Animal Poo & You –
Staying Healthy Around Your Animals

Fecal Matters
Instructor Guide

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This Instructor Guide supports the *Fecal Matters* animated lesson of the *Animal Poo & You* curriculum on prevention of zoönotic diseases. This guide provides the instructor with background information, discussion questions, in-class and at-home student activities, and other aids to supplement the learning objectives presented in the otherwise stand-alone animated video lesson. Instructors can make use of content in this guide in whole or in part to engage students both prior to and following viewing the video to reinforce the learning objectives. Note that not all information in this guide is intended for direct delivery to students. Instructors should consider the ages, backgrounds, interests, and capabilities of their students when adapting and applying the information contained in this guide.

Suggested Use for this Guide:

Before viewing/sharing the video with students, the instructor can:

1. Review the lesson's **Learning Objectives**, **Background Information**, and **Vocabulary/Concept Building** sections in this guide to become acquainted with key topics presented in the video.
2. Review the **Resources** list for more information about a specific topic.
3. Set the environment for the video's learning objectives by posing one or more of the **Discussion Questions (Pre-Video)** to students, which may be presented as "things to think about while watching the video".

Share the video with students:

The **Video Lesson** may be viewed alone or in sequence with the other lessons in the *Animal Poo & You* curriculum.

After viewing/sharing the video with students, the instructor can:

1. Engage students in a discussion using the **Discussion Questions (Post-Video)**.
2. Reinforce students' understanding of the subject area by reviewing terms in the **Vocabulary/Concept Building** section.
3. Share **Fun Facts** which expand beyond the key learning objectives to further stimulate interest and independent learning in the topics presented.
4. Share **Activities** with students as in-class exercises or take-home assignments to apply information from the video in a fun, hands-on way.
5. Administer the **Quiz Questions** to assess the students' understanding of the key learning objectives.
6. Complete and sign the **Certificate of Achievement** for students who have completed the lesson and demonstrated their understanding of key concepts by correctly answering the Quiz Questions.

Video Lesson

Fecal Matters

In this lesson, the barnyard characters learn about fecal matter (feces) and how it contains microbes that can cause disease.

Learning Objectives

Main Concept(s):

- Animal poop contains germs that can make people sick.
    - Poop germs can be found on animals and everywhere they live.
    - Germs are present even if an animal looks clean and healthy.
- If you touch something covered with poop germs, your hands can carry the germs to your mouth, nose, or eyes – where they can make you sick.
- Keep animal areas clean and remove animal poop daily.
- Wash hands with soap and water immediately after working with your animal.

After completing this lesson, students will be able to:

- Identify areas and surfaces where germs from animal feces could be present
- Describe how touching contaminated surfaces can spread germs to people and make them sick
- Describe ways they can reduce the risk of getting sick from animal feces
- Explain ways to keep animal areas clean

Background Information

Animal Feces and Microbes

Feces are the body's waste: feces contain bits of food that are undigestible (fiber) or not necessary for an animal's nutrition. Feces are also a means for the body to dispose of cells and tissues it no longer needs. Fecal matter is often brown in color due to bile excreted from the liver into the gastrointestinal tract, where it is disposed of in feces.

Animals (including humans) have microbes (including bacteria, viruses, and parasites) that live naturally in their intestines and are sometimes expelled with feces. Each animal's intestinal microbes can be unique, and those microbes that are harmless or helpful in aiding digestion in one animal can be harmful or even deadly in another animal or in a human.

For example, bacteria known as *Escherichia coli* (*E. coli*) live naturally in the intestines of many animals, including humans. However, there is a particular type of *E. coli,* called *E. coli* O157, frequently found in the intestines of cattle that can cause severe illness and even death in people. Even healthy animals can expel microbes in their feces that make people sick. Some of the more common fecal microbes that cause illness in people are:

- *Salmonella* (bacteria)
- *E. coli* O157 and other Shiga toxin-producing *E. coli* (bacteria)
- *Campylobacter* (bacteria)
- *Cryptosporidium* (parasite)

These pathogens typically cause gastrointestinal illness in humans, including diarrhea, fever, and stomach cramps, which usually resolve without treatment. But in some cases, illness can progress to severe disease, causing organ damage/failure, and even death. For example, infection with *E. coli* O157 and other Shiga toxin-producing *E. coli* (or STEC) can cause especially severe disease and result in a complication called hemolytic uremic syndrome (HUS). HUS is a life-threatening complication that leads to anemia and kidney damage. Risk of HUS is highest in young children and most often after *E. coli* O157 infection.

Diseases shared between animals and humans are also called "zoönotic diseases". Many zoönotic diseases are transmitted through the fecal-oral route, meaning that microbes expelled

in animal feces are accidentally swallowed by humans. This can occur through direct contact with fecal matter, or through fecal contamination of human food and drink. Contamination with feces of animal origin can be a concern for a variety of food products, including meats, produce, and milk.

Livestock and Fecal-Oral Zoönotic Diseases

Livestock such as goats, pigs, cows, and chickens deposit feces on the ground or floor of the stall, pen, or field in which they live. Feces and their pathogens can be present anywhere that the animal has access. Furthermore, fecal matter can be dispersed throughout the animal's living environment by the animal's feet, fur, or other means. Dried animal feces can also be released into the air and contaminate areas above the floor and ground, including on the fencing or railing of an animal's pen. Even when there are no visible feces, there may still be contamination, and even tiny amounts of fecal matter can contain thousands of microbes that can cause illness in humans.

Every year, many people get sick from zoönotic diseases transmitted through the fecal-oral route. Some outbreaks of fecal-oral diseases have been traced to public venues such as petting zoos, livestock fairs, and animal exhibits – areas where members of the public interact with animals and their environments. Cases of salmonellosis, STEC, and other zoönotic diseases are reported every year in California; children 5 years of age and younger, people with weakened immune systems, and adults over 65 years of age are more likely to get seriously ill from zoönotic pathogens. Outbreaks of zoönotic diseases have caused illness and even death among sensitive groups, including young children, following direct or indirect contact with animals at exhibits in California. Illnesses have also occurred as a result of contact with pets and animals at home, including backyard poultry (chicken and ducks).

Prevention of Fecal-Oral Zoönotic Diseases

Animals themselves, animal environments, and waste-removal equipment (such as manure forks and muck buckets) should be considered to be contaminated with microbes from animal feces, even after the obvious feces have been removed from their surfaces. Fecal contamination of some materials common to animal environments—wood fences, straw

bedding, dirt floors—may be impossible to fully remove. A person's shoes, gloves, and clothes can also become contaminated with animal feces.

Zoönotic diseases can be very serious, and it is important for people who engage with animals to take steps to limit their risk of infection.

The following principles and practices to prevent fecal-oral transmission of zoönotic pathogens are important to teach to youth working with animals:

- Know how you can get sick from animal poop!
- Wash your hands thoroughly with soap and water after working with an animal, cleaning up after an animal, or being in an area around animals.
- Keep items out of your mouth, including food and drink and fingers, while you are around animals or areas where animals are kept. Human food, water bottles and other drink containers, toys, and other personal items should be left outside of areas where animals live.
- Have separate shoes that are used only to work with your animals and keep them outside of the house. Or, wear washable boots if coming in contact with animal manure and wash the boots after you use them.
- Have separate clothes or coveralls that are used only while working with animals. Leave those clothes at or near the barn/stable except when they need to be washed. Clothes worn while working with animals should be washed separately from other household laundry and should be washed with hot water and bleach to kill any germs from animal poop.
- Keep areas where animals are present clean and free from poop – like humans, animals need clean living areas to stay healthy.
    - Animal poop should be removed from pens and enclosures every day.
- Animal feed bins, water buckets, and other containers and surfaces should be cleaned regularly.

Vocabulary/Concept Building

The following words and concepts used in the video lesson may be new or unfamiliar to some students:

- **Feces**: waste matter that remains after food has been digested and nutrients extracted; this is what leaves the body during a bowel movement
    - Synonyms and slang for "feces" mentioned in the video lesson:
        - Poop/poo
        - Guano (specifically the excrement of seabirds and bats)
        - Scat (especially the droppings of carnivorous mammals)
        - Manure
        - Ejectamenta
        - Ordure
        - Feculence
        - Whoopsies (informal British term used euphemistically to refer to a piece of excrement)
- **Microbes**: microscopic organisms (germs) that can cause illness; the key types of microbes include bacteria, viruses, parasites, and fungi
- **Paddock**: an enclosed area used especially for pasturing or exercising animals

Fun Facts

- Scatology or coprology is the study of poop in medicine and biology.
- Coprolites are fossilized poop of dinosaurs and other animals that lived millions of years ago. Scientists can study these fossils to learn about these animals' diets, behavior, and environment.
- Since poop is the body's waste, it is generally disposed of, but some animal poop can be composted to be used for plant fertilizer.
- A three-toed sloth climbs down from the treetops once a week to poop.
- Dung beetles eat piles of poop that are left behind by other animals.
- A parrotfish chews on coral reefs and then poops it out as sand.
- A bear doesn't poop during the six months it is asleep in the winter (hibernating).
- Rabbits eat their own poop (a process known as "coprophagy") and digest it a second time to maximize the nutritional value of their diet rich in fiber and cellulose.

Resources

- Diagram of Animals' Digestive Systems – Michigan State University Extension 4-H Youth Development
- 4-H Grab & Go Animal Science Guide: Ruminant Digestion – Washington State University
- About *Salmonella* Infection – U.S. Centers for Disease Control and Prevention (CDC)
- Cool Jobs: Poop Investigators – Science News Explores
- About *Escherichia coli* Infection – CDC
- About Crypto Infections – CDC
- About *Campylobacter* Infection – CDC
- Zoönotic Diseases – California Department of Public Health
- Healthy Pets, Healthy People: Backyard Poultry – CDC
- Exposure to Animal Feces and Human Health: A Systematic Review and Proposed Research Priorities (Penakalapati et al.) – *Environmental Science & Technology*, 2017

Discussion Questions

Pre-Video

- What's the first thing you think of when I say the word "poop"?
- Do you think that all animals poop?
- Why do you think animals poop?
- Is poop "gross" or "yucky"? Why?

Post-Video

A transcript of the *Fecal Matters* video lesson is available as a reference to aid instructors in classroom discussion after viewing the video.

- Why do you think the animals in the video say to "keep your hands offa' that doo doo"?
- Name some places where you might find animal poop.
- Even if you can't see poop around an animal, is it possible that germs from their poop are still on or around them?
- What can happen if you touch animal poop?
- What are some things you can do to keep from getting sick from germs in animal poop?

Quiz Questions

Quiz questions may be administered to students individually or as a group, in either a verbal or written format. A printable version of the *Fecal Matters* quiz is available.

1. Which of the following areas in an animal pen could be covered with animal poop germs?
    A. Fence
    B. Water bucket
    C. Dirt or ground
    D. Feed bin
    E. All of the above
2. True or False: If you touch a surface that doesn't look like it has poop on it, you don't need to wash your hands.
3. If you touch your face with unwashed hands after being in an animal pen, name a part of your face where germs can get into your body.

Quiz Answer Key:

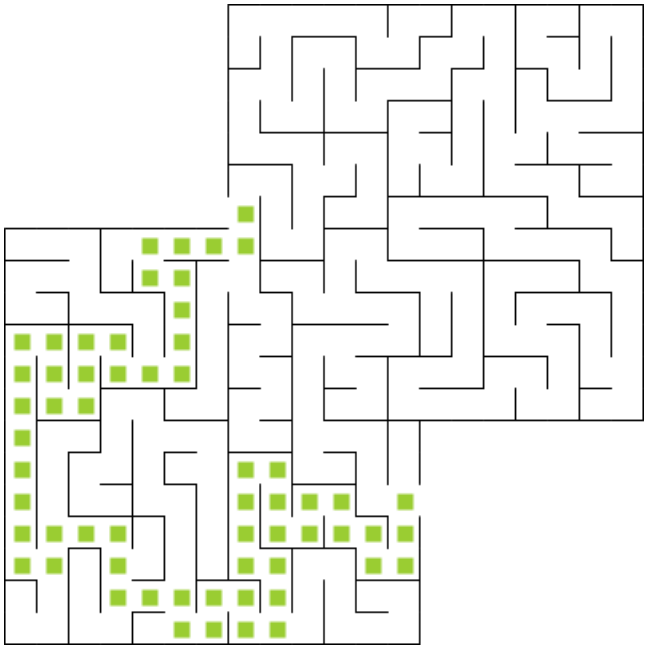
1. E
2. False
3. Answers can include: eyes, nose, mouth

Activities

Note that some students may need assistance completing activities.

1. **Maze**
   - Students navigate through a maze, starting at the animal barn and leading to the house, without stepping in any poop.

   Answer Key:



2. **Whose Poos?**
   - Students match animals to their respective piles of poop.

   Answer Key:

   1. Goat = D
   2. Cow = E
   3. Horse = A
   4. Chicken = F
   5. Pig = C
   6. Human child = B

3. **Word Search**
   - Students find the various synonyms for poop in a jumble of letters.
     - **i.** Note that the more difficult words are included as "Bonus Words".

Answer Key:

S	**E**	**C**	**E**	**F**	D	**E**	R	**T**	**A**	**C**	**S**	K	U	N
N	T	M	Y	M	Z	**J**	Z	Q	Z	C	K	Q	A	M
W	S	V	E	P	S	**E**	M	V	Z	**D**	W	V	H	L
C	I	J	E	U	B	**C**	C	A	U	**R**	Y	E	N	P
W	R	T	Q	J	**M**	**T**	Q	R	V	**O**	W	E	A	U
C	Y	O	U	M	**A**	**A**	**O**	X	V	**P**	L	F	V	F
Q	W	Z	V	K	**N**	**M**	**R**	T	T	**P**	K	S	E	K
Y	N	**D**	P	E	**U**	**E**	**D**	R	O	**I**	O	W	L	C
Z	I	**O**	P	G	**R**	**N**	**U**	K	H	**N**	A	L	X	R
N	R	**O**	W	S	**E**	**T**	**R**	J	T	**G**	M	**P**	**O**	**O**
I	U	**D**	F	U	G	**A**	**E**	G	V	**S**	W	T	J	G
Y	J	**O**	E	I	R	A	Y	A	C	K	B	Q	T	F
Y	S	**O**	G	S	T	K	R	M	S	**G**	**U**	**A**	**N**	**O**
L	E	Q	M	B	M	R	O	L	V	P	K	L	F	R
D	Q	T	**F**	**E**	**C**	**U**	**L**	**E**	**N**	**C**	**E**	J	Q	Z

Other Activities

- Teaching science when you don't know diddly-squat: Why do animal poops look different? – Michigan State University Extension 4-H Science & Engineering

About

Animal Poo & You is an integrated curriculum designed to introduce basic concepts of zoönotic disease prevention to youth engaged in agricultural activities. Lessons are designed and developed using vocabulary and images, presented in a musical narrative, appropriate to youth aged 5-8 years. Each animated lesson presents the student with information on a specific area of zoönotic disease prevention and may be viewed individually or in a classroom setting.

Animal Poo & You is a collaborative project between the California Department of Public Health, the California Department of Food and Agriculture (CDFA), the University of California 4-H Youth Development Program, the California Foundation for Agriculture in the Classroom, Bike City Theatre Company, and Le Studio de Mon Creatch. Financial support for this project was provided in part by the U.S. Centers for Disease Control and Prevention, the Council of State and Territorial Epidemiologists, and the CDFA Antimicrobial Use and Stewardship Program.