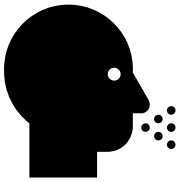
Animal Poo & You –
Staying Healthy Around Your Animals

Achoo! It's Novel Flu…and SARS-CoV too!

Instructor Guide



Achoo! It's Novel Flu...and SARS-CoV too! Instructor Guide

This Instructor Guide supports the *Achoo! It's Novel Flu…and SARS-CoV too!* 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 if more information is desired 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

Achoo! It's Novel Flu…and SARS-CoV too!

In this lesson, the barnyard characters learn about novel influenza (flu) and how it and other zoönotic diseases can spread via the respiratory route from animals to people, and from people to animals.

Learning Objectives

Main Concepts:

- Zoönotic diseases come from germs that spread from animals to people.
- Viruses can spread through the air between animals and people.
- New kinds of flu can spread from birds and pigs to people, and from people to pigs.

After completing this lesson, students will be able to:

- Explain the role of germs that cause illness in animals and humans
- Identify at least one animal that can spread new kinds of flu to humans
- Recognize general symptoms of respiratory illness, including the flu in people and animals
- Understand why sick animals should be separated from other animals

Background Information

Zoönotic Diseases

Zoönotic ("zoh-uh-NAH-tik") diseases, or zoönoses, are infectious diseases that are shared between animals and humans. Zoönotic diseases can be caused by microbes such as viruses, bacteria, fungi, and parasites, including familiar zoönotic diseases such as rabies, influenza, and illness due to pathogenic *E. coli*. The capacity that all zoönotic microbes have in common is the potential to affect the health of both people and one or more species of animal. Some zoönotic microbes, like the rabies virus, cause disease in both humans and animals. Other zoönotic microbes, such as some strains of *Salmonella* and *E. coli*, are harmless in some animal species, but are pathogenic and cause illness in people. Some zoönotic microbes, such as the coronavirus that causes COVID-19, began as microbes in animals, but evolved to be transmitted directly between people.

Zoönotic microbes can be transmitted from animals to people in many ways:

- Consuming food or drink contaminated with animal feces – this is a common means of exposure for many zoönotic pathogens

- Bites from mammals and arthropods (ticks, mosquitoes)
- Transfer of microbes to mucous membranes (from hands to eyes, nose, or mouth) from environments contaminated by animal waste
- Inhaling microbes present in the air

Respiratory Pathogens

Many zoönotic pathogens can be transmitted through the air. Zoönotic pathogens can be expelled into the air through respiratory secretions (saliva, sputum) from infected animals. Depending on the microbe and the environmental conditions, microbes can remain in the air for less than a second to several minutes or even hours. If a human inhales air in which the microbes are suspended, the human may become infected. If a human or animal is infected with a respiratory pathogen, common signs of illness include cough, fever, and runny nose.

Two important zoönotic diseases that are transmitted among humans through the respiratory route are COVID-19 and influenza. While zoönotic transmission of these diseases is uncommon, they provide examples of illnesses that originated in animals before circulating among humans.

COVID-19

COVID-19 is a zoönotic respiratory disease that originated in animals and emerged among humans in Asia in late 2019. Within months, cases of COVID-19 were identified throughout the world. Within three years, the global pandemic resulted in millions of human cases and deaths. SARS-CoV-2, the coronavirus that causes COVID-19, is transmitted chiefly through respiratory secretions from person to person. Molecular analysis of the coronavirus indicated that it has similarities to viruses found in certain Asian bats and may have originated from bats. Most animals appear to have little susceptibility to SARS-CoV-2, and there is no evidence that domestic animals such as livestock and pets play a role in maintaining or transmitting the virus to humans. However, there have been incidents where a human infected with COVID-19 transmitted SARS-CoV-2 to an animal. This phenomenon where a disease is transmitted from a human to an animal is sometimes called a zoöanthroponosis or "reverse zoönosis". In the United States, SARS-CoV-2 has been occasionally detected in pet dogs and cats, wild deer, farmed mink, as well as tigers, lions, otters, gorillas, and other zoo animals. Cattle, swine, and other livestock do not appear to be susceptible to infection with SARS-CoV-2.

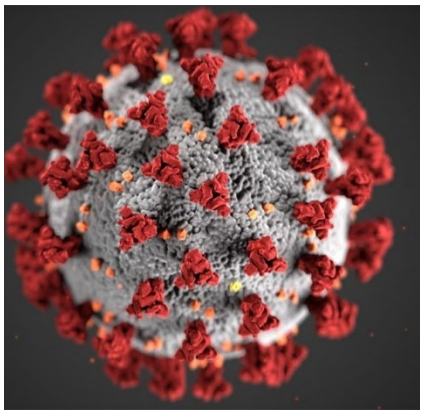


Image source: CDC

Influenza

Influenza ("flu") is a respiratory disease that is widespread throughout the world and affects humans and many species of animal. Thousands of influenza cases and deaths among people occur each year as a result of human-to-human transmission; members of certain groups (older adults, immunocompromised persons, young children) can experience more severe disease if infected.

Influenza is caused by a wide array of ever-changing viruses—some of which affect only people, some affect only animals, and some affect both. Some influenza viruses are specifically adapted to certain species of animals (dogs, horses) and rarely, if ever, infect humans. Other influenza viruses can more easily cross over from animals (swine, birds) to infect humans, causing new types of influenza that then may or may not circulate widely within human populations. But, if an animal is infected with more than one type of influenza virus (e.g., swine **and** avian), the viruses can "swap" genetic material, which can change or expand the range of susceptible hosts, including humans, for which the virus is pathogenic.

Types of human influenza include:

- Seasonal influenza. The most common type of influenza to infect humans is seasonal influenza. Each year, especially during the winter months, seasonal influenza viruses are transmitted exclusively between humans. Illnesses in people can range from mild to severe to fatal. It is common for influenza viruses to adapt and undergo genetic changes (also called mutations) every year. Vaccines are redeveloped each year to try and target circulating seasonal influenza viruses.

- Novel Influenza. Novel (new) influenza viruses differ from the influenza viruses that circulate among people during a given season. Novel influenza viruses are usually influenza viruses that circulate among animals and acquire the ability to infect humans.
    - Influenza viruses that normally circulate among swine specifically but have infected humans are called "variant influenza viruses".
- Pandemic influenza. An influenza pandemic is a global outbreak of a novel influenza virus that has emerged and is capable of direct transmission from person to person in an efficient and sustained way.

Nearly all influenza viruses that infect people, including those that circulate among humans as seasonal influenza, began as novel influenza viruses that emerged from viruses that infected birds ("avian influenza") or swine ("swine influenza").

Avian Influenza. There are many influenza viruses that occur naturally among wild birds. Domesticated birds (chickens, turkeys, etc.) may become infected with avian influenza viruses through direct contact with infected waterfowl (wild ducks and geese) or other infected poultry, or through contact with surfaces that have been contaminated with the viruses. Different avian influenza viruses can cause different severities of disease in poultry, from no illness, to mild illness and decreased productivity and reduced growth, to death.

Avian influenza viruses do not normally infect humans. But when influenza viruses from different animal species mix, there is an increased opportunity for the viruses to mutate, potentially into a new strain that is pathogenic to humans. This occurs most commonly when avian influenza viruses interact with swine influenza viruses.

Swine Influenza. Swine influenza viruses regularly cause outbreaks of disease among pigs. Swine influenza causes fever, lack of appetite, depression, lethargy, sneezing, coughing, and discharge from the nose or eyes in pigs. Some pigs infected with influenza virus may show no or only mild signs of illness, while others may become severely ill and die. Swine influenza viruses can circulate among swine throughout the year, but most outbreaks occur during the late fall and winter. Influenza vaccines for swine are available in the U.S. but should be used or considered only in consultation with a veterinarian.

Swine influenza viruses do not normally infect humans. Swine influenza viruses that develop the capacity to transmit to people are called "variant influenza viruses" and are usually detected in people who had direct contact with swine. Most commonly, humans become infected with variant influenza viruses when they inhale influenza virus aerosolized in swine respiratory secretions (e.g., sneeze, cough) or through transfer from contaminated surfaces (e.g., hand-to-mouth). People infected with variant influenza viruses have symptoms that are similar to those for regular human seasonal influenza: fever, lethargy, lack of appetite, and coughing. Other occasional symptoms include runny nose, sore throat, eye irritation, nausea, vomiting, and diarrhea.

Pigs are also susceptible to avian and human influenza viruses and can be infected by multiple viruses from different species (e.g. duck + human) at the same time. If this happens, it is possible for the genes of these viruses to mix and create a new or "novel" virus. If this novel virus causes illness in people and can be transmitted easily from person to person, an influenza pandemic can occur. The H1N1 influenza virus that emerged in 2009 is an example of how an influenza virus can in a short time progress from novel to pandemic to seasonal – see Estimating the Burden of 2009 Pandemic Influenza A (H1N1) in the United States (April 2009 – April 2010) – *Clinical Infectious Diseases*, 2011.

Prevention of Novel Influenza

Prevention of novel influenza strains before they emerge is key to reducing the risk of illness among both animals and people. Animal health officials recommend a set of simple biosecurity principles that can be applied to any animal species, including swine and poultry, to help prevent disease spread.

Youth who raise and show birds and swine can follow some of the guidelines below to help prevent influenza in their animals.

- When bringing a new animal into the herd or flock, keep it separated until a veterinarian can examine it and determine that it is not carrying any diseases.
- Stay away from live or dead wild pigs (boar) and wild birds, particularly waterfowl (ducks, geese).
- If you or family or friends are sick with flu-like symptoms, stay away from your animals until you or others are feeling well. Arrange for someone else to feed and care for your animals until you are well.
- Some people are more likely to get sick from animal germs, even if they are healthy. This includes very young children (like babies and toddlers) and older adults (like grandparents). People who are very young or very old should stay away from pigs and birds (such as chickens and ducks) and should not visit swine or bird barns and exhibits.
- Keep animal areas clean by regularly removing manure and washing surfaces with soap and water. When cleaning swine poop and bird droppings, wear protective clothing, gloves, and a mask that covers your mouth and nose.

- Follow a veterinarian's guidance for vaccinating animals against influenza.
- Remove and separate from the herd or flock any animals that have a cough, diarrhea, or other signs of influenza until they are no longer sick.
- When caring for sick animals, wear protective clothing (coveralls), gloves, and a mask that covers your mouth and nose.
- Keep food and drink for humans out of animal areas — don't eat, drink, or put anything in your mouth while you are in animal areas and not until after washing your hands after leaving animal areas.
- Don't take toys, cups, or other household items into animal areas where they can get contaminated with animal germs.
- Wash your hands often with soap and running water before and after working with and touching animals, or just being in animal areas. If soap and water are not available, use an alcohol-based hand sanitizer.

Vocabulary/Concept Building

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

- **Swine:** relating to pigs
- **Avian:** relating to birds
- **Zoönotic** (zoh-uh-NAH-tik) **diseases:** illnesses that can spread between animals and people
- **Respiratory pathogens:** microbes (bacteria, viruses, or other organisms) that can cause an infection in the respiratory tract (nose, throat, lungs)
- **Novel:** new; not resembling something formerly known or used
- **Recede:** to move back or away; gradually diminish

Fun Facts

- During a sneeze, germs and droplets can fly out of a person's mouth at about 100 miles per hour. (American Lung Association)
- The color of an animal's snot can tell you something about its respiratory health. Clear snot is healthy. If there is an infection, snot may be white or yellow; green snot may indicate a particularly severe infection. Red or brown snot may indicate injury or bleeding. Black snot usually reflects a fungal infection.
- Pigs are smarter than any other domestic animal, including dogs. (PBS – Nature)
- Pigs can be found on every continent except Antarctica. (Britannica Kids)
- In some countries and cultures when a person sneezes, common responses include: "Health!", "Live long and prosper", "To your wishes!", and "The weather will be nice tomorrow!".

Resources

- About Bird Flu – U.S. Centers for Disease Control and Prevention (CDC)
- About Human Infections with Variant Influenza Viruses – CDC
  - Influenza (Flu) Viruses of Special Concern – CDC Archive
- Influenza in Animals – CDC
- Preventing Bird Flu Infections – CDC
- Take Action to Prevent the Spread of Flu Between Pigs and People – CDC
- Influenza and Zoonoses Education Among Youth in Agriculture Resource Repository – Council of State and Territorial Epidemiologists
  - Influenza H3N2v: Key Facts for People Exhibiting Pigs at Fairs
  - Measures (for Kids) to Minimize Influenza Transmission at Swine Exhibitions
  - A Champions Guide to Youth Swine Exhibition – Biosecurity & Your Pig Project

Discussion Questions

Pre-Video

- Have you ever had the flu? How did you feel?
- Do you think that animals and humans can share diseases, or make each other sick?
- During the COVID-19 pandemic, people often had to wear face masks. Why is that? What are some other things that people did to prevent the spread of COVID-19?

Post-Video

A transcript of the *Achoo! It's Novel Flu…and SARS-CoV too!* video lesson is available as a reference to aid classroom discussion after viewing the video.

- What happens when you cough or sneeze – does coughing or sneezing spread germs?
- What are some signs that an animal is sick (either in general or an animal that is sick with the flu)? Are those signs similar to the symptoms in people?
- Why do you think animals that are sick need to be kept separate (isolated) from other animals?

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 *Achoo! It's Novel Flu…and SARS-CoV too!* quiz is available.

1. True or False: Zoönotic diseases spread from animals to people **and** from people to animals.
2. Which of the following animals can spread flu germs through the air and make people sick? Circle one.
    A. Giraffes
    B. Lions
    C. Worms
    D. Pigs
3. An animal can spread germs that cause the flu when it…
    A. Coughs or sneezes
    B. Reads the newspaper
    C. Does the hokey pokey
    D. Rides a bicycle
4. True or False: Sick animals should be kept separate from other animals.

Answer Key:

1. True
2. D
3. A
4. True

Activities

Note that some students may need assistance completing activities.

1. **Word Scramble**
   - Students use the provided clues to unscramble the letters to form key words from the lesson.

   Answer Key:

   1. Novel flu
   2. Germs
   3. Swine
   4. Sneeze
   5. Sore throat
   6. Isolation
   7. Vaccination
   8. Zoonotic diseases

2. **Cootie Catcher**
   - Students color, fold, and take turns playing the Cootie Catcher (also called a "Fortune Teller") with classmates or family members at home, answering questions about novel flu or performing silly tasks related to the topic.
     - Printable instructions for the Cootie Catcher are available. Additional instructions are available from Scholastic.
     - A blank template is available if students wish to create their own Cootie Catcher. Other key words and fun questions or tasks related to the lesson that could be added to a Cootie Catcher include:
       - Face Mask | Why does wearing a face mask when you are sick help prevent germs from spreading?
       - Isolation | If you were sick and had to be isolated, what three things would you take with you?
       - Clean Hands | Quick! When was the last time you washed your hands today?

3. **Put Pig in a Pen**
   - Students draw where on the farm their sick pig should be kept so it doesn't get other pigs or animals on the farm sick.

   Answer Key:
   Students should draw their pig within the circular isolation pen, away from other pigs on the farm.

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.