettered Pieces* in the *Water, Bedding,* and *Food* cups.
3. With arms locked and as a group, have Groups A, B, and C go to each of the Activity Stations. Have Group D go to all of the Activity Stations EXCEPT Grooming. At each station, ask the youth to pick up one folded slip of paper for their group from the cup, one group at a time, and bring it back to their corner to place in their group's cups. Once in their corners, have them open up the pieces of paper they collected during this round and write down the information on their *Recording Sheet*.
   - (**Leader Tip:** If the youth ask about the *Blank Piece* and how to record it, just tell them to leave that space blank.)
4. Discard all the *Letter Pieces* the groups collected from each station during this round.

### Round 4

1. Use the chalk to reduce the size of the activity area again by at least 50%, and realign all of the cups and stations to fit this reduced size.
2. Before you start Round 3, put all *Blank Pieces* in the *Water* cup. Place the *Lettered Pieces* in the *Grooming, Bedding,* and *Food* cups.
3. With arms locked and as a group, have Groups A, B, and C go to each of the Activity Stations. Have Group D go to all of the Activity Stations EXCEPT

Grooming. At each station, ask the youth to pick up one folded slip of paper for their group from the cup, one group at a time, and bring it back to their corner to place in their group's cups. Once in their corners, have them open up the pieces of paper they collected during this round and write down the information on their *Recording Sheet*.

» (**Leader Tip**: If the youth ask about the *Blank Piece* and how to record it, just tell them to leave that space blank).

4. At the end of Round 4, announce to the youth that Group D was a wild animal infected with a disease. Have each group look at their *Recording Sheets* and circle the round(s) where they came into contact with Group D.

### Final Round

1. Now, announce to the youth that Group A was vaccinated and that they are safe and disease-free.
2. Finally, ask the youth to discuss in their small groups what they can interpret from all the data they collected and were given.

## Sharing, Processing and Generalizing

Ask the youth to interpret the information they wrote on their *Recording Sheets* throughout the activity. 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 points might include

1. **What did each group record on their *Recording Sheets* and how did they interpret their data?**
2. **What do you think are some ways you (representing an animal) could have become infected with a disease in this activity?**
3. **What do you think are some ways to reduce the risk that you (representing an animal) will become infected with a disease?**
4. **How did your group's experience change when the space was reduced at each round? What do you think the size of the living space has to do with disease transmission?**
5. **What role do you think the Blank Pieces played in this activity? What happened when you picked a Blank Piece? Why do you think there were no indirect contacts?**
6. **What does this activity teach you about potential pre-harvest food safety risks that might occur when you raise a real food-producing animal? What are some ways you can reduce these pre-harvest food safety risks?**

## Concept and Term Introduction

At this point, volunteers need to ensure that the concepts and terms **bio-security, disease transmission, management, pathogens, pre-harvest food safety, prevention, quarantine, risk assessment,** and **self-assessment** 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

Ask the youth:

- **How would you design a living space for your animals to best meet their needs? Draw a picture of your proposed design. Consider space, sanitation, protection from wild animals, and pre-harvest food safety.**

# REFERENCES


Childers, A. B., and B. Walsh. Pre-harvest food safety. 1996. Annals of New York Academy of Science. (V. 791 Issue: Imaging brain structure and function: Emerging technologies in the neurosciences). Pp. 314–317. www.blackwell-synergy.com/doi/pdf/10.1111/j.1749-6632.1996.tb53538.x

Davies, P. Pre-harvest food safety and pork. http://mark.asci.ncsu.edu/HealthyHogs/book1994/davies2.htm

Dictionary.com. http://dictionary.reference.com/

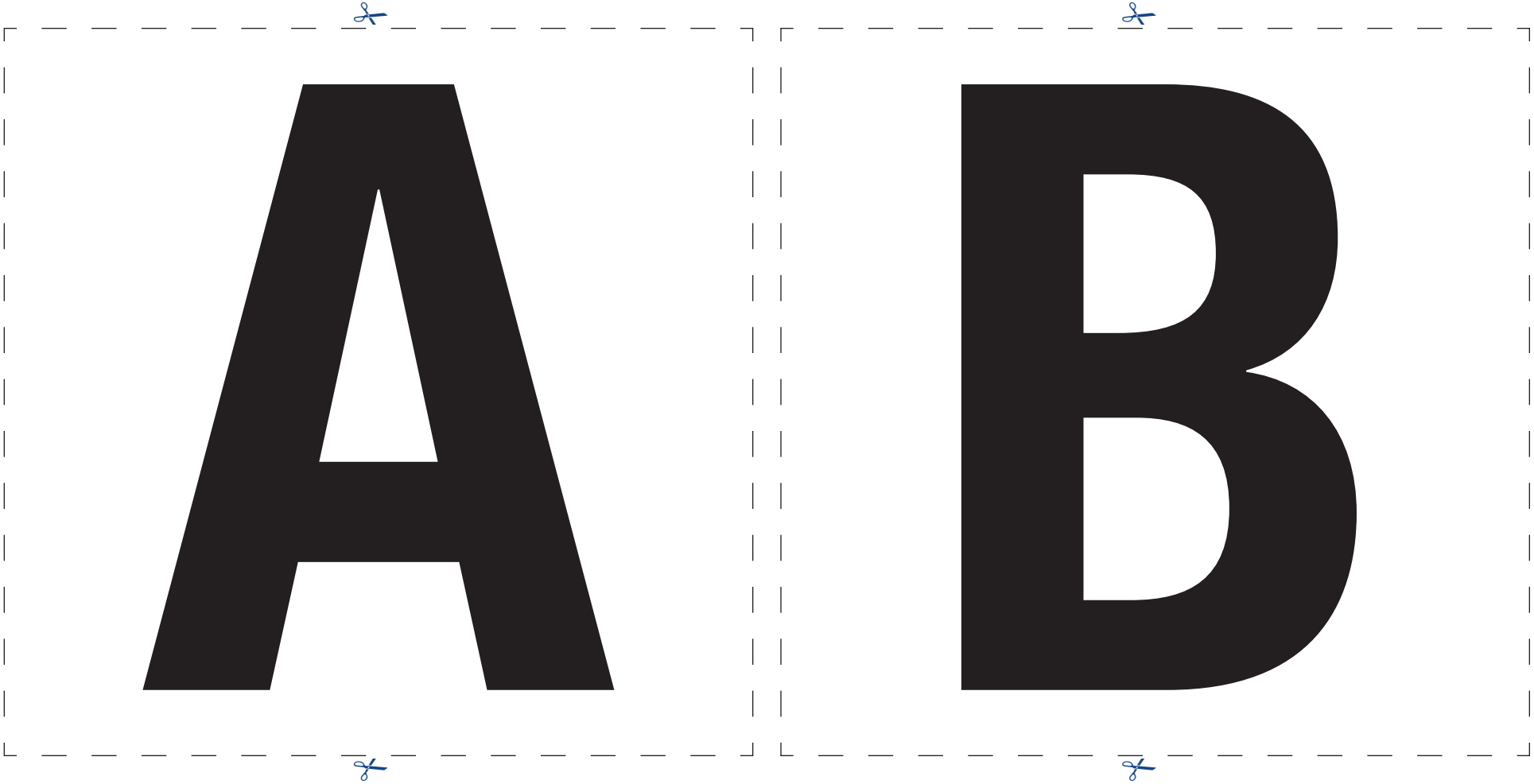
Safe Foods. Pre-harvest food safety and security. www.safefoods.nl/Lists/News/DispForm.aspx?ID=13

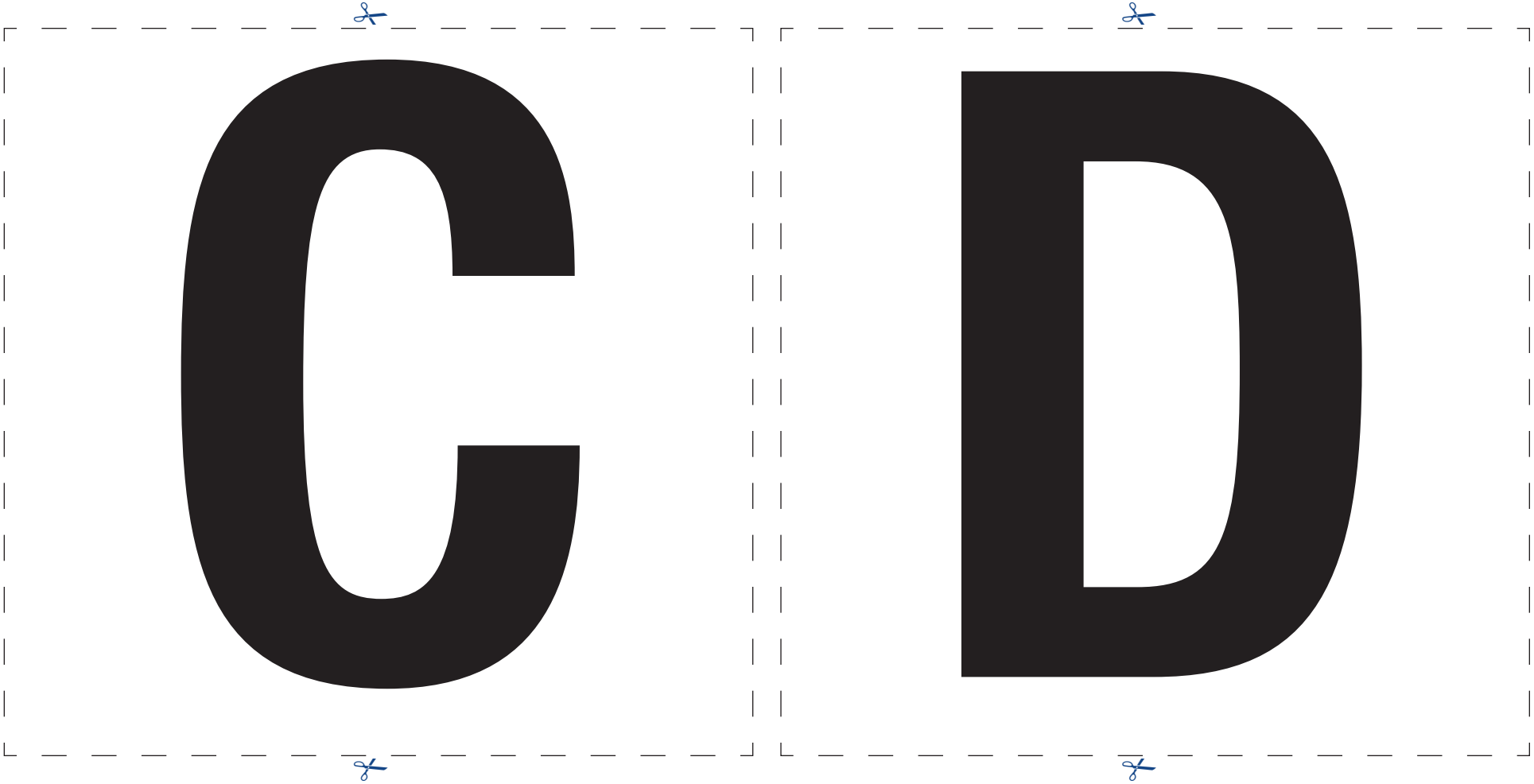
U.S. Food and Drug Administration. Food protection plan. www.fda.gov/oc/initiatives/advance/food.html

World Health Organization. Department of Communicable Disease, Surveillance and Response. Pre-harvest food safety. 2001. http://whqlibdoc.who.int/hq/2002/WHO_CDS_CSR_EPH_2002.9.pdf

World Health Organization. Foodborne disease surveillance: Pre-harvest food safety. www.who.int/foodborne_disease/strategies/preharvest/en/index.html

## Group Station Letters




C
D

## Activity Stations

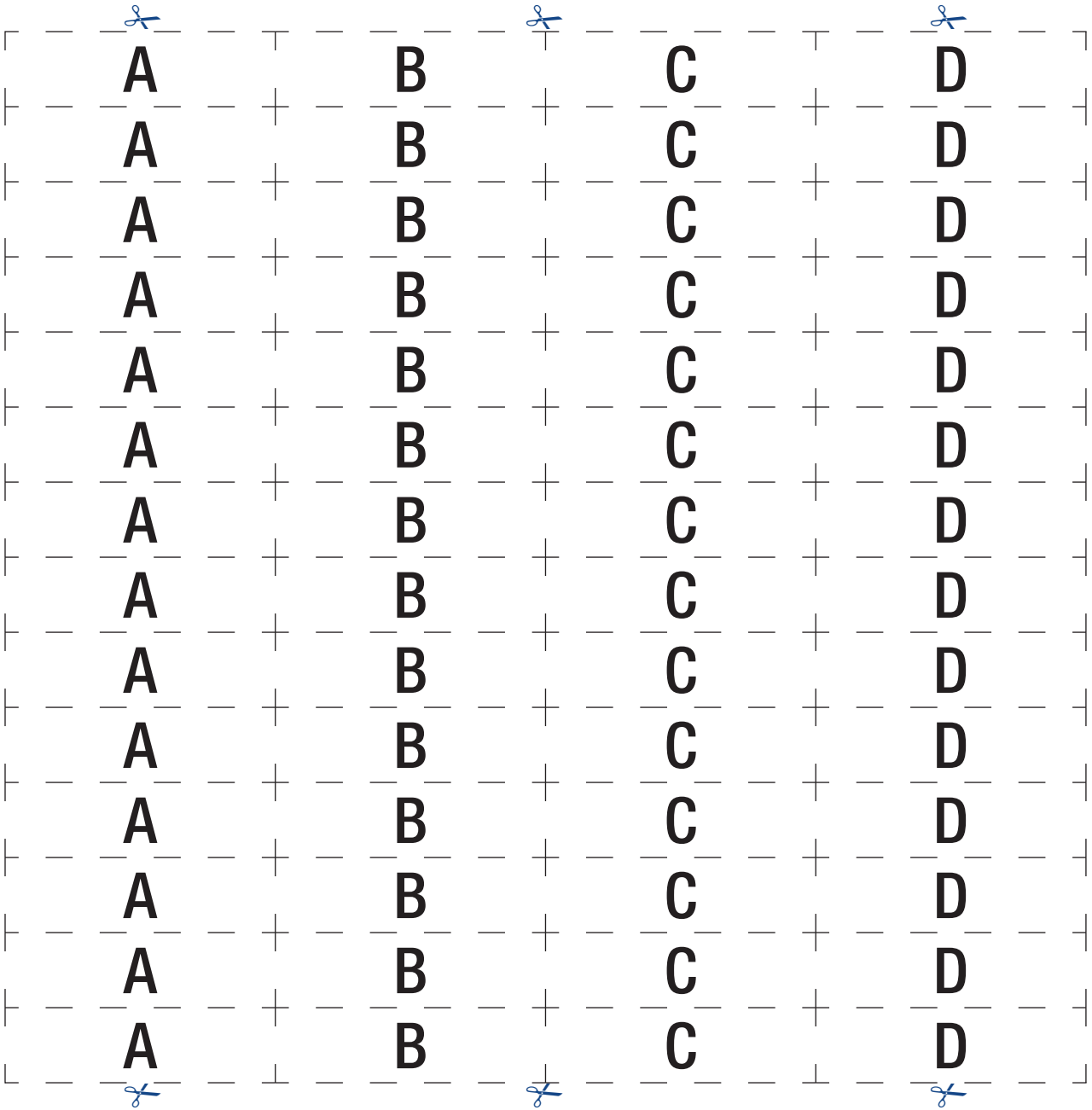
# Food

# Water

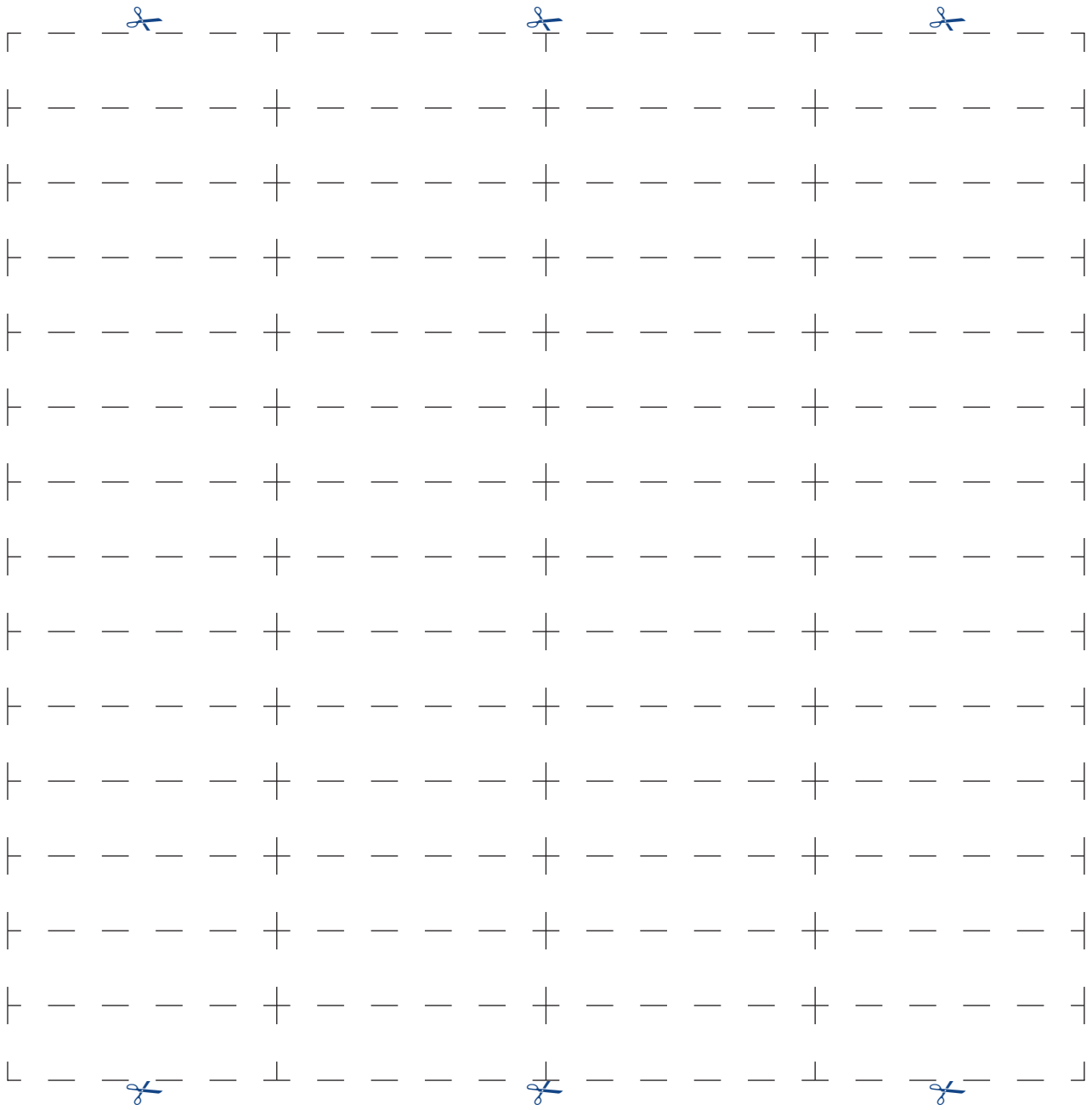
# Bedding

# Grooming

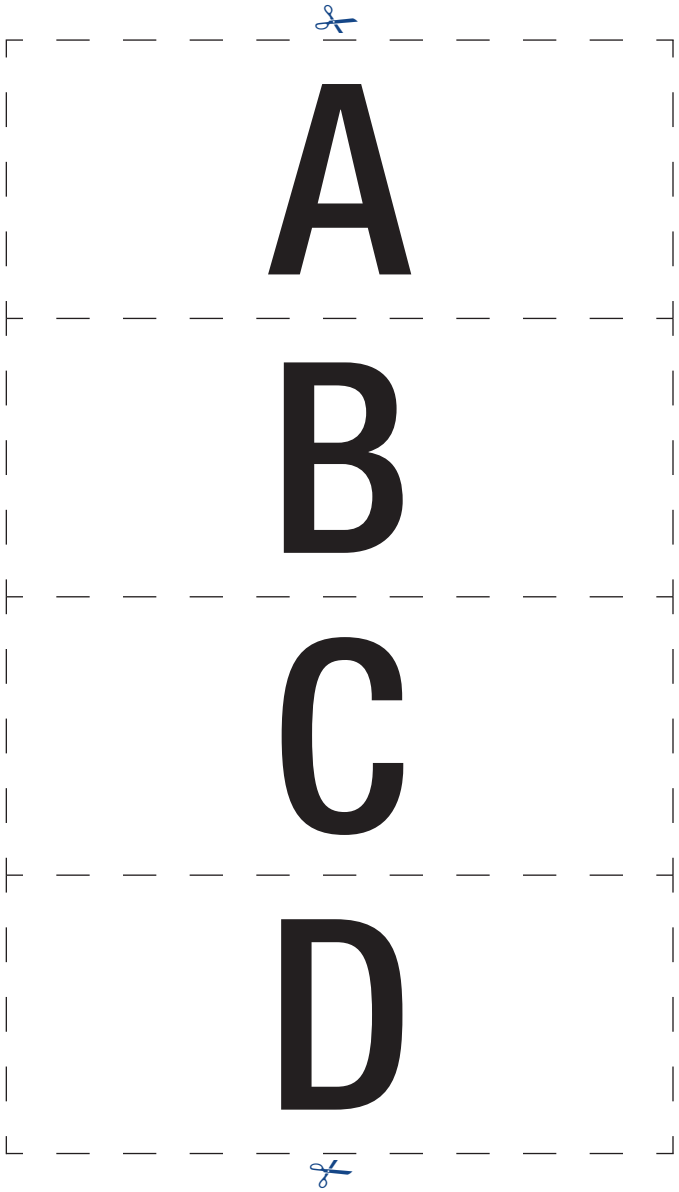
## Letter Pieces



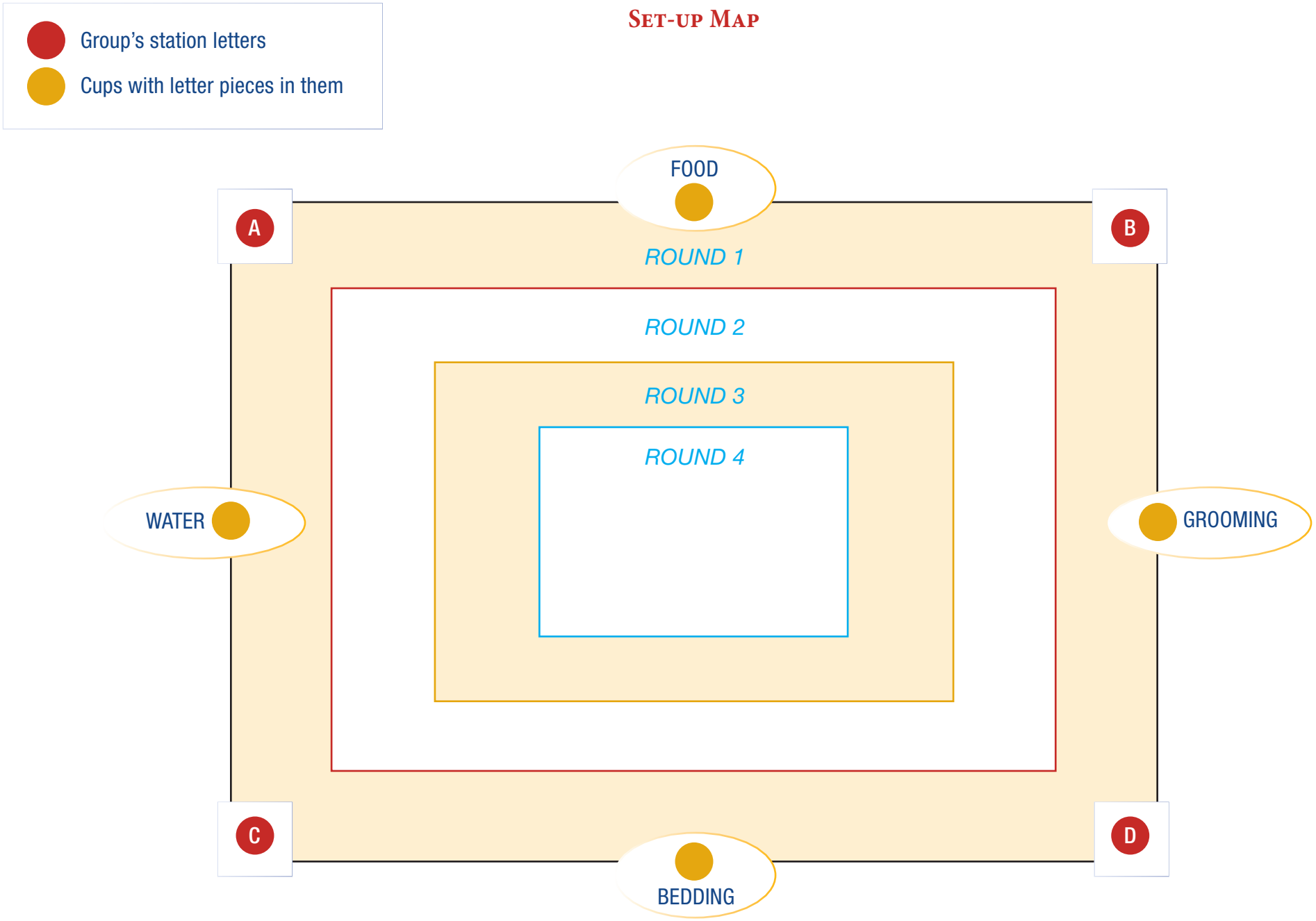
## Blank Pieces



## Group Cup Labels



## Set-up Map


Group's station letters
Cups with letter pieces in them
FOOD
A
B
ROUND 1
ROUND 2
ROUND 3
ROUND 4
WATER
GROOMING
C
D
BEDDING

## Recording Sheets

| ANIMAL A | Food | Water | Bedding | Grooming |
|---|---|---|---|---|
| *Example:* | *A* | *D* | | *B* |
| Round 1 | | | | |
| Round 2 | | | | |
| Round 3 | | | | |
| Round 4 | | | | |

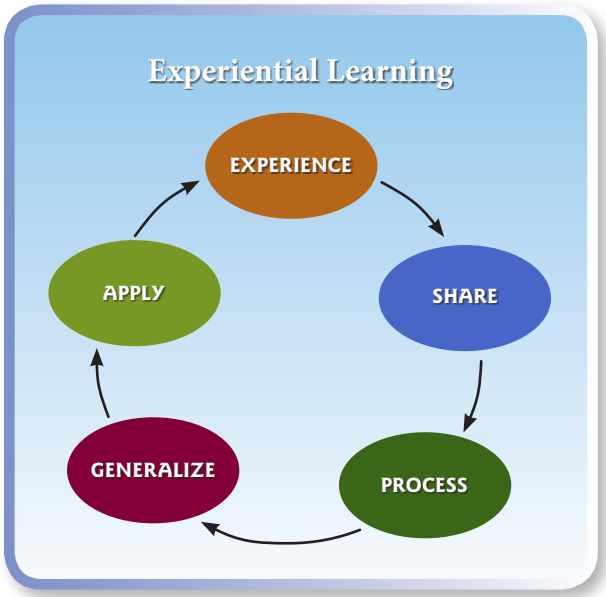
| ANIMAL C | Food | Water | Bedding | Grooming |
|---|---|---|---|---|
| *Example:* | *A* | *D* | | *B* |
| Round 1 | | | | |
| Round 2 | | | | |
| Round 3 | | | | |
| Round 4 | | | | |

| ANIMAL B | Food | Water | Bedding | Grooming |
|---|---|---|---|---|
| *Example:* | *A* | *D* | | *B* |
| Round 1 | | | | |
| Round 2 | | | | |
| Round 3 | | | | |
| Round 4 | | | | |

| ANIMAL D | Food | Water | Bedding | Grooming |
|---|---|---|---|---|
| *Example:* | *A* | *D* | *B* | |
| Round 1 | | | | |
| Round 2 | | | | |
| Round 3 | | | | |
| Round 4 | | | | |

## 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 a real-life setting. 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 website, http://www.experientiallearning.ucdavis.edu/default.shtml.

## For More Information

To order or obtain ANR publications and other products, visit the ANR Communication Services online catalog at http://anrcatalog.ucanr.edu or phone 1-800-994-8849. You can also place orders by mail or FAX, or request a printed catalog of our products from

University of California
Agriculture and Natural Resources
Communication Services
1301 S. 46th Street
Building 478 - MC 3580
Richmond, CA 94804-4600

Telephone 1-800-994-8849
510-665-2195
FAX 510-665-3427
E-mail: anrcatalog@ucanr.edu



**Publication 8510**

ISBN-13: 978-60107-873-5


**For information about ordering this publication, telephone 1-800-994-8849. For assistance in downloading this publication, telephone 530-750-1225.**

To simplify information, trade names of products have been used. No endorsement of named or illustrated products is intended, nor is criticism implied of similar products that are not mentioned or illustrated.

An electronic copy of this publication can be found at the ANR Communication Services catalog website, http://anrcatalog.ucanr.edu.

UC PEER REVIEWED This publication has been anonymously peer reviewed for technical accuracy by University of California scientists and other qualified professionals. This review process was managed by the ANR Associate Editor for Human and Community—Youth Development, Lynn Schmitt-McQuitty.

web-7/14-WJC/RW