

Investigate biosecurity

How do we use biosecurity to keep chickens safe?

Standards

- **Nature of science:** Identify questions and concepts that guide scientific investigations.
- **Nature of science:** Design and conduct scientific investigations using a variety of methods and tools to collect empirical evidence, observing appropriate safety practices.
- **B.DI.3:** Loss of diversity: Humans are a biotic factor in ecosystems and can impact critical variables within these systems.

Introduction

One of the most important ways to prevent disease exposure to your flock is to recognize the early signs of infection and know how to prevent them from spreading. Biosecurity is a set of measures put in place at commercial poultry operations to help minimize the spread of disease.

Student prior knowledge

Problem solving and decoding are important skills to have as a scientist. Students should understand how pathogens spread among populations and how chicken behavior can affect the movement of disease within the flock.

Suggested timeline

1 to 2 class periods (50–100 minutes)

Materials

- Chicken diseases FAQ and worksheet
- Chicken housing FAQ and worksheet
- Poultry biosecurity FAQ and worksheet
- Student clue cards
- Writing utensils

Teacher preparation

- Before class starts, make copies of the chicken housing, poultry biosecurity and chicken diseases FAQs and worksheets and the student clue cards.
- Place students into groups to collaborate for this lesson.

Procedure

1. Introduce the following scenario to students: Avian Influenza Outbreak Due to Biosecurity Lapses.
2. Next, read the background to the students: Cluckingham Palace is a medium-sized chicken farm with several barns housing thousands of chickens. The farm has been operating successfully for years with relatively good biosecurity practices in place. However, due to a recent lapse in biosecurity measures, the farm is experiencing an outbreak of avian influenza. Play the game and figure out who did it!
 - a. Students will be given the articles to read one at a time. They will answer the questions after each article and find the CODE word.
 - b. Once the students have the code word, have them bring the card to the teacher. The teacher then gives the students the corresponding clue cards. (Chicken–Chicken, Workers–Workers, Barn–Barn).

- c. After the students have all three sets of clue cards, they will use the information on the cards to determine which three actions are responsible for allowing the disease to spread through the farm.
- d. Students will choose a barn, a worker, and a chicken from each section that they think is the culprit of the outbreak. Students will bring the allegations to the veterinarian (teacher) to determine if they have solved the mystery at Cluckington Palace.

Suggested wrap-up activity

Discuss the purpose of chicken housing and the different types of housing used in poultry farming. Have students research the importance of coop design principles, including ventilation, lighting, nesting boxes, and roosting bars for small and large farms. Discuss the importance of biosecurity protocols and their role in preventing disease spread within poultry flocks.

Differentiation

- Level the text depending on student needs.
- Make a timed challenge or a race to see who finishes first.

More challenges

- Have the students research each of the diseases in more detail and determine which disease is affecting the flock. Determine the most likely source of the disease in the farm.
- **Home connection:** Watch the virtual field trip on biosecurity: <https://www.youtube.com/live/mFv8J1MuJnY?si=1lxF3NPooWpig2uW>. You could also interview a local poultry farmer about the biosecurity measures they use at their farm.

Support information

- **Biosecurity:** procedures intended to protect humans or animals against disease or harmful biological agents.
- **Culling:** removal of a chicken from the flock.
- **Pullets:** a young hen that is under 1 year of age and has not started laying eggs yet.
- **Pol hens:** a young hen between 18 and 22 weeks.
- Ohio's poultry farms implement strict biosecurity measures to prevent the spread of diseases. These measures include controlled access to farms, sanitation protocols, and monitoring of flock health. Many of Ohio's poultry farms have modern facilities equipped with advanced technology to ensure the health and welfare of the birds. These facilities help to ensure biosecurity measures. Giving students real world connections and problems to solve enhances students' understanding of the content.
- National Poultry Improvement Plan: <https://www.ohiopoultry.org/Backyard-Flocks/index.cfm>
- Defend the flock: <https://www.aphis.usda.gov/livestock-poultry-disease/avian/defend-the-flock>
- Poultry biosecurity for 4-H: <https://www.youtube.com/watch?v=TnseqPmzJO4>

Teaching suggestions

- This activity can be played in a number of ways. You can play it as a class, in pairs, or small groups. You could also assign one group to each of the clue cards and as a class have a debate to determine the three clues.
- Students can do additional research to support their claims.
- Have students determine the source and the spreader of the outbreak to the rest of the barns.
- Teachers can also add additional articles related to each of the diseases represented in the chicken cards.

Career connections

Have you ever wondered what type of poultry careers help to make a healthy, safe environment for commercial birds? Let's take a look!

- **Hatchery workers** manage hen care and equipment to achieve high hatchability while performing tasks such as egg setting, transfer, and care of day-old chicks.
- **Poultry caretakers** help with monitoring flocks for their health and well-being, ensuring they have constant access to fresh food and water as well as a safe living environment. Caretakers walk their barns everyday to check their flock and the equipment that helps to keep them safe and fed.
- **Flock managers** are responsible for assisting in the overall success of the daily pullet barn operations.
- **Maintenance technicians** must be able to read schematics, maintain, troubleshoot, and repair all production equipment, along with support and building services.
- **Poultry service technicians** perform equipment adjustments and repairs, preventive maintenance, and emergency maintenance.
- **Poultry production managers** oversee areas of animal husbandry, flock management, bird scheduling, and movement. They work to determine feeding recommendations.

Answer key

Chicken diseases worksheet

1. What is the primary cause of Pullorum disease?
 - a. Avian influenza virus
 - c. *Salmonella pullorum* bacterium**
 - d. Infectious Coryza bacterium
 - f. Newcastle disease virus
2. Avian influenza can cause which of the following symptoms in poultry?
 - d. Swelling of the face and sinuses
 - a. Foamy discharge from the eyes and nostrils
 - b. Reduced egg production
 - k. All of the above**
3. What is a common method of transmission for avian influenza?
 - m. Vertical transmission from hen to chick
 - t. Contaminated water sources
 - i. Direct contact with infected birds**
 - z. All of the above
4. Infectious coryza is primarily a disease affecting which part of the chicken?
 - r. Digestive system
 - n. Respiratory system**
 - b. Reproductive system
 - w. Nervous system
5. What is a recommended method for preventing avian influenza outbreaks on a poultry farm?
 - f. Feeding antibiotics regularly
 - r. Keeping birds in overcrowded conditions
 - h. Following strict biosecurity measures**
 - i. Allowing wild birds access to feed and water
6. Which symptom is *not* associated with infectious coryza?
 - o. Swollen eyes
 - h. Foul-smelling nasal discharge
 - c. Sudden death**
 - j. Reduced feed intake
7. How is infectious coryza primarily transmitted?
 - e. Through direct contact with infected birds**
 - h. Through aerosol transmission
 - p. Through contaminated eggs
 - q. Through wild bird droppings

Unscramble the letters of the multiple choice answers to determine which cards you need.

C	H	I	C	K	E	N
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Chicken housing worksheet

Important factors for backyard flock housing:

- Providing clean water at all times.
- Ensuring good airflow to prevent respiratory issues.
- Installing locks or latches on coop doors to deter predators.
- Using poultry-safe disinfectants to sanitize the coop.
- Offering one nesting box per 3–4 hens.
- Maintaining a layer of bedding at least 4 inches deep.

Unscramble the highlighted letters to find the clue.

B	A	R	N	C	A	R	D	S
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Poultry biosecurity worksheet

1. Who should ask for permission before entering a poultry facility?

V	I	S	I	T	O	R	S
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2. Disinfect equipment, vehicles, and footwear before and ____.

A	F	T	E	R
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3. Implementing biosecurity zones _____ movement to a minimum.

K	E	E	P	S
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4. Eliminate standing _____ sources.

W	A	T	E	R
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5. Monitor birds for signs of illness or unusual _____

B	E	H	A	V	I	O	R
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6. Wear clean clothing and _____ dedicated to the farm.

F	O	O	T	W	E	A	R
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Unscramble the letters in the highlighted boxes to determine which cards you need.

W	O	R	K	E	R
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Next steps

Now that you have all the clue cards, choose one barn, worker, and chicken from each section that you think is the culprit of the outbreak. Take your allegations to the veterinarian (teacher) to determine if you have solved the mystery at Cluckington Palace.

ANSWER TO THE CLUES

- Maintenance Technician found the hole that let the outside bird into the farm.
- Barn Two is the source.
- Chickpea has the avian flu.
- If they do the extensions, Lady Cluckington spreads the outbreak to the other barns.