



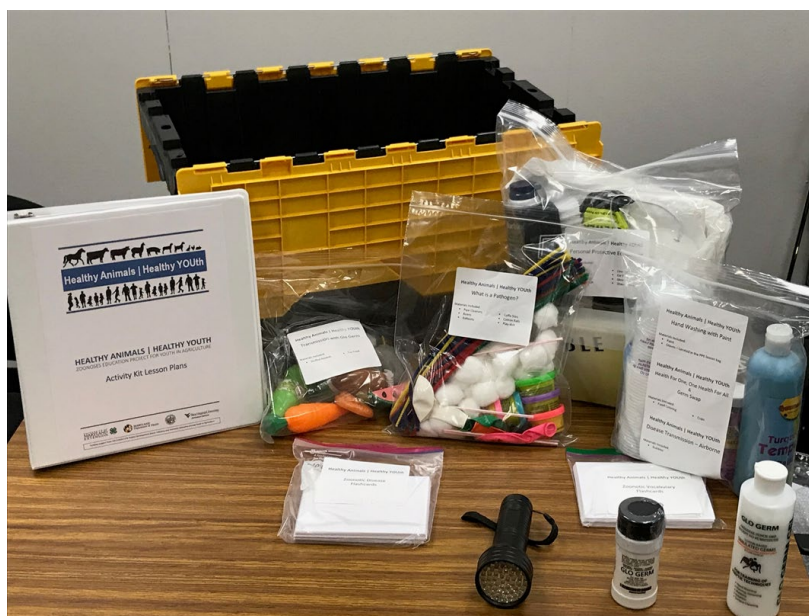
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ZOONOSIS EDUCATION PROJECT FOR YOUTH IN AGRICULTURE

Activity Kit & Lesson Plans



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Funding support from CDC/USDA/CSTE Project Development Grant: Influenza and Zoonoses Education among Youth in Agriculture



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ZOONOSIS EDUCATION PROJECT FOR YOUTH IN AGRICULTURE

Activity Kit Contents

COVERED TOPICS

- What is Zoonosis?
- Identifying Zoonotic Diseases
- Disease Transmission
- Hand Washing
- Biosecurity
- Antimicrobial Resistance
- Animal Health Checks
- Personal Protective Equipment
- Careers

Section 1

What is Zoonosis?

1. Introduction to Zoonosis
2. Zoonosis Matching Game -Flashcards
3. Diseases that Animals and Humans Share - Flashcards
4. Zoonoses Jeopardy Game

Section 2

Identifying Zoonotic Diseases

1. What is a pathogen? - "Build a parasite"
2. Health for One, One Health for All
3. Animal Health Picture Sort Game
4. An Introduction to Identifying Zoonotic Diseases (PowerPoint)

Section 3

Disease Transmission

1. Routes of Transmission (Worksheet)
2. Disease Transmission through Direct Contact
3. Disease Transmission via Aerosol and Droplets
4. Direct Contact Glo Germ Activity
5. Germ Swap
6. Got Immunity?

Section 4

Hand Washing

1. Glo Germ Handwashing Demonstration
2. Painted Hands: Hand Sanitizer and PPE Glove Use
3. Hand Washing and Hand Sanitizer Use

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Section 5

Biosecurity

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2. Biosecurity Lessons
 - Develop a Simple Biosecurity Plan
 - Internal and External Biosecurity Measures
 - Spreading Disease One Touch at A time
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4. Basics of Biosecurity

Section 6

Antimicrobial Resistance

Section 7

Animal Health Checks

1. MDA Equine Self Certification Form
2. MDA Livestock Self Certification Form
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Section 8

Personal Protective Equipment

1. PPE Safe Removal Activity
2. Sequence for Putting On and Removing PPE – CDC
3. Steps to Putting on and Removing PPE, Including Coveralls – World Health Organization

Section 9

Careers

1. Bridging Human and Animal Health



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Credits

PROJECT PARTNERS

- Maryland Department of Health
- University of Maryland Extension 4-H
- Maryland Department of Agriculture
- West Virginia University Extension Service

PROJECT FUNDING

The Maryland & West Virginia Healthy Animals | Healthy YOUTH: Zoonoses Education Project for Youth in Agriculture received funding support from the CDC/USDA/CSTE Project Development Grant: Influenza and Zoonoses Education among Youth in Agriculture

Maryland & West Virginia

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ZOONOSES EDUCATION PROJECT FOR YOUTH IN AGRICULTURE

Activity Kit Contents

SECTION 1

Section 1 What is Zoonosis?

1. Introduction to Zoonosis
2. Zoonosis Matching Game – Flashcards
3. Diseases that Animal and Humans Share – Flashcards
4. Zoonosis Jeopardy Game

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Zoonoses Fact Sheet

Activity Materials:

- No materials needed

Methods of transmission:

- Direct Contact
- Indirect Contact
- Oral
- Aerosol/Droplet
- Vector borne

Introduction:

People and animals have been living closely together for centuries. We continue to interact often with animals—pets, livestock, small stock, recreational, zoo and wild animals. The environments we share as animals and humans are also important. Constantly changing conditions such as the weather, natural disasters, and human habitat developments expanding into farm/ranch lands and wildlife habitats link the environment people, and animals together. People, animals, and insects frequently interact and share environments, and because of this, diseases are passed back and forth. Some old disease reemerge, and new diseases can appear. Our efforts to keep food and water sources safe, protect the environment, and safeguard people and animals from diseases must also overlap.

What are zoonotic diseases?

Zoonotic diseases, or zoonoses, are diseases that can be spread between animals, people, or produce. Zoonoses are one example of how the health of people is related to the health of animals and environment. Some of these diseases you may be familiar with or have heard of, such as E. coli, influenza, or rabies. Others, including Q fever, toxoplasmosis, or psittacosis, may be new to you. There are even some diseases that scientists do not know much about because they are so new or are not seen very often in the United States. These are called emerging diseases. Zoonotic diseases can affect people and animals differently. In some cases, the disease can cause sickness in both animals and people. Sometimes, animals are just ‘carriers’

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of the disease-causing germ, but don't get sick. The germs that cause zoonotic diseases can be **viruses**, **bacteria**, **fungi**, or **parasites**.

There are many different zoonotic diseases, which have the potential to spread in many different ways and over long distances. This is true for several reasons:

1. We interact with animals, animal products, or produce in our daily lives.
2. We raise animals for food, work, enjoyment, or business.
3. We keep animals in and around our homes as pets, work, or recreation.
4. We come into close contact with animals at fairs, events, shows or zoos.
5. We may encounter wildlife or insects that spread disease when we are outdoors.
6. We eat many products that come from animals, such as eggs, milk, cheese, and meat.

How are zoonotic diseases spread?

The way a disease can be spread is called the mode or route of transmission. There are five major ways that zoonotic diseases can be spread. Remember, these diseases can be spread in both directions - from animals to people and from people to animals.

A. Direct contact— the disease can be spread through animal bites or scratches or by interacting very closely with or touching an animal that has a disease-causing germ.

B. Indirect contact—the disease can be spread by touching non-living objects (called fomites), that an animal with a disease-causing germ has had contact with. This can include buckets, brushes, towels, shearing and grooming tools, animal bedding (such as straw shavings), equipment for animal health checks and tagging, and even fences that sick animals may rub up against.

C. Oral—the disease can be spread by eating food or drinking water or milk with a disease-causing germ. This can happen if milk is not pasteurized or if food is not cooked to the correct temperatures that prevent growth. Also, if someone does not wash their hands before eating or drinking after handling animals with a disease-causing germ. Some produce can carry disease-causing germs as well.

D. Aerosol/Droplet—the disease can be spread by breathing in a disease-causing germ from the air. This often happens when an animal is giving birth and droplets from reproductive tissues (placenta or fluids) get in the air OR when the environment has disease-causing germ in the soil from an animal's urine or feces and a person breathes in the dust particles.

E. Vector borne—the disease is spread by some type of insect or bug (like mosquitoes or ticks) that picks up the disease from an animal and then transmits to a person when they are bitten.

How can we prevent zoonotic diseases?

We don't always know if an animal is carrying a disease. This happens because we can't see the disease-causing germs and because the animals might not get sick. Luckily, there are several steps that we can follow all the time to make sure we and our animals stay healthy.

The most important thing is to properly wash hands before and after interacting with animals. Good hand hygiene is key! The second thing is to be aware of the disease-causing germs that animals can carry and know how they can be spread to people. Be a responsible and knowledgeable animal owner, handler, or trainer. For example, if you are at a public fair with your animal, remind other people to wash their hands—provide washing stations and antiseptic cleaners if needed. Other ways to stay safe include handling and preparing food safely, keeping insects and bugs away from your home, animals and barns, and being careful around animals that could be aggressive, protective or dangerous. Staying safe around pets, livestock, small stock, and wild animals is always important.

To keep ourselves healthy, we also need to keep our animals healthy. Make sure you are caring for your animals properly. Give them fresh food and water, clean their bedding often, and exercise them and yourself as well. Have your local veterinarian do regular health examinations and give vaccinations and medications as needed. If one animal gets sick, keep it separated from other animals until it gets better so that other animals don't get sick as well. Also, if you are travelling with animals, try to keep their stress level low and limit travel to minimal amounts, at cooler times and when traffic and traffic waits are low.



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Zoonosis Matching Game

ACTIVITY MATERIALS

- Zoonosis Disease Flashcard Set

Objectives

- Determine the definition of each zoonotic term/disease.
- Match terms with the correct corresponding definition.

Background Information

This activity is designed to give participants a basic understanding of essential vocabulary related to zoonotic diseases. This lesson features a matching game to help participants gain an understanding of those vocabulary words and the importance of zoonotic awareness.

Conduct the Activity

There are many ways that you can choose to play this game. Feel free to use any or all of the options below or make your own spin off! We recommend that you go over the vocabulary with the group before playing the games, but if you are dealing with an advanced group this may not be necessary.

Option One – Find Your Match

1. Assign cards with a term to half of the group and cards with the matching definitions to the other half of the group. You may need to use a portion of the cards if you have a smaller group and use the remaining cards in another round.
2. Once the group each has a card, give them 60 seconds (more or less depending on how advanced the group is) and tell them to find the person with the matching card to theirs!
3. Once time is up, see which members found the correct match. Rearrange members into the correct pairs if they are wrong.

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4. Repeat this exercise, or use the cards you were unable to fit in the first round!

Option Two – Working Together

1. Split your group into multiple teams. The groups could be as small as two or as big as you want, depending on how advanced the members are.
2. Split the cards up between each of groups, making sure each group has the matching definition card for each term given to them. You may also print off multiple copies of the cards so each group has the full set.
3. Allow each group a certain amount of time to try to match each term to its definition.
4. Once they are done, go over the correct matches with all the groups or allow groups to switch stations to see if another group can fix any wrong matches.

Option Three – Classroom Style

1. Arrange your group in a way so they are all facing you. You may choose to familiarize the group with the terms and definitions before moving on to the next steps.
2. Hold up each definition and read it off to the members of the group, asking them to try recall the matching term. It may be helpful to have a list of the possible terms somewhere they can see.
3. If they cannot recall the term, you may tell them what the correct term is or put the definition aside and come back to it.
4. To make this a little more difficult, you can try reading off the term instead of the definitions and ask that members try to recall the definition of each term.

Option Four – Memory

1. Put matching terms and definitions face down in a grid like fashion. Feel free to choose the amount of terms you choose to use depending on your group size and previous knowledge. Be sure to include the definition for each term you put down.
2. Ask each group member to flip over two cards at a time, with the ultimate goal of flipping over the matching term and definition. The first few rounds will likely not result in matches, but will help with memorizing some of the locations of specific words/definitions.
3. If a member thinks they have a match, ask them to remove the word and definition from the grid. Review their match; if it is correct, leave it out of the game until the end. If it is wrong, put face down in their original positions and resume gameplay.
4. The game ends when all terms and definitions are matched. You can choose to tally matches from each individual group member to find a “winner”, or allow for a collaborative win.

Activity Wrap-Up

Engage the students in discussion about the new terms they learned. Why is it important to learn about zoonosis?

Source: *Maine, One Health - Activity 1 Matching Game*

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Zoonosis Matching Game

Key

Ascaris	A roundworm that lives in the gut of some animals and can cause illness
Asymptomatic	When a living thing does not show signs of illness
Bacteria	A single-celled germ that cannot be seen with the naked eye and can cause illness
Biosecurity	Practices to prevent the spread of illness
Campylobacter	A germ that lives in the gut of its host and can cause diarrhea, intestinal swelling, vomiting and abortions in humans and animals
Centers for Disease Control and Prevention (CDC)	An agency that protects the health, safety, and security of Americans from disease threats
Cryptosporidium	A protozoal parasite that can cause stomach diarrhea and is often spread through water or animal contact
Cull	The killing of animals done to stop the spread of illness
Disease	An illness that affects a person, animal, or plant
E. Coli	Bacteria normally found in the intestines of people and animals, but when conditions and sanitation are poor the bacteria can cause scours (diarrhea)
Enteric Disease	Stomach illnesses caused by germs that enter the body through the mouth
Epidemiology	The study of the cause, spread, and control of illnesses
Fomite	A nonliving object that can carry and spread germs
Foodborne Illness	An illness caused by eating or drinking something with harmful germs

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Incubation Period	The time between when a human or animal is exposed to a germ and when they get sick
Influenza (Flu)	An illness of the lungs that can spread quickly to other humans or animals
Leptospirosis	A spiral-shaped bacteria that can affect the liver and kidneys as well as other organs.
Orf/Sore Mouth	A contagious, viral disease affecting the mouth nose and feet
Q Fever	Caused by a bacteria and is associated with abortion in pregnant sheep, goats and camelids but may be also carried by normal animals
Quarantine	Keeping sick animals away from healthy animals to avoid the spread of illness
Rabies	A severe, viral disease that can affect all mammals. Infection results in damage to the nervous system and ultimately death
Ringworm	A contagious fungal infection that causes circular bald patches on the skin
Salmonella	A germ that can cause stomach illness in humans
Symptom	Any feeling of illness that cannot be measured such as a sore throat
Vaccine	A shot given to prevent a specific disease
Vector	A living thing that can spread an illness to others
Virus	A small germ that can cause illness and needs a living thing to spread Example: Influenza (Flu)
Zoonotic Diseases	Illnesses that can be spread between humans and animals

Ascaris

A roundworm that lives in the gut of some animals and can cause illness

Bacteria

A single-celled germ that cannot be seen with the naked eye and can cause illness

Biosecurity

Practices to prevent the spread
of illness

Campylobacter

A germ that lives in the gut of
its host and can cause diarrhea,
intestinal swelling, vomiting and
abortions in humans and
animals

Center for Disease Control and Prevention (CDC)

An Agency that protects the health, safety, and security of Americans from disease threats

Cryptosporidium

A protozoal parasite that can cause stomach diarrhea and is often spread through water or animal contact

Cull

The killing of animals done to
stop the spread of an illness

Disease

An illness that affects a person,
animal, or plant

E. Coli

Bacteria normally found in the intestines of people and animals, but when conditions and sanitation are poor the bacteria can cause scours (diarrhea)

Enteric Disease

Stomach illnesses caused by germs that enter the body through the mouth

Epidemiology

The study of the cause, spread,
and control of illnesses

Fomite

A nonliving object that can carry
and spread germs

Foodborne Illness

An illness caused by eating or drinking something with harmful germs

Incubation Period

The time between when a human or animal is exposed to a germ and when they get sick

Influenza (Flu)

An illness of the lungs that can spread quickly to other humans or animals

Leptospirosis

A spiral-shaped bacteria that can affect the liver and kidneys as well as other organs

Orf/Sore Mouth

A contagious, viral disease affecting the mouth nose and feet

Q Fever

Caused by a bacteria and is associated with abortion in pregnant sheep, goats and camelids but may be also carried by normal animals.

Quarantine

Keeping sick animals away from healthy animals to avoid the spread of illness

Rabies

A severe, viral disease that can affect all mammals. Infection results in damage to the nervous system and ultimately death

Ringworm

A highly contagious fungal infection that causes circular bald patches on the skin

Salmonella

A germ that can cause stomach illness in humans

Symptom

Any feeling of illness that cannot be measured such as a sore throat

Vaccine

A shot given to prevent a specific disease

Vector

A living thing that can spread an illness to others

Virus

A small germ that can cause illness and needs a living thing to spread

Example: Influenza (Flu)

Zoonotic Disease

Illnesses that can spread
between humans and animals

Asymptomatic

When a living thing does not
show signs of illness

Diseases That Animals and Humans Share: The Words You Need to Know



Skill Level:

- ▶ Beginner to advanced

Life Skills:

- ▶ Communication, critical thinking and disease prevention

Setting:

- ▶ An indoor space where participants can easily hear as well as lay out several vocabulary cards; seating is optional

Time:

- ▶ 30–50 minutes

Materials:

- ☐ *Diseases That Animals and Humans Share: The Words You Need to Know* vocabulary cards for activity:
 - ▶ 12 cards for beginner participants
 - ▶ 36 cards for advanced participants (set of 12 also used in beginning)
- ☐ 48 sticky notes
- ☐ 1 permanent marker
- ☐ Scissors

Overview:

The *Diseases That Animals and Humans Share: The Words You Need to Know* lesson is designed to give participants a basic understanding of essential vocabulary related to zoonotic diseases that may be unclear or misunderstood. The lesson features a matching game to help give participants an understanding of the vocabulary words as well as the importance of zoonotic awareness.

Objective:

After completing this activity, participants will be able to:

- ▶ Determine the definition of each zoonotic vocabulary word used.
- ▶ Match correct terms with definitions.
- ▶ Understand each vocabulary word when used in a sentence.

PROCEDURE:

Before the meeting:

1. Review the lesson and verify that you have all the vocabulary cards necessary for the activity. Study the vocabulary words and the given definitions to be prepared for the activity. Tables 1 and 2 on page 2 list the vocabulary words and give an example of each used in a sentence. When a participant is confused about a word, use the tables to read an example sentence that contains its proper use. Tables 3 and 4 on pages 3 list the vocabulary words and their definitions. Keep these tables handy for yourself for quick reference.
2. Separate beginner cards from advanced cards. Pair each definition up with its appropriate vocabulary word and lay out the pairs for both groups. You will need these pairs for the introductory exercise.
3. If you do not have a prepared set of vocabulary cards, prepare them by the following methods:
 - A. Cut apart the included cards for the beginner and advanced level participants located at the end of this lesson.
 - B. Beginning at 1, write the numbers 1 through 12 on sticky notes (one number per note using the permanent marker).
 - C. Beginning at 1, write the numbers 1 through 36 on sticky notes (one number per note using the permanent marker).
 - D. Place one number on the opposite site of printing for each set of cards (beginner 1-12, advanced 1-36).
 - E. If you're concerned about knowing the correct definition of a term, keep Tables 3 and 4 handy.
4. Make sure that you have enough space for one or two groups to lay out all of their cards.

Table 1. Diseases That Animals and Humans Share: The Words You Need to Know “Sentence Examples (Beginner)”

Vocabulary Word	Proper Use in a Sentence
Centers for Disease Control and Prevention (CDC)	The Centers for Disease Control and Prevention worked hard to educate Americans about Ebola during the West African outbreak.
disease outbreak	In the past few years, there has been a troubling disease outbreak of porcine epidemic diarrhea on swine farms in the United States.
epidemiologist	Jackie wants to become an epidemiologist and study influenza.
pathogen	The spread of pathogens can be prevented by washing your hands with soap and water.
sterilize	Sterilize laboratory equipment before use to prevent contamination with unwanted germs.
zoonotic	Rabies is a serious zoonotic disease that can be transmitted to humans through a bite from an infected animal.

Table 2. Diseases That Animals and Humans Share: The Words You Need to Know “Sentence Examples (Advanced)”

Vocabulary Word	Proper Use in a Sentence
bacteria	For bacteria to grow there must be nutrients, moisture, oxygen (in most cases) and an appropriate temperature.
blood-borne pathogen	Malaria is a blood-borne pathogen that affects people and is spread by mosquitoes.
<i>E. Coli</i>	The swine became sick from E. Coli after drinking water contaminated with fecal matter.
fomite	You should disinfect fomites , such as boots, in-between farm visits.
foodborne illness	One of the most common foodborne illnesses in the United States is salmonellosis, caused by germs that are generally found in raw meat or eggs.
fungi	The yeast used to help bread rise is actually a type of fungi .
incubation period	The incubation period for rabies is around 1 to 3 months from the time of the bite to when symptoms begin to show.
influenza	H1N1 is a particularly dangerous strain of influenza .
microorganism	Microorganisms are responsible for many illnesses.
quarantine	When a farm is quarantined, there should be no movement of infected animals from that location, and no healthy animals should be introduced to that farm until the quarantine is lifted.
<i>Salmonella</i>	It is possible to contract salmonella from eating raw cookie dough due to the germs in the raw eggs.
state veterinarian	The State Veterinarian's Office investigates the cause of a disease outbreak in animals by employing epidemiologists.
symptoms	A stuffy nose is a symptom of the common cold.
United States Department of Agriculture (USDA)	The United States Department of Agriculture helps farmers affected by drought, floods, pest infestations and other harmful events.
vaccination	It is extremely important for everyone to stay up to date on vaccinations for their health and the health of those around them.
vector	Mosquitos can be vectors for disease, carrying pathogens from one host to the next when they take a blood meal.
virus	There are 15 types of avian flu viruses that affect birds.
withdrawal period	After a dairy cow is treated with antibiotics for a mastitis infection, she must go through a withdrawal period during which her milk is not used for human consumption.

Table 3. Diseases That Animals and Humans Share: The Words You Need to Know “Vocabulary Words (Beginner)”

Vocabulary Word	Definition
zoonotic	A disease that can spread from animals to people.
pathogen	Something such as a virus or bacterium that causes disease.
epidemiologist	A specialist in diseases that affect groups of people or animals.
disease outbreak	When many people or animals in a specific area become ill in greater numbers than normal.
Centers for Disease Control and Prevention (CDC)	Government agency that protects the health, safety and security of Americans from disease threats.
sterilize	To make free from living microorganisms by using physical or chemical agents.

Table 4. Diseases That Animals and Humans Share: The Words You Need to Know “Vocabulary Words (Advanced)”

Vocabulary Word	Definition
microorganism	A microscopic living organism that can be single or multi celled.
virus	Small infectious agent that can only reproduce inside the host cell it infects.
influenza	A highly contagious respiratory disease.
<i>Salmonella</i>	Bacteria that often cause food poisoning in humans, commonly found in chicken and egg products.
<i>E. Coli (Escherichia coli)</i>	Bacteria that often affect the intestinal track (gut) and cause severe diarrhea, and are associated with fecal contamination.
foodborne illness	Sickness caused by food contaminated with bacteria, parasites or viruses.
vector	A living organism (usually a biting insect) that can transfer a disease from one animal or plant to another.
quarantine	Separation and restriction of the movement of people or animals that may have been exposed to an infectious disease to see if they become sick.
bacteria	Single-celled (Prokaryotic) living microorganisms that can cause disease.
fungi	Multi-celled (Eukaryotic) organisms such as yeasts, molds and mushrooms.
blood-borne pathogen	A microorganism in blood that can cause disease, usually transferred by needles or biting insects.
incubation period	The time between being exposed to a pathogen and when symptoms begin.
vaccination	A harmless version of a microorganism that is introduced to humans or animals to help stimulate immunity, making them resistant to infection by that microorganism.
United States Department of Agriculture (USDA)	A government agency focused on food, agriculture, natural resources, rural development, nutrition and the public policy related to these issues.
symptoms	Physical changes in an animal or person caused by a pathogen that are often non-specific (for example, fever, body aches) that may indicate disease being present.
withdrawal period	The amount of time it takes for medicine given to a production animal to decrease to a safe, acceptable level so the animal can be milked or harvested for food.
state veterinarian	The person in charge of receiving notification of reportable animal diseases from all laboratories and veterinarians in the state.
fomite	An object such as a car, boots or even door knobs, that can help carry pathogens from one location to another.

During the meeting:

1. Introduce the activity by reading aloud or paraphrasing the following:

*Often times, the things we cannot see make humans and animals sick. Being able to understand the risks associated with diseases allows us to be better caretakers of ourselves as well as of production and companion animals. Today, we are going to learn about some of the words that describe health and illness for humans and animals. To start, what is a **pathogen**?*

2. Allow participants time to consider the question and then gather answers from volunteers.

3. Read aloud or paraphrase the following:

*A **pathogen** is something such as a virus or a bacterium that causes disease. Illnesses caused by pathogens can spread quickly through a herd or flock, or from animal to human or human to animal. Knowing what the words mean can help you to understand veterinarians (doctors who care for animals) as well as prepare yourself for raising and caring for animals. Today, you will be learning key vocabulary words that allow you to better understand the risks posed to you and your animals.*

4. Read aloud or paraphrase the following:

*To get started, we are going to look at five more definitions. You may have heard or read about an agency called the CDC. **CDC** is an acronym that stands for the Centers for Disease Control and Prevention, a government agency that protects the health, safety and security of Americans from disease threats. For example, the CDC has helped ill and healthy people when they enter the United States from places in West Africa where there is concern about Ebola virus disease. Ebola is actually a zoonotic disease that can also be spread person to person. Does anyone know what **zoonotic** means?*

5. Allow participants time to consider the question and then gather answers from volunteers.

6. Read aloud or paraphrase the following:

***Zoonotic** or **zoonosis** refers to a disease that can be spread from animals to humans. Because people are around animals so much, we must know the risks and take preventive measures to keep both our animals and ourselves healthy. **Epidemiologists** help keep everyone healthy. These are scientists who specialize in diseases that affect groups of people or animals. They investigate patterns and causes of disease in humans. They mostly study any sudden increase in the presence of a disease (when many people or animals in a specific area become ill in greater numbers than normal), which is called a **disease outbreak**. If you are counting, we have already reviewed five words so that leaves one more: **sterilize**. To sterilize means to remove living microorganisms by using physical or chemical agents.*

7. Pass out the 12 cards from the beginner portion of the lesson (6 vocabulary words and 6 corresponding definitions). Have participants work as a group to match the individual holding the vocabulary word to the individual holding the correct definition. If you have less than 12 people, use less cards, making sure that the correct definitions and vocabulary words are included in those that are passed out. You may have more cards than you have participants. If so, just make sure each participant has a card. If you have fewer cards than participants or an odd number of participants then they may pair up and have one word or definition for two people.

8. Read aloud or paraphrase the following:

Now we are going to apply what we just learned. Twelve of you are going to get a card. Once you have your card, you are to work as a large group to match the individual holding the vocabulary word to the individual holding the correct definition. Once the match is complete, link arms. You have 2 minutes starting now.

9. Once the group has matched each individual holding the vocabulary word to each individual holding the corresponding definition, announce that time is up. Check that participants have matched the correct word with its definition. Use the six *Diseases That Animals and Humans Share: The Words You Need to Know* “Vocabulary Words (Beginner)” as your key. If partners are paired incorrectly, allow them to switch to a new partner, but do not give the correct answer. Check pairs again and assist participants as needed. Once all pairs are matched, go around the circle of pairs and have a participant in each pair read the vocabulary word and definition.

10. If you are working with young participants, skip to step 13. If you are working with advanced participants, continue here by reading aloud or paraphrasing the following:

Knowing the definition ahead of time makes a matching game much easier. Now let’s try a little tougher version. Each of you will get one card and without being told the definition ahead of time, you will be asked to go find your match. Just like before, once you have your cards, individuals holding a vocabulary word will need to match up with the individual holding the corresponding definition. Once the match is complete, link arms. You have 4 minutes starting now.

11. Once all individuals holding vocabulary words match up with individuals with corresponding definitions, announce that time is up. Check that participants have matched the correct word with its definition. Use the 36 *Diseases That Animals and Humans Share: The Words You Need to Know* “Vocabulary Words (Advanced)” as your key. If any are incorrect, allow them to switch to a new partner, but do not give the correct answer. If participants seem to struggle with the matching, assist them by providing the answer or asking other participants to assist them to make the match correct. Once all pairs are matched, go around the circle of pairs and have a participant in each pair read the vocabulary word and definition.
12. To increase retention, have participants place all of the pairs in a pile and then form a circle. Pass out the cards in random order so that participants most likely get a new card. Announce that you are going to try the same activity again providing 4 minutes for them to find their match. Follow the instructions in step 11 to determine correct answers. Repeating the definitions as a group is optional.



Example of card layout for a beginner game version using a prepared card set. A “match” has been turned over.



Example of card layout for an advanced game version using a prepared card set.

13. Read aloud or paraphrase the following:

Building our vocabulary takes time, but all of you are doing great. Next, we are going to try a matching game using the same vocabulary words. On my signal, please number off with every other person being a one or a two. Then the ones will be on my right (We will call them Team 1) and twos on my left (We will call them Team 2). You will work together as a group taking turns to match the correct vocabulary word with its definition. Go ahead and number off and move to your new team.

14. While participants are numbering off, place the cards in a random order on a hard surface such as a table or floor in a grid pattern so that the cards are easy to flip over.

15. Read aloud or paraphrase the following:

Now time for the game! To play, we will alternate with Team 1 and Team 2 taking turns trying to find matches. When I say “go,” Team 1 should flip up two cards at a time as a team. (Members can take turns flipping or choose a team captain to do it.) If the team believes they have a definition and its correctly matching vocabulary word, set both cards aside. If it is not a correct pair (that is, two definitions or the wrong vocabulary word for the definition), flip both cards back over and allow Team 2 to try. You will repeat this until we match all of the definitions to the correct vocabulary word.

16. Each time a new vocabulary word is flipped, use both the beginner and advanced versions of *Diseases That Animals and Humans Share: The Words You Need to Know* “Sentence Examples” to say the word in a sentence. Repeat words and sentences if desired to assist participants in making matches. If needed, assist participants by telling them it is not the correct answer so that the game keeps moving.

17. Once this portion of the game is complete, consider allowing the beginner participants to add in some of the advanced words. If desired, count off by ones and twos again to create new teams, and repeat the game to increase retention.

18. Read aloud or paraphrase the following:

Today we have learned about just some of the terms that professionals in agriculture discuss every day. Being able to understand the terminology allows for you as consumers and producers to make educated decisions. These decisions help you in preventing disease outbreaks and enable you to better understand animal and human health concerns.

ADAPTATIONS & EXTENSIONS:

- To ensure that participants are not memorizing numbers, change the number on the card by writing a new number on a sticky note and placing it on the card. Make notes on your sheet if needed to help serve as the key.
- Take portions of the lesson and use them at county fairs to increase zoonotic disease literacy of fairgoers and participants.
- For older or more experienced participants:
 - Have all cards face up so that the vocabulary word and definition are visible. Time each participant to see how quickly and accurately they can pair the word and definition.
 - For a larger audience, adapt steps 13-16 to number participants into additional teams so that participants are more active.
 - Consider dividing the cards if needed to have smaller matching games if additional volunteers are available to assist with running the game.
 - Form teams and allow each team to work together to match the vocabulary word to the definition and time how long it takes to accurately complete the task.
 - If working with a smaller group, create an additional card and allow participants to play a version of Old Maid. Begin by handing out an equal number of cards to each player. To play, begin with one person and then each player takes turns offering a card to the person on the left. That person selects a card and adds it to his or her cards. This player then sees if the selected card matches the definition of any of his or her original cards. If so, the vocabulary word and definition is discarded face up as well. Other players approve the definition and then the player who just took a card then offers his or her hand to the person to the left and so on.
- For younger or less experienced participants:
 - Have participants draw pictures as a group or individually of what they believe each of the six beginner vocabulary words would look like. For example, they would draw people to present the CDC staff working to learn more. Compare drawings at the end to help increase understanding.
 - Over time, add in additional cards to the game by selecting cards from the advanced card group to increase vocabulary of participants.
 - To increase readability, take the included terms and definitions in Table 3 and print each out on a separate sheet of paper. Number each sheet 1 through 12 and then place the sheets on the floor so that participants can read the sheets from a distance when playing the matching game.

TALKING IT OVER:

Ask the group the following questions.

- What is a zoonotic disease? Why should we continue to learn more about them?
- How might some of these vocabulary words help you in working with agricultural youth organizations?
- What are some careers relating to animal and human health?
- Based on what you learned, what are some things you can do to help keep you and your animals healthy?

REFERENCES & RESOURCES:

Michigan 4-H Youth Development. (2014). *Be a “zoonotic” disease detective* (4H1671; adapted from Georgia 4-H original). East Lansing: Michigan State University, MSU Extension.

National Center for Infectious Diseases. (2008). *Teachers’ tools: Educational resources for teachers at k-12 levels*. Atlanta, GA: Centers for Disease Control and Prevention. Retrieved from http://www.cdc.gov/NCIDOD/teachers_tools/index.htm

United States Department of Agriculture. (2014). *Animal health*. Washington DC: Author. Retrieved from http://www.usda.gov/wps/portal/usda/usdahome?navid=ANIMAL_HEALTH

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MICHIGAN STATE UNIVERSITY | Extension

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JEOPARDY JEOPARDY JEOPARDY JEOPARDY JEOPARDY JEOPARDY

JEOPARDY!

JEOPARDY JEOPARDY JEOPARDY JEOPARDY JEOPARDY



Healthy Animals | Healthy YOUTH



ZOONOSSES TEAM JEOPARDY

JEOPARDY!



ZOO NOSES TERMS

JEOPARDY!



DISEASE TRANSMISSION

JEOPARDY!



BIOSECURITY TRANSMISSION

JEOPARDY!



“FAIR PLAY”

JEOPARDY!



Theme



Timer



Lose



Cheer



Boo



Silence

HAND WASHING

JEOPARDY!



ZOOONOTIC DISEASES

JEOPARDY!



**ZOONOSSES
TERMS**

**DISEASE
TRANSMISSION**

**BIOSECURITY
ESSENTIALS**

“FAIR PLAY”

**HAND
WASHING**

**ZOONOTIC
DISEASES**

\$100

\$100

\$100

\$100

\$100

\$100

\$200

\$200

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\$300

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\$500

FINAL JEOPARDY

JEOPARDY!



Theme



Timer



Lose



Cheer



Boo



Silence

A change in the normal state of the body or one or more of its organs that disturbs the proper performance of normal body functions



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Disease



JEOPARDY!



**A disease that is
spread between
animals and humans**



Start Timer

GO TO
ANSWER
(question)

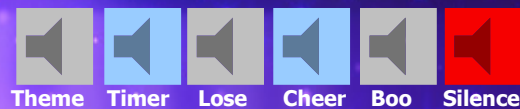
JEOPARDY!



Zoonosis



JEOPARDY!



**People who live or work
with animals are at risk
of infection with
zoonotic diseases.
True or False**



Start Timer

GO TO
ANSWER
(question)

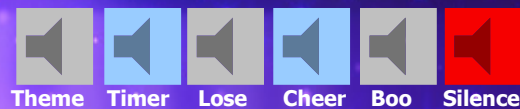
JEOPARDY!



True



JEOPARDY!



Viruses, bacteria, parasites and fungi which cause disease



Start Timer

GO TO
ANSWER
(question)

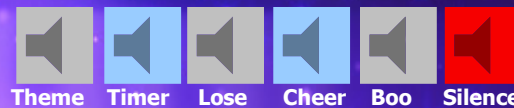
JEOPARDY!



Pathogen



JEOPARDY!



**People that are younger –
under the age of 5 years,
people that are older – over
the age of 65 years,
women who are pregnant,
people with compromised
immune systems or having
underlying health problems**



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



**Groups of people
at higher risk for
getting sick from
a zoonotic
disease**



JEOPARDY!



**This type of transmission
occurs when a healthy
animal or person comes
in contact with an
infected animal or person**



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Direct Contact Transmission



JEOPARDY!



**Sneezing is a common
example of this type of
transmission**



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Aerosol or Droplets Transmission



JEOPARDY!



An example of this type of disease transmission could be a person dropping his/her candy bar (or baby pacifier) onto the ground where it can become contaminated and then picking it up and putting it in his/her mouth



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Ingestion (or Oral) Transmission



JEOPARDY!



**Insects and pests that
carry pathogens from
an infected animal to
one that is healthy**



Start Timer

GO TO
ANSWER
(question)

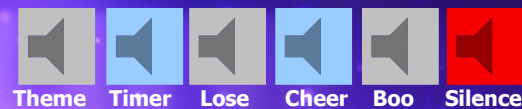
JEOPARDY!



Vector



JEOPARDY!



**The term used to
describe objects or
surfaces that may have
become contaminated
with pathogens**



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Fomite



JEOPARDY!



**The term used to
describe a series of
practices designed to
prevent the
introduction and
spread of pathogens**



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Biosecurity



JEOPARDY!



**Care for sick animals
(first OR last) when
working with a group
of animals**



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Last



JEOPARDY!



**Maintain fences and
structures to keep
_____ in and
_____ out in order to
limit contact between
them**



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Livestock in and Wildlife out



JEOPARDY!



When bringing home a new animal or an animal returning from the fair, this biosecurity practice should be followed before co-mingling exhibit animals with other herd animals



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Isolation or Quarantine



JEOPARDY!



The two primary components of biosecurity



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



- 1) Keeping disease from entering an area,**
- 2) Preventing disease from spreading to other locations**



JEOPARDY!



Animal doctor



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Veterinarian



JEOPARDY!



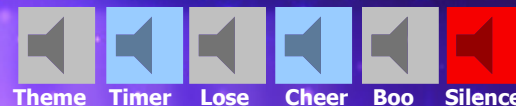
**This agency
determines animal
health guidelines for
Maryland (West
Virginia) fairs and
shows**



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Maryland (West Virginia) Department of Agriculture



JEOPARDY!



**DO complete this
before loading your
animal and taking it
to a fair or show**



Start Timer

GO TO
ANSWER
(question)

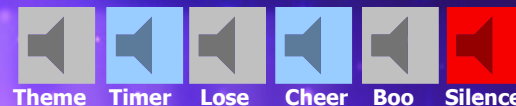
JEOPARDY!



Exhibitor's Self-Certification of Animal Health Form



JEOPARDY!



**Do not wear clothing
worn at the fair out
with animals at your
farm without first
doing this**



Start Timer

GO TO
ANSWER
(question)

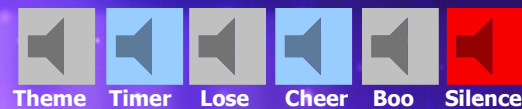
JEOPARDY!



Laundering



JEOPARDY!



**Federal USDA tags are
required for animals
being exhibited in
Maryland to improve
this**



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Animal Disease Traceability



JEOPARDY!



**Many germs are
spread by not _____
hands with soap and
clean, running water**



Start Timer

**GO TO
ANSWER
(question)**

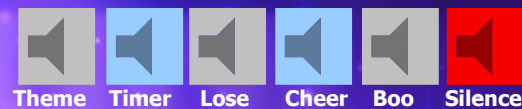
JEOPARDY!



Washing



JEOPARDY!



When handwashing, scrub all surfaces of your hands, including the palms, backs, fingers, between your fingers and under your nails. Keep scrubbing for at least _____ seconds



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



20 seconds



JEOPARDY!



If soap and water are not available, use this to clean hands (it will quickly reduce the number of germs)



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Hand Sanitizer



JEOPARDY!



**If soap and water are
not available, use an
_____ - based hand
sanitizer that contains
at least 60% _____ to
clean hands**



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



**Alcohol-based hand
sanitizer that
contains at least 60%
alcohol**



JEOPARDY!



DAILY DOUBLE

**This item from people or animals
is an important source of germs
like *Salmonella*, *E. Coli* and
Norovirus that cause diarrhea,
and it can spread some
respiratory infections like
Adenovirus and *Hand-Foot-Mouth*
disease**



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Feces



JEOPARDY!



This zoonotic disease is a severe, viral disease that can affect all mammals. Infection results in damage to the nervous system and ultimately death. Since this disease is life-threatening in both animals and humans, vaccination is highly recommended.



Start Timer

GO TO
ANSWER
(question)

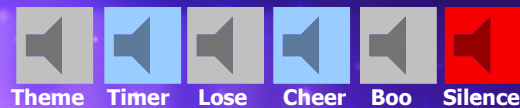
JEOPARDY!



Rabies



JEOPARDY!



**This species is a
carrier of the H1N1
influenza virus**



Start Timer

GO TO
ANSWER
(question)

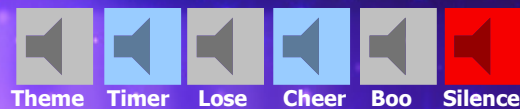
JEOPARDY!



Swine



JEOPARDY!



**This is a highly
contagious fungal
infection of the
skin**



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Ringworm



JEOPARDY!



This bacteria is normally found in the intestines of people and animals, but when conditions and sanitation are poor the bacteria can cause scours (diarrhea) in animals.

In humans, this bacteria can cause abdominal cramping, bloody diarrhea, and occasionally, especially in young children and the elderly, life threatening kidney disease.



**GO TO
ANSWER
(question)**

JEOPARDY!



E. Coli



JEOPARDY!



This is a contagious, viral disease affecting the mouth, nose and feet – most often in sheep and goats. Transmission to humans occurs when a break in the skin comes into contact with the virus (through an infected animal or fomite)



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Orf/Sore Mouth (Contagious Ecthyma)

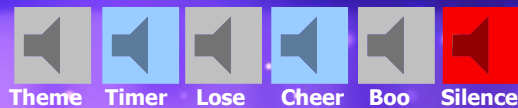


JEOPARDY!



FINAL JEOPARDY!

JEOPARDY!



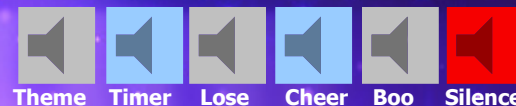
The meaning of “VCPR”



Start Timer

GO TO
ANSWER
(question)

JEOPARDY!



Veterinary – Client – Patient Relationship



JEOPARDY!





Healthy Animals | Healthy YOUTH



ZOONOSSES

Team Jeopardy

Category / Points Level	Your Team's Answer
ZOONOSSES TERMS	
100	
200	
300	
400	
500	
DISEASE TRANSMISSION	
100	
200	
300	
400	
500	
BIOSECURITY ESSENTIALS	
100	
200	
300	
400	
500	
"FAIR PLAY"	
100	
200	
300	
400	
500	
HANDWASHING	
100	
200	
300	
400	
500	
ZOONOTIC DISEASES	
100	
200	
300	
400	
500	



Healthy Animals | Healthy YOUTH



HEALTHY ANIMALS | HEALTHY YOUTH
ZOOLOSES EDUCATION PROJECT FOR YOUTH IN AGRICULTURE

Activity Kit Contents

SECTION 2

Section 2 **Identifying Zoonotic Diseases**

1. What is a pathogen? - "Build a parasite"
2. Health for One, One Health for All
3. Animal Health Picture Sort Game
4. An Introduction to Identifying Zoonotic Diseases (PowerPoint)

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UNIVERSITY OF
MARYLAND
EXTENSION



MARYLAND
Department of Health



West Virginia University
EXTENSION SERVICE

What Is a Pathogen?



Skill Level:

- ▶ Beginner to intermediate

Life Skills:

- ▶ Critical thinking, decision making, disease prevention and healthy lifestyle choices

Setting:

- ▶ An outdoor or indoor space where participants can use craft materials

Time:

- ▶ 45–60 minutes

Materials:

(Zoonotic Disease Educational Kit
Supplies provided in pathogen kit are based on creating 3 groups)

- ☐ Pathogen kit (one per small group):
 - ▶ 2 pipe cleaners (one whole, eight $\frac{3}{4}$ -inch pieces, two 3-inch pieces)
 - ▶ 15 cotton balls
 - ▶ 1 coffee stir straw (cut into 3 pieces, 1 $\frac{2}{3}$ inches in length)
 - ▶ One 1-ounce container of modeling clay (such as Play-Doh) or similar crafting clay
 - ▶ 16 photo squares or 16 pieces of double-sided tape
 - ▶ 1 balloon
 - ▶ 10 beans
 - ▶ 1 pencil or other similar-shaped item such as a pen, marker or stick
- ☐ If making your own kits, purchase the following items:
 - ▶ 1 package of pipe cleaners
 - ▶ 1 bag of cotton balls
 - ▶ 1 package of coffee stir straws
 - ▶ One 3-pound container (or numerous smaller containers) of modeling clay (such as Play-Doh)
 - ▶ 1 tape dispenser of double-sided tape or package of photo squares
 - ▶ 6 or more balloons
 - ▶ 16 ounces dry beans (any type)
 - ▶ 1 pencil or other similar-shaped item such as a pen, marker or stick per group

Overview:

The *What is a Pathogen?* lesson is designed to introduce participants to the general concepts of the three main types of microorganisms that cause infection. The basic qualities of each related to zoonotic diseases possibly encountered with raising, caring for and being around animals is also discussed. The lesson features a hands-on component to help participants understand how pathogens differ and to help define the abstract concept of a pathogen.

Objective:

After completing this activity, participants will be able to:

- ▶ Describe examples of a pathogen and the problems they can cause.
- ▶ Construct three types of bacteria as well as a virus and a parasite to observe and determine the differences between the three main types of disease agents.
- ▶ Name the general reproductive methods of bacteria, viruses and parasites.
- ▶ Describe common diseases caused by these disease agents and methods to prevent them.

PROCEDURE:

Before the meeting:

1. Review the lesson and gather any supplies you will need.
2. Prepare materials for the three main portions of this activity.
 - ▶ **Bacteria section (first part):** Modeling clay, pipe cleaners, cotton balls, writing utensils or sticks, double-sided tape/photo squares
 - ▶ **Virus section (second part):** Balloons, beans, cotton balls, coffee stir straws, double-sided tape/photo squares
 - ▶ **Parasite section (third part):** Modeling clay
3. Set up an area with materials grouped so you can easily pass them out.
 - ▶ **Bacteria section:**
 - **A.** 1-ounce container of clay, along with the eight $\frac{3}{4}$ -inch pieces of pipe cleaner, and two 3-inch pieces of pipe cleaner
 - **B.** 9 cotton balls, and double-sided tape/photo squares
 - **C.** Whole pipe cleaner and a writing utensil or stick per group
 - ▶ **Virus section:** Balloon, 10 beans, double-sided tape/photo squares, 6 cotton balls, and 3 pieces of coffee stir straws per group
 - ▶ **Parasite section:** Modeling clay re-used from bacteria A section

4. The following table outlines the pathogens the participants will be making:

Types of Pathogens		
Type	What it represents	Example
Bacteria: Rod-Shaped (A)	The modeling clay represents the majority of the bacterium, while the pipe cleaners represent pili and flagella that bacteria can use to sense their environment.	<i>Salmonella</i> <i>E. Coli</i>
Bacteria: Cocci (B)	Each cotton ball represents a bacterium. These bacteria can make different formations and form chains, clumps and more.	Mycoplasma
Bacteria: Spirochete (C)	The pipe cleaner represents the bacterium in its entirety. These bacteria tend to be long and can coil due to increased flexibility.	<i>Borrelia burgdorferi</i> (causes Lyme Disease)
Virus	The balloon represents the outside membrane of the virus, while the beans inside represent the genetic material of the virus. The cotton balls and cotton balls with straws represent two components that help the virus to bind to and to inject their genetic material into other cells.	Influenza
Parasite	The long tubes represent mature worms, while the small balls represent eggs that have not yet hatched.	Roundworm



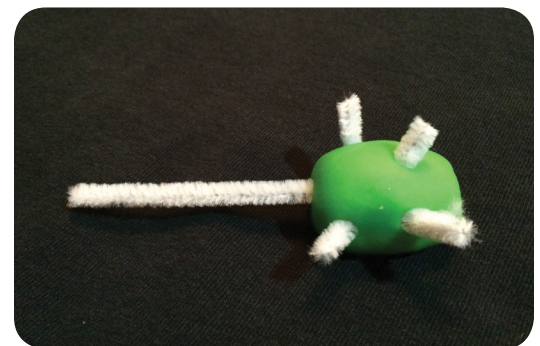
Models of the Three Main Pathogen Types
(Bacteria, Viruses and Parasites)

During the meeting:

1. Introduce the activity by reading aloud or paraphrasing the following:

Nearly every animal and human gets sick at some point. When an illness is caused by a pathogen (a virus or bacteria), it can spread quickly through a herd or flock, or from animal to human or human to animal. Some pathogens travel through the air (after a sneeze, for example) and some travel from pen to pen or even farm to farm on people's shoes or on the tools or equipment they move from one site to another. Today, we'll determine what a pathogen is by exploring the various kinds of pathogens.

2. Divide the group into three or four-person teams (depending on the size of your group and the number of pathogen kits you've prepared). Have each group form a circle. Then ask one person from each group to collect the first part (the bacteria section) of the pathogen kit for the team.
3. Next, read aloud or paraphrase the following:
Pathogens play an important role in our lives. You may have heard pathogens mentioned often, but what exactly are they? We are going to start off by learning about bacteria. Bacteria come in several different shapes and sizes. When I give the signal, your team will have 2 minutes to create what you believe a bacterium would look like using the supplies provided to your group.
4. Inform participants that they can begin and allow 2 minutes for each team to create a bacterium. Provide them with a 30-second warning that the time will be up.
5. After 2 minutes, or when the teams seem to have finished their creations, call time and tell the teams to stop working. When the participants have returned their attention to the whole group, ask for one volunteer from each team to explain the team's creation. Have each volunteer explain why the team members believe it represents a bacterium. Continue the sharing until all of the teams have had a turn. If time and space allow, have the teams walk around the work space to look closely at the models created by the other teams.
6. Read aloud or paraphrase the following:
Thank you for your imaginative creations. Now we are going to look at the science behind three different types of bacteria. To start, combine all of your modeling clay to form a log shape. (Allow time for each team to construct a log shape.) What you have just created is called "rod-shaped" bacteria. Split the clay model in half and give it to the person next to you. Reproduction took place and now there are two bacteria.
7. Make sure all groups have reached this point and then read or paraphrase the following:
Use the pieces of pipe cleaner and stick them into the two clay logs so they stick out like antennas over the bacterium. You have just created the hair-like projections.
8. Guide and assist participants through making a rod-shaped bacterium. They can do this by using the materials provided, pushing the small pieces in the sides of the now round log of clay. Then take the longer portion and place it at one of the ends. (See photo right.)



Model of Zoonotic Bacteria – Rod-Shaped

9. Read aloud or paraphrase the following:

If we take a look at our bacteria, we see they are log or “rod” shaped. When we split them in half we demonstrated how they reproduce – they create a copy of themselves. The shortest pipe cleaners represent “pili,” small hair-like extensions that help bacteria adhere to cells. The longer pipe cleaner pieces represent “flagella,” which help bacteria to move. Not all rod-shaped bacteria have pili or flagella, but some have pili or flagella, or both. Examples of rod-shaped bacteria are Salmonella and E.Coli. We have successfully made our first type of bacteria.



Model of Zoonotic Bacteria – Cocci

10. Have participants set their rod-shaped bacteria to the side. Read aloud or paraphrase the following:

Next, we will make our second bacteria called cocci (Kok-sigh) bacteria. For this, use your cotton balls and double-sided tape/photo squares. Use the tape/photo squares to stick the cotton balls together into any formation you want. (See photo left.)

11. Allow members to adhere cotton balls together in any formation they want. Encourage them to be creative. Read or paraphrase the following:

As I look around, I see you’ve made many different formations. Does anyone want to share what they made? (Allow for volunteers.) Although you formed many different shapes, each single cotton ball within that shape represents an individual bacterium. These cocci bacteria are round like a ball, but they often like to cluster into interesting shapes. An example of this kind of bacteria is Mycoplasma, which infects pigs and poultry. Mycoplasma gallisepticum in chickens often causes respiratory disease symptoms such as coughing and difficulty breathing.

12. Ask participants to move the cocci to the side. Read aloud or paraphrase the following:

We will now make what is called a spirochete bacterium. Take the single full-length pipe cleaner and wrap it around the pencil (or the similar-shaped object that you gave them). Then slide the pipe cleaner off of the object. (See photo left.) This represents a spirochete bacterium. It is long, can coil and tends to be flexible. This is another commonly found shape of bacteria. Borrelia burgdorferi is one of the largest concerns as it causes Lyme disease.



Model of Zoonotic Bacteria – Spirochete

13. Instruct participants that as a team, they need to compare the three distinct differences of the bacterium they made. Allow two minutes for a brief discussion. Ask for volunteers to report back to the entire group with their findings.

Examples may include: Rod-shaped bacteria have pili and flagella, which help them to sense their environment and move. Cocci can clump together in special ways to form groups. Spirochete are flexible, long and skinny and can maneuver in ways the other two might not be able to.

14. Once the group is ready to move on read aloud or paraphrase the following:

As successful bacterial builders, we can now move on to virus building. Unlike bacteria, viruses need host cells to reproduce. The host cell usually dies when the viruses either take too many resources or explode the host cell.

15. Have a volunteer from each group come up to the supply station to get the second set of supplies (virus section) including the balloon and beans.
16. Each group will need a balloon and 10 beans. As a group, participants should place the beans through the opening of the balloon one by one (with balloon not inflated). This will result in the beans being inside of the balloon. Assist participants as needed.
17. Have one person on each team blow the balloon up and tie it off. Some participants may need assistance.
18. Participants will use double-sided tape/photo squares to adhere cotton balls and cotton-balls-with-straws combination to the outside of the balloon. To create the cotton-balls-with-straws combination, place tape/squares on the end of the straw and stick it into a cotton ball. Spread the cotton ball up around the straw to cover all the tape/squares and attach it well. Use the tape/squares to stick the cotton balls and the cotton balls with straws to the outside of the balloon in a random assortment. Have one group member hold the balloon while other group members carefully tape. The photo right shows how the cotton balls and cotton balls with straws look when attached to the balloon.



Model of Virus

19. Once the viruses are complete, ask participants what they think each of the following items represent:
 - Balloon
 - Beans
 - Cotton balls
 - Cotton-ball-with-straw combination

20. Once participants have shared their thoughts, read aloud or paraphrase the following:

Viruses are usually hard to see, but we made ours so that we can clearly identify the various structures. In our case, the balloon represents the outer membrane of the virus. The beans that we put on the inside are its genetic material (DNA or RNA) – that’s what it gives to the cell so the cell has a blueprint for making more viruses. The cotton balls and cotton-ball-with-straw combination that we put on the outside represent the various kinds of proteins found on the outside of the virus. These can have many different purposes: they can help the virus attach to a cell, enter their genetic material or “blueprints” into the cell, help with the release of viral particles and more. An example of a virus is influenza. Influenza is a common virus that is responsible for many different kinds of flu in humans as well as pigs, ducks and other animals.

21. Next, read aloud or paraphrase the following:

To finish our lesson, we are going to now take a closer look at parasites. Parasites also vary greatly in size and structure. When I give the signal, your team will have 3 minutes to create what you believe parasites would look like reusing the clay you have been provided.

22. Inform participants that they can begin and allow them 3 minutes to create their parasite. Provide youth with a 30-second warning.

23. After 3 minutes, or when the teams seem to have finished their creations, call time and tell the teams to stop working. When the participants have returned their attention to the whole group, ask for one volunteer from each team to explain the team’s creation. Have them tell why they believe it represents a parasite or parasites. Continue the sharing until all of the teams have had a turn. If time and space allow, have the teams walk around the work space to look closely at the models created by the other teams.

24. Read aloud or paraphrase the following:

Your parasites are very imaginative and prove just how different parasites can be. Long structures can be similar to a roundworm, which is an internal parasite (found inside of an animal). Other external or outside parasites can include ticks, lice and mites that would be smaller in their structure.

Now, let’s build a roundworm and eggs.

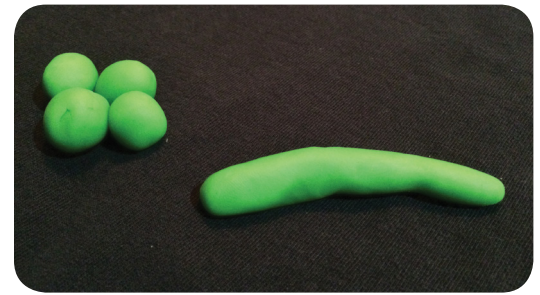
25. Instruct groups to split the clay in half. Half of their clay will be used to make a long worm, and the other half is to be used to make several small round balls. (See photo right.)

26. Read aloud or paraphrase the following:

The worm you created represents a mature roundworm. The round balls represent eggs from which a worm will hatch. Most parasites hatch from eggs.

27. Read aloud or paraphrase the following:

Today, we have made our own versions of these pathogens: bacteria, viruses and parasites. Pathogens are common concerns for those individuals raising animals as well as in everyday life. Humans need to be aware of their surroundings and take precautions to try to avoid pathogens that we make or may not be able to see. Pathogens generally reproduce quickly so taking precautions is important to keeping humans and animals safe and healthy.



Model of a Zoonotic Parasite
(Roundworm and Eggs)

TALKING IT OVER:

Ask the group the following questions.

- ▶ What are the three main types of pathogens that we made today?
- ▶ What differences are there between these three types in how they make more of themselves?
 - Bacteria reproduce by making a direct copy of themselves. Viruses use a host cell to make more viruses. Parasites make eggs, and hatch from these eggs to become mature parasites.
- ▶ What common diseases can these pathogens cause?
 - Bacteria can cause Lyme disease, as well as sickness from *Salmonella* or *E.coli*. Influenza is a common virus that is responsible for many different kinds of flu. Parasites can infest an animal and cause problems such as roundworm.
- ▶ What are some precautions you can take to reduce your interactions with pathogens?
- ▶ How does knowing how each pathogen reproduces impact prevention methods?
- ▶ What precautions can you take to help prevent you and your animals from getting ill?

ADAPTATIONS & EXTENSIONS:

- ▶ To make the lesson more personalized, purchase more materials so each participant can create their own pathogens. Instead of each participant getting clay for the initial rod-shaped bacterium, give clay to every other person. Then have the participant who has the clay split it in half and give half to the person without clay next to him or her to signify bacteria reproducing. All other portions of the lesson would stay the same for an individual.
- ▶ For older or more experienced participants:
 - Have participants brainstorm some common diseases they encounter or have heard of with animals. Then have them research and prepare a presentation on a specific pathogen that causes a zoonotic disease that they could share with the fair board or 4-H livestock or species-specific council.
- ▶ For younger or less experienced participants:
 - Adapt the lesson and save time by creating the cotton ball and straw sections prior to the activity.
 - Have participants draw cartoons on how pathogens look different. Allow them to be as creative as they want.

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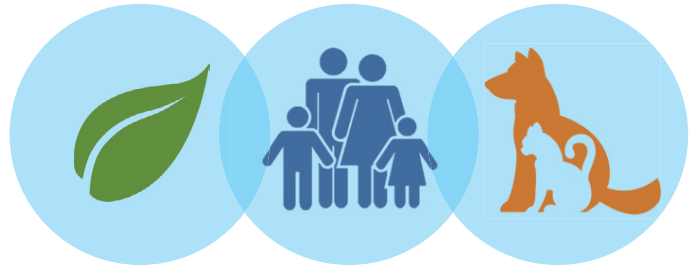
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Health for One, One Health for All



Overview:

The *One Health – Health for One, One Health for All* lesson is designed to teach participants about the One Health concept that recognizes that environmental health, animal health and human health are all connected. Over the course of this lesson, participants will learn habits to minimize zoonotic disease transmission, reduce health risks and apply the principles of One Health to 4-H animal projects. The lesson features an engaging component to help reinforce concepts discussed.



PROCEDURE:

Before the meeting:

1. Review the *One Health – Health for One, One Health for All* lesson and gather any supplies you will need.
2. Prepare the three bottles of colored water:
 - A. Remove a small amount of water from each bottle (approximately one tablespoon).
 - B. Dissolve one color tab in each bottle of water. This may require minimal to vigorous shaking while capped.
3. Set up the four empty cups on a level surface. These will be used later in the lesson for mixing the colored water.
4. Review Table 1, which indicates what each color represents and how it relates to One Health. This will assist you in teaching the lesson.

Objectives:

After completing this activity, participants will be able to:

- ▶ Describe each aspect of One Health and how they connect to each other.
- ▶ Recognize how they, as humans, fit into the One Health initiative.
- ▶ Explain methods of zoonotic disease prevention within One Health.

Skill Level:

Intermediate

Life Skills:

Communication, critical thinking, cooperation and disease prevention

Setting:

An outdoor or indoor space where participants can easily hear; seating is optional

Time:

15–20 minutes

Materials:

- ☐ 3 bottles of water (8-16.9 oz. bottles)
- ☐ 3 dissolvable color tabs (Optional alternative if color tabs are not available: Red, blue and yellow food coloring)
- ☐ 4 clear cups (5 to 12-ounce cup depending on size of water bottles)
- ☐ Paper towel (optional)

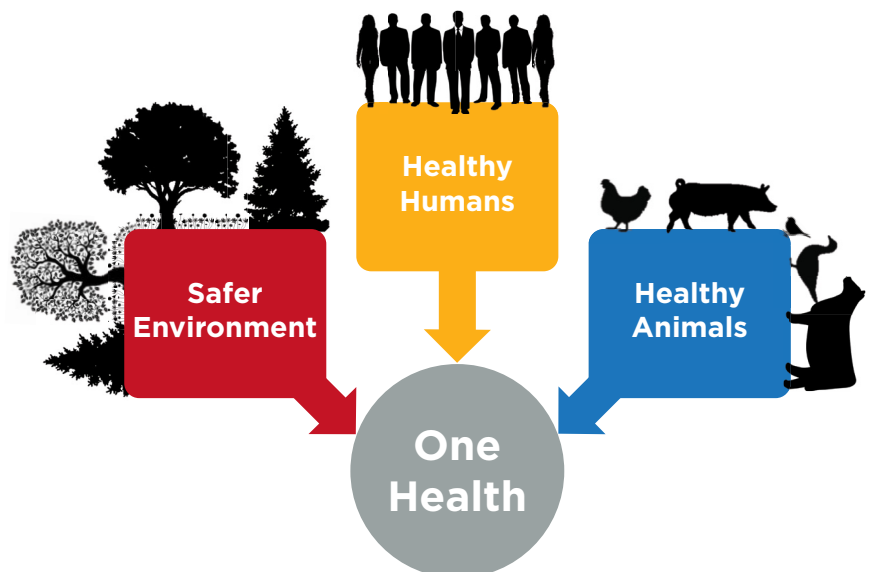


Table 1. What Each Color Represents and How Each Relates to One Health

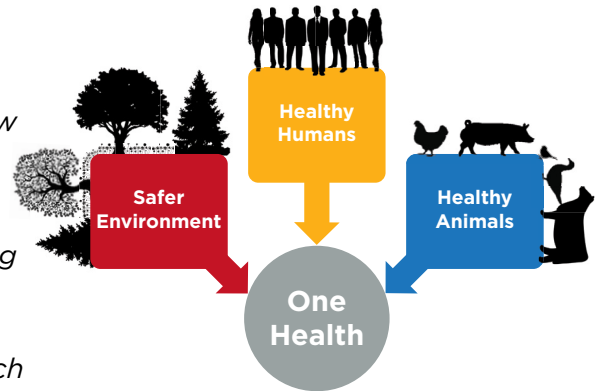
Color	What it represents	How it relates to One Health
Blue	Animals (such as cattle, sheep, hogs, goats, birds, cats, dogs, reptiles, aquatic species or other wildlife)	Animals exist everywhere. Numerous animals come into contact with people through agriculture and all animals live in the environment.
Red	Environment – air, water, ground (water – rivers, lakes or ponds; ground – soil, pasture or forest)	People and animals come into contact with the environment by walking, eating and breathing.
Yellow	Humans – anyone who has come into contact with animals, the environment or another person who has had contact with animals or the environment	People come into contact with animals through pets, agriculture or zoos, or in nature. All humans live in one environment we call Earth.
Orange (Red + Yellow)	Pollutants – chemicals that humans deposit in the environment	Humans pollute the air with chemicals such as carbon monoxide by driving cars. They pollute the ground and water with chemicals used in industry. Examples: industrial chemicals, insecticides, fertilizers, greenhouse gasses
Green (Blue + Yellow)	Zoonotic Diseases – diseases that can be passed between humans and animals	60% of human diseases are considered to be of animal origin. Examples: ringworm, sore mouth, E. coli, salmonella, listeria, influenza
Purple (Blue + Red)	Eutrophication – the process of accumulating nutrients in the environment	Animal feces contain many nutrients so we must be careful how we manage manure to ensure that these nutrients do not overaccumulate and damage the environment. When this occurs, we see issues such as algal blooms. Examples: nitrogen, phosphorous, potassium, sulfur, magnesium, calcium
Gray/Black (Blue + Red + Yellow)	Multitrophic Interactions – interactions across multiple levels of the food web (A “food web” is a model of how food is grown and consumed by various organisms within an environment.) Everything interacting together is One Health.	We must all be aware of the impact that our actions have. Everything we do not only affects ourselves but everything around us (environment and animals). Examples: If the soil is depleted of its nutrients, plants will not be able to survive. Then lower level animals may be undernourished and die, and “apex predators” (animals such as lions or humans that solely rely on other organisms for food) may be malnourished and become more susceptible to diseases.

During the meeting:

1. Introduce the activity by reading aloud or paraphrasing the following:

Nearly every animal and human gets sick at some point. Six out of 10 new human diseases originate from animals. The new diseases are passed between animals and humans through a process known as “zoonosis.” “Zoonotic diseases” can be passed through the environment in the air (after a sneeze for example) or by touching animals that are sick and not washing your hands.

The connections between environmental health, human health and animal health all contribute to “One Health.” Each of these components – animals, humans and the environment – are known as the “branches” of One Health. Today we are going to talk about how you and your 4-H project animals contribute to One Health. We’ll start by discussing what the three bottles of colored water represent.



2. Discuss what the blue, red and yellow colors represent with regard to One Health. Read aloud or paraphrase the following:

Blue represents **animals**. Animals exist everywhere.

Numerous animals come into contact with people through agriculture and all animals live in one environment we call Earth.

Red represents the **environment**. People and animals come into contact with the environment by walking, eating and breathing.

Yellow represents **humans**. Humans are anyone who has come into contact with animals, the environment or another person who has had contact with either. People come into contact with animals through pets, agriculture or zoos, or in nature. All humans live in one environment we call Earth.

Each of these colors represents the three branches of One Health – animals, humans and the environment.

3. Ask the participants for examples in their everyday lives that fit each color.

- **Blue – animals:** This would include any animals such as cattle, sheep, hogs, goats, birds, cats, dogs, reptiles, aquatic species or other wildlife.
- **Red – environment:** The environment consists of the air, water and ground (water – rivers, lakes or ponds; ground – soil, pasture or forest).
- **Yellow – humans:** That’s you!

4. Now pour $\frac{1}{3}$ of the red water bottle and $\frac{1}{3}$ of the yellow water bottle into one of the clear cups to make **orange**. Discuss what the orange represent with regard to One Health, by reading aloud or paraphrasing the following:

Orange represents human (yellow) and environmental (red) interactions. Humans pollute the air with chemicals such

as carbon monoxide by driving cars. They contaminate the ground and water with “pollutants” found in industrial chemicals.

5. Ask the participants for examples in their everyday lives about showing they interact with their environment.

You interact with your environment by walking, eating and breathing.

6. Now pour $\frac{1}{3}$ of the blue water bottle and another $\frac{1}{3}$ of the yellow water bottle into one of the clear cups to make **green**. Discuss what the green represent with regard to One Health, by reading aloud or paraphrasing the following:

Green represents animal (blue) and human (yellow) interactions. Six out of 10 new human diseases are considered to be of animal origin. The diseases that can be passed between humans and animals are known as “zoonotic diseases.”

Examples of zoonotic diseases include ringworm, sore mouth, E. coli, salmonella, listeria and influenza.

7. Ask the participants for examples in their everyday lives showing how they interact with animals.

You interact with animals when you work with your 4-H animal projects, when you play with your pets or when you go to the zoo.

8. Now pour another $\frac{1}{3}$ of the blue water bottle and another $\frac{1}{3}$ of the red water bottle in one of the clear cups to make **purple**. Discuss what the purple represents with regard to One Health, by reading aloud or paraphrasing the following:

Purple represents animal (blue) and environment (red) interactions. “Eutrophication” is the process of accumulating nutrients in the environment. Animal feces contain many nutrients so we must be careful how we manage manure to ensure that these nutrients do not overaccumulate and damage the environment. When this happens, we see issues such as algal blooms.

Examples of nutrients include nitrogen, phosphorous, potassium, sulfur, magnesium and calcium.

9. Ask the participants for examples in their everyday lives showing how animals interact with the environment.

Animals interact with their environment the same way humans do, by living, eating and breathing. Deer live in a forest, they eat the grass and they drink the water.

10. Now mix the final $\frac{1}{3}$ of the blue, red and yellow water bottles to make **gray/black** in the final clear cup. (The liquid in the bottles and cups should now look similar to the depiction in the photo on the left). Discuss what the gray/black represents with regard to One Health, by reading aloud or paraphrasing the following:

Bottles and cups after mixing is complete



Gray/black represents animal (blue), environmental (red) and human (yellow) connections. Animals, the environment and humans interact through “multitrophic interactions,” which are collaborations across multiple levels of the food web. (A “food web” is a model of how food is grown and consumed by various organisms within an environment.) We all must be aware of the impact that our actions have. Everything we do not only affects ourselves but also everything around us (environment and animals). Together animal health, environmental health and human health make up One Health.

For example, if the soil is depleted of its nutrients, plants will not be able to survive. Then lower level animals may be undernourished and die, and “apex predators” (animals such as lions or humans that solely rely on other organisms for food) may be malnourished and become more susceptible to diseases.

Think about when you go for a long nature walk. Often times, humans bring a water bottle and snacks with them on the walk. Around trails, garbage containers are usually available and are intended to help reduce the human impact on the environment. If you do a good job of throwing trash away instead of littering, animals and the environment will not be affected.

11. Ask the participants for examples in their everyday lives showing how they interact with animals **and** the environment.

When you care for your 4-H project animal you are interacting with animals **and** the environment. When you manage manure from your project animal you are keeping them clean **and** returning nutrients to the soil.

12. Read aloud or paraphrase the following:

Think of the environment as a campsite. When a family goes camping they are interacting with the environment and the wildlife around them. When cooking, they take extra care to make sure that they do not leave food or trash out for wildlife (such as bears and raccoons) to find. If they start a fire, they make sure to put the fire completely out before they leave. We always want to leave a campsite better than we found it.

13. As a group, discuss what participants can do to improve One Health. Consider using the questions below to help encourage participant discussion.

- What can you do to improve your environment? (recycle, reduce waste, minimize the amount of energy you use, pick up trash, don't litter, minimize your use of fertilizers and pesticides)
- What can you do to improve the environment of your 4-H project animal? (keep pens or stalls and feed clean and dry, provide fresh clean water, properly dispose of manure and waste, properly ventilate)

TALKING IT OVER:

Ask the group the following questions.

- What can you do to minimize the impact that your 4-H project animals have on the environment?

A few examples include: Properly handling manure, minimizing waste, managing water usage and runoff.

- How can you help reduce the risk of zoonotic diseases in your community?

A few examples include: Always wash your hands after interacting with animals or their environment; vaccinate your animals; stay up to date on your immunizations and vaccinations; if you are sick then stay home (away from other animals and people); always keep your animals and their environment clean and dry; and if animals become sick, contact your veterinarian; help educate fellow exhibitors and fair attendees about preventing the spread of zoonotic diseases.

- Why is it important for humans to consider animal and environmental health and well-being as you raise your 4-H animal projects?

We must be aware of the impact that our actions have, and remember that everything we do not only affects ourselves but also those around us (environment and animals).

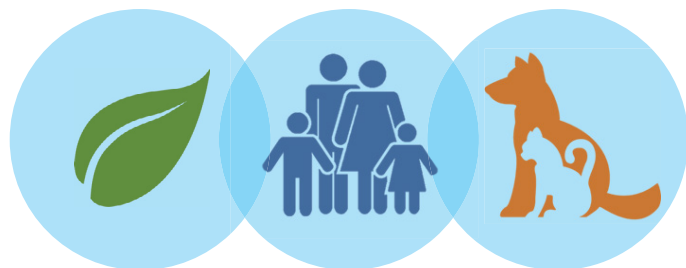
- What can you do to improve animal health? (*keep your animal clean and comfortable, consult your veterinarian if your animal becomes ill, vaccinate your animal, make sure your animal gets plenty of exercise*)
- What can you do to improve your health? (*eat healthy; exercise regularly; stay up to date on immunizations; always wash your hands after being around animals or in nature, or after going to the bathroom*)

14. Ask participants to help list some ways that they could practice One Health principles.

Some examples include: Manage manure properly. Manage water usage. Reduce waste from both you and your animal. Always throw your trash away so animals do not eat it and become sick. Never litter as it will pollute the environment. Vaccinate you and your animals. If you are sick, stay home (away from other animals and people). Wash your hands when interacting with animals or their environment. Always keep your animals and their environment clean and dry to keep them healthy. If your animal becomes sick, contact your veterinarian right away.

15. To summarize, read aloud or paraphrase the following:

Each color interacted with each other just as each branch (animals, humans and the environment) contributes to One Health. By continually observing our animals and facilities, such as housing areas, we can reduce the chances of health concerns for our animals and ourselves. By using strategies such as washing our hands, we can minimize the spread of zoonotic diseases. Remember: The connections between environmental health, human health and animal health all contribute to One Health. Therefore, we must be aware of the impact that our actions have, and remember that everything we do can affect ourselves and those around us. Finally, you are a part of the agriculture industry and a member of the community we call Earth; the efforts you make to keep your animals healthy help ensure the safety of our food supply and well-being of your animal.



ADAPTATIONS & EXTENSIONS:

For Older or More Experienced Participants:

- ▶ Have participants brainstorm a list of ways that they can help community members to follow One Health principles at the local fair or other animal-related events. Then have participants research and prepare a presentation on the topic that they choose to share with the fair board or 4-H livestock/species-specific council.
- ▶ Challenge teen leaders to travel to younger participants' barns to help them find ways that can improve One Health principles. Have volunteers help younger members choose one way and carry out that action throughout the year.

For Younger or Less Experienced Participants:

- ▶ Combine the colors as described without including the examples of impacts on the branches. Instead, ask the participants to think only about their relationship with their favorite indoor pet. Apply what participants think about small changes, such as cleaning an animal cage, and how those small changes can affect each branch of One Health.
- ▶ Reduce the number of color mixes that are discussed. Instead of making orange, green and purple, only create the gray/black mixture and talk about how the red, blue and yellow contributed to the final product.
- ▶ Gather three tubular plastic hoops (such as Hula-Hoops) and place them on the ground near each other. Choose three participants. Have each participant stand with one foot in one of the hoops to represent each branch of One Health (animals, humans and the environment). Have the participants pick up their hoops and move toward each other trying to fit all three hoops in the smallest amount of space possible without leaving their hoops. This will help illustrate that the space we all share is interconnected with only a small section relating solely to humans, animals and the environment.

ALIGNMENT TO SCIENCE AND ENGINEERING PRACTICES:

How 4-H Increases Science Literacy

Nationally and in Michigan, 4-H has long enjoyed a reputation for engaging young people in positive, experiential (hands-on), and nonformal activities that are inquiry based. The activities in the *4-H Animal Science Anywhere* series can be used to enhance classroom science education. The activities are aligned with the eight Scientific and Engineering Practices from *A Framework for K-12 Science Education* (National Research Council, 2012, p. 42).

The activities in *4-H Animal Science Anywhere: Influenza — One Health – Health for One, One Health for All* were evaluated for their alignment with the Science and Engineering practices by Michigan State University (MSU) Extension Educator Tracy D'Augustino in 2016.

Alignment to Science and Engineering Practices continued

Table 2. How This Lesson Aligns With the Science and Engineering Practices (National Research Council, 2012, p. 42)

Science & Engineering Practice	Action	Activity Step
► Asking questions and defining problems	► Participants brainstorm examples of animals, environments and humans. ► Participants brainstorm human interactions with the environment. ► Participants brainstorm human interactions with animals. ► Participants brainstorm animal interaction with the environment. ► Participants brainstorm human interactions with animals and the environment.	3 5 7 9 11
► Developing and using models	Participants observe a demonstration mixing colored water modeling how humans, animals and the environment all interact.	2-10
► Planning and carrying out investigations		
► Analyzing and interpreting data	Participants discuss the impact humans and their animals can have on the environment.	9, 11, 13
► Using mathematics and computational thinking		
► Constructing explanations and designing solutions	► Participants explain why it is important to be aware of the impact that their actions have on animals and the environment. ► Participants discuss how to minimize the impact that their actions have on animals and the environment.	12-14 11, 13, 14, Talking It Over
► Engaging in argument from evidence	Participants discuss the damage to the environment if care is not taken when interacting with animals and the environment.	10, 12, 15, Talking It Over
► Obtaining, evaluating, and communicating information	► Participants obtain and evaluate information from their model to gain understanding of the principles of One Health. ► Participants communicate information about the principles of One Health with each other. ► Participants evaluate and communicate ways to reduce the impact they and their 4-H animal projects have on the environment, so that they can further communicate with each other, with adults and with fair attendees.	2-11 11-14 11, 13

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Activity Kit Contents

SECTION 3

Section 3 Disease Transmission

1. Routes of Transmission (Worksheet)
2. Disease Transmission through Direct Contact
3. Disease Transmission via Aerosol and Droplets
4. Direct Contact Glo Germ Activity
5. Germ Swap
6. Got Immunity?

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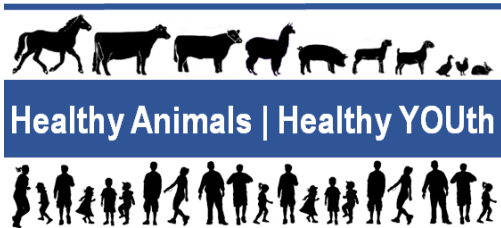
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Zoonosis Disease Transmission: Routes of Transmission

Instructions:

Match the route of transmission to ways it can be prevented. Only one letter may be used per blank, but letters may be used more than once.

Routes of Transmission:

- A. Direct Contact
- B. Aerosol/Droplet
- C. Indirect Contact
- D. Ingestion (Oral)
- E. Vectors

Ways to prevent Disease Transmission:

- _____ 1. Use insect control products
- _____ 2. Isolate sick animals
- _____ 3. Provide fresh air to humans and animals
- _____ 4. Dispose of or wash boots and clothing after animal contact
- _____ 5. Wash your hands before preparing food
- _____ 6. Work with your veterinarian to check and treat your animals for parasites
- _____ 7. Wear gloves when working with sick animals
- _____ 8. Store food at the proper temperature
- _____ 9. Wear respiratory protection when working with animals
- _____ 10. Decrease humidity and odor build-up in barns
- _____ 11. Clean and disinfect any equipment used with sick animals
- _____ 12. Increase the distance between healthy and sick animals
- _____ 13. Wash your hands after cleaning pens or contact with manure
- _____ 14. Cook meat to the appropriate internal temperature
- _____ 15. Avoid sharing equipment, or clean and disinfect equipment when sharing is necessary

Source: Maine, One Health – Activity 2 Zoonotic Disease Course

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Disease Transmission Through Direct Contact

ACTIVITY MATERIALS

- No materials needed

METHODS OF DISEASE TRANSMISSION

- Direct Contact
- Indirect Contact
- Oral
- Aerosol/Droplet
- Vector borne

Objective

- This activity will help participants explore the routes of disease transmission.
- This activity will help demonstrate how germs could spread through direct contact.

Background Information

An easy way to catch most infectious diseases is by coming in contact with a person or animal who has the infection. Two ways infectious diseases could spread through direct contact are:

- *Person to person / Animal to animal.* A common way infectious diseases spread is through the direct transfer of germs (pathogens), including bacteria, viruses, fungi, and parasites, from one individual to another. This can occur when the individual with the pathogen touches, kisses or rubs noses, or bites an individual that is not infected.

Germs can also spread through the exchange of body fluids from sexual contact. The individual who passes the germ may have no symptoms of the disease, but may simply be a carrier.

- *Animal to person / Person to animal.* Being bitten or scratched by an infected animal — even a pet — can make you sick and, in extreme circumstances, can be fatal. Handling animal waste can be hazardous, too, especially when direct contact with waste occurs. For example, pregnant women can acquire a toxoplasmosis infection by scooping a cat's litter box. Also, sometimes a sick person can cause a healthy animal to become sick.

Conduct the Activity

1. Select one student to secretly pretend to be infected by a disease. Instruct the student to squeeze the other participants' hand while shaking hands.

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2. Once an individual's hand is squeezed, that person is also "infected" with the disease and must squeeze others hands when they shake another's hand.
 3. This can be done quickly, even with a 30 second or one minute time limit. After about 30 seconds, ask the students if they had their hand squeezed, if so they have been "infected" by the disease.

Activity Wrap-Up

To conclude this activity, see if the youth participants can identify situations where direct contact can occur, such as:

1. public places where people come into direct contact with others,
2. farms where animals come into direct contact with one another,
3. places where animals and people come into direct contact with each other.

Note: Animals on a farm may be contained in close quarters and can spread disease through direct contact. Disease can be spread through direct contact by infected animals that may not yet show symptoms. If an animal shows symptoms of illness, it should be separated from the herd or flock for treatment.

Source: Saskatchewan Science Center – Classroom Activity Disease Transmission

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Disease Transmission via Aerosol and Droplets

5

ACTIVITY MATERIALS

- Liquid bubble solution
- Box of tissues*

*not included in kit

METHODS OF DISEASE TRANSMISSION

- Direct Contact
- Indirect Contact
- Oral
- Aerosol/Droplet
- Vector borne

Objectives

- This activity will help demonstrate how disease can spread through the air via aerosol or droplet transmission.

Background Information

You can catch some diseases simply by breathing in disease-causing germs. The disease which spread by this method are called airborne diseases.

Airborne diseases can spread when an infected person coughs, sneezes, or talks, spewing nasal and throat secretions into the air. This is called aerosol or droplets transmission. Certain viruses or bacteria take flight and hang in the air or land on other people or surfaces.

When you breathe airborne pathogenic organisms in, they take up residence inside you. You can also pick up germs when you touch an infected surface, and then touch your own eyes, nose, or mouth.

Conduct the Activity

1. Discuss with the youth participants their ideas about what aerosol or droplets disease transmission might be.
2. Inform the students that for this activity, bubbles will represent pathogens in the air. Each time a bubble lands on them they have become “infected” with an airborne pathogen. This shows the students how some diseases are spread through the air.
3. Give each student a tissue. Have them stop the bubbles from landing on themselves by blocking the bubbles with the tissue.
4. If they successfully block the bubbles, they will not become “infected”.

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Activity Wrap-Up

This activity is a positive way to encourage the use of tissues when sneezing. It provides a visual representation youth participants can use to understand the importance of covering sneezes to keep pathogens from spreading through the air.

- Ask the participants if they can see the aerosol or droplets emitted by someone when they sneeze or when they cough.
- When someone sneezes or coughs, how far do you think the aerosol or droplets can travel? How can we find out?
- If you do not have a tissue to catch a sneeze or cough, would it be better to sneeze or cough into your hand or into your elbow? Why? Would a person be more likely to spread germs caught in their hand or their elbow?
- Demonstrate how a person would catch a sneeze or cough in their elbow joint.
- Talk with the student how germs can attach to dust particles and travel through the air. What PPE could we use to help prevent breathing in airborne germs?

Source: Saskatchewan Science Center – Classroom Activity Disease Transmission

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Disease Transmission

Direct Contact Glo Germ Activity

ACTIVITY MATERIALS

- 3 to 4 Small Stuffed Animals
- 3 to 4 Plastic Toy Food Items
- Glo Germ Powder
- UV Flashlight
- Sink, water, and soap*

*Not included in the kit

METHODS OF DISEASE TRANSMISSION

- Direct Contact
- Indirect Contact
- Oral
- Aerosol/Droplet
- Vector borne

WORKING WITH GLO GERM

Glo Germ is consists of an odorless lotion (or powder) which glows brightly when exposed to ultraviolet light.

NOTE: A little bit of Glo Germ goes a long, long way!

Objectives

- This activity will help participants explore the routes of disease transmission.
- This activity will help demonstrate how germs could spread through direct contact.

Background Information

Proper Hand Washing Technique

Proper hand washing technique:

1. Wet your hands with clean running water (warm or cold) and apply soap.
2. Lather your hands by rubbing them together with the soap.
3. Scrub all surfaces of your hands, including the palms, backs, fingers, between your fingers, and under your nails. Keep scrubbing for at least 20 seconds. Need a timer? Hum the "Happy Birthday" song twice.
4. Rinse your hands under clean, running water.
5. Dry your hands using a clean towel or air dry them. Do not dry on clothes, which may be contaminated by germs!

About Glo Germ

Glo Germ™ is a product sold both in liquid and powder form that contains proven safe ingredients formulated to be the same size as bacteria, basically 5 microns in size. When used in either the powder or liquid-based form, with the use of an ultra-violet light, it simulates the spread of germs, teaching how quickly and broadly germs can be spread in a short period of time. (Source:

www.glogerm.com)

Glo Germ lotion is applied like a typical hand lotion. Glo Germ lotion works well to demonstrate handwashing. The lotion form is generally easier for youth to apply. Glo Germ powder is more difficult to apply for handwashing

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demonstrations (very chalky). However, Glo Germ powder works well to demonstrate germ transmission by cross-contamination and direct contact.

In this activity, we will use “props” that will be passed around, such as stuffed animals, plastic toy food items, or other similar items like a grooming comb that you may have handy. These items may represent animals touched at a fair or farm, shared barn equipment (water buckets, stall rakes, wheelbarrows, hog panels, etc.) These items are wiped with Glo Germ powder, which is not easily seen with the naked eye. The use of an ultraviolet (UV) light enables the powder to “glow.”

Conduct the Activity

Activity Part 1: Petting or Handling an Animal

1. Cover 1 small stuffed animal with a small amount of Glo Germ powder all around the animal.
2. Introduce your stuffed animal to the youth participants as your “favorite pet” and invite them to pet and hold it. Encourage one person after another to pet or hold your “favorite pet”.
3. You can keep a second pet “germ-free” by not applying any Glo Germ material to it. Use this one to show that although this item was not shedding any pathogens at the beginning, now that it’s been handled by many people who were exposed to “infected” pet, it becomes contaminated (i.e. it glows) by the end of the activity.
4. Use the UV light to show the Glo Germ on everyone’s hands, and talk about the germs might have spread through direct contact.
5. With Glo Germ still on the participants hands, proceed to Part 2 of the activity

Activity Part 2: Eating Without Washing Hands after Animal Contact

1. Pass around 3 to 4 clean Plastic Toy Food items. Explain to the participants that we are going to see what could happen when we choose to eat after handling animals if we do not wash our hands.
2. Ask the participants to share the food, passing the items around so that everyone gets some. It’s nice to share, right?
3. Have the participants bring the plastic food items to the UV light and check for the presence of germs. Are they contaminated?
4. Do they glow under the UV light?
5. Talk with the participants what might happen if this was real food and they had eaten it? Oral Transmission!

Activity Part 3: Handwashing

1. Have the youth participants wash their hands at the sink and return to the classroom.
 2. Once all of the participants have washed their hands, attempting to remove all of the simulation germs, gather them to check their hands again with the UV light.
 3. Turning the lights off will help show the areas missed more easily.
 4. Turn on the UV light and have them show the palm and back of their hands. Show students that, although thorough cleaning attempts are made, germs and other unclean particles remain.
-

The Glo Germ sticks on like germs. Pay particular attention to the back of their hands, between their fingers, and around their finger nails.

5. Review the proper handwashing technique from the *Background Information* section above with the participants.
6. Have the participants repeat the hand washing steps until all germs are gone and they have learned the proper technique to wash their hands.

Alternate Germ Transmission Activity

1. Put a small amount of Glo Germ powder on the palm your right hand. Shake several individuals' hands when they walk into the session.
2. Demonstrate with the UV flashlight, how the Glo Germ transferred from your hands to their hands. People can spread germs to other people too.
3. Do the same with fomites, such as an animal brush, halter, or animal cage. Glo Germ will transfer from these objects to participants' hands. Use the UV flashlight to reveal the presence of germs.

Activity Wrap-Up

Wrap-up by engaging the youth participants in a discussion about how germs are transmitted between animals and people and between people and people. Discuss the importance of handwashing. The following questions may be used to begin the discussion:

- How were germs that cause illness spread from one individual to another in this activity?
- Why would you need to thoroughly wash your hands after working with animals, touching their pens or cages, and handling their waste material? Especially before eating!
- Do you think you do a good job of washing your hands each time you wash? What do you need to do differently?

Source: *Maine, One Health – Activity 4 Glow Germ*

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Germ Swap

ACTIVITY MATERIALS

SIMPLE VERSION

- Disposable cup for each participant
- Food coloring
- Water*

ADVANCED VERSION*

- Disposable cup for each participant
- 1/8 cup (30ml) distilled water per participant*
- Sodium Carbonate Standard Solution 0.02N (Hach, cat. #18149) (Positive Solution) (LABELED SC)*
- Phenolphthalein Solution 0.1% (Hach, cat. #189753) (Testing Solution) (LABELED PH)
- Dropper bottle*
- Measuring utensils*
- Disposal container large enough to accommodate liquid from all participant cups*

*Items not included in kit

Objectives

- This activity will help explain who is at highest risk for becoming ill from a disease
- This activity will help explain ways zoonotic diseases might be spread to you or your animals on the farm and at exhibitions.
- This activity will help describe measures to prevent zoonotic disease spread to you and your animals on the farm and at exhibitions.

Background Information

Some people are carriers of disease. Initially, these carriers may appear healthy or show only mild signs of disease. At some point they may eventually get sick, but they may not be recognized as having the disease until they've exposed and infected others. This is one reason why some pathogens can spread so quickly.

This activity is designed to simulate the uncontrolled spread of a disease through a population. Cups have been half-filled with water, except for one or two which contain baking soda water. The one or two people with the baking soda cups will be the original carriers of the "disease," but they will carry this disease in a cup rather than in their body—and appear healthy on the outside. The original carrier(s) will make contact with other participants who will then make contact with others. At the end of the activity, everyone will be tested to see who has become infected, and we'll discuss how to trace the infection back to its source.

NOTE: We will be wearing nitrile gloves for this activity, but you still need to be careful with your cup and solution as



we work through this activity. If you spill any on yourself, immediately go to a bathroom to wash it off. It may stain clothing.

Conduct the Activity

Simple Version of Germ Swap with Food Coloring

This is the “modified” or “simple” version of the germ swap activity. This activity uses food coloring, so the ingredients are easily accessible. Because this activity uses food coloring, the participants must be careful not to spill. Or this is a good activity for outdoors.

1. Line one clear plastic cup on a table for each youth participant in the group. Place 2-3 oz. of clean water in each cup.
2. Put 1-2 drops of blue food coloring in 9 of every 10 of the participant’s cups. This represents a 90% “healthy” pig population.
3. Put 2-3 drops of yellow food coloring in the remaining 1 of every 10 of the participant’s cups. This represents a 10% “ill” pig population.
4. Have each participant pick a cup, but don’t reveal quite yet what the colors mean
5. Instruct everyone to mingle and join up in pairs. For each pair, there will be a person A and B (this is just for explanation purposes). Have person A pour the contents of their cup into person B’s cup. Then have person B pour $\frac{1}{2}$ of the mixed liquid from their cup back into person A’s cup, so they have even amounts again. This act is supposed to replicate “swapping” germs.
6. Repeat. This time have the participants pair up with a different person. Repeat the “germ” swapping process from Step 5.
7. Afterwards, see how many people have “green”, infected cups from the initial 10% of infected animals.
8. This activity demonstrates how 1 sick pig per 10 can turn into many more in a barn at a fair or farm.

Advanced Version of Germ Swap

This is the advanced version of the germ swap activity. It requires a more extensive list of materials which are not included in the kit.

Before participants arrive:

1. Add approximately $\frac{1}{8}$ cup (30ml) of distilled water to a disposable cup for each participant; filling the cup about $\frac{1}{3}$ full. This should be done just before the activity begins, to ensure pH changes do not occur. **Do not use tap water**, as not all water sources are pH neutral.
-

2. To make “positive germs” add ¼ teaspoon (~25 drops) of Sodium Carbonate standard solution to one cup (more if you have a large group). Place a small, inconspicuous mark on each of the “infected cups”, to be identifiable later.

3. Add stock Phenolphthalein solution to a dropper bottle for easier distribution.

Once participants arrive:

1. Pass out one cup to each participant, explaining that each represents an animal at an exhibition. Point out that each cup and the liquid inside looks the same. Discuss animal contact within a show setting, and then instruct students to exchange water (swap germs) with three other participants. To complete an exchange, the participant should pour their fluid into another participant’s cup, and then half should be poured back into the original cup. As students are exchanging germs, announce that an “X” amount animal(s) came to the show already infected with a respiratory disease. The “X” amount of animals will be equal to the amount of cups with Sodium Carbonate, AKA the “infected” cups.

2. As students finish swapping, ask if they can tell who is “infected” and how many additional animals they think may now be “infected”.

3. To determine whether each individual’s animal is “infected,” add up to 4 drops (~100ul) of phenolphthalein solution to each cup. If the liquid turns pink the animal is infected, if the liquid remains clear the animal is negative. Discuss how diseases spread within the animal population and allow participants time to figure out who started as “infected” by tracking their swapping partners. Confirm using the inconspicuous marks on the infected cups.

4. Pour liquid from all cups in disposal container and thoroughly wash and rinse cups, if you plan to reuse.

Activity Wrap-Up

- Discuss with the youth participants the possible multiplication effect of a disease that is spreading.
- What percentage of the population was infected with just two rounds of the germ swap activity? How much would that percentage increase with one more round?
- What is an epidemic? *An epidemic is the quick spread of infectious disease to a large number of people in a population within a short period of time.*
- What could be done to prevent the spread of the disease?

Source: Maine, One Health - Activity 2 Germ Swap

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Got Immunity?



Key Concept:

Disease transmission and control

Grade Level: 4–7

Education Subject: Science

Success Indicator:

After completing this lesson, learners will be able to:

- Describe and define the three ways that diseases spread.
- Describe the role of immunizations in disease prevention.

Materials and Methods

Preparation Time: 20 minutes

Lesson Time: 45 minutes

Space:

- Germ Keep Away Game: Any
- Immunity Challenge Game: Open field (such as an athletic field or gymnasium) or open classroom

Materials:

- Disease cards (equal numbers of the three cards, with enough total cards for half the learners)
- A hat or small container
- Bandanas (at least one per learner)
- Same-sized, lightweight balls or balloons (three to five per learner)

Instructions:

Preparation time:

1. Read through the activity and gather the supplies in the materials list. You may want to make a handout of the vocabulary list.
2. Photocopy, cut apart and fold over the disease cards. Put the cards in the hat or other small container.

Lesson time:

1. Tell the learners that this lesson is going to focus on how diseases are spread and how immunizations can help slow or prevent the spread of diseases. Ask them the following questions:

What makes disease spread through a group of animals?

What are some things that humans do to prevent the spread of disease?

2. **The Germ Keep Away Game.** Explain to the group that they'll be playing the Germ Keep Away Game, which demonstrates a few of the many ways that diseases spread. The game focuses on transmission by contact with:
 - Infected animals (touch).
 - Droplets in the air (air).
 - Insect bites (insect).
3. Divide the class into two groups: "diseases" and "animals."
4. Have each person in the disease group draw one disease card from the hat without showing it to anyone else.
5. Have the animal group huddle and decide on one tactic to prevent the spread of each mode of disease (such as quarantining animals that are sick to prevent infection from diseases that are spread by touch, providing adequate ventilation in barns to prevent infection from diseases that are spread by droplets in the air, and using flea and tick preventives to prevent infection from diseases that are spread by insect bites). Have the group develop a hand signal for each of the prevention measures that the members identify.
6. Next have the disease group spread out across the room. After they're settled, tell the animal group to walk around the diseases until you say "stop" — then they must move to the closest person in the disease group. If two or more members of the animal group are close to the same disease group member, have one of them move to someone else.

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Adapted from the 4-H Science Toolkit: Animal Science Lesson Plan series developed by Cornell Cooperative Extension, Ithaca, NY.

Vocabulary:

Antibody – A blood protein made by cells of the immune system to fight infection.

Antigen – A substance that, when introduced into the body, stimulates the production of an antibody.

Disease – An abnormal condition of an animal's body that causes it to function improperly. Rabies is one example of a serious disease that affects animals and humans. If animals and humans are not protected with a rabies vaccination and they are infected with the disease, they can die from it.

Immunity – A medical term that describes having strong enough biological defenses to prevent disease or infection.

Infection – The damaging growth of an invading organism. In an infection, the infecting organism lives and multiplies inside its host. The infecting organism is also called a pathogen.

Pathogen – Typically a microscopic organism, or germ. Types of pathogens include bacteria, parasites, fungi, viruses, prions and viroids.

Vaccine – Injection of a live, weakened or killed microbe into a human or animal to stimulate the person's or animal's immune system against the microbe, preventing disease. Vaccinations are also called immunizations.

Virus – Ultramicroscopic infectious agents that replicate themselves only within the cells of living hosts; many cause disease.

7. When each animal is paired with a disease, tell the learners that on the count of three, those with disease cards will reveal their cards and the animal learners will show one prevention sign. If the preventive measure the animal person is signaling is effective against the type of disease transmission of the person he or she is paired with, then the animal moves on to the next round. If the preventive measure is not effective against that type of disease transmission, then the animal gets sick and must sit out the next round.
8. Play until everyone gets sick! Then switch animals and diseases and play again.
9. After the second round, discuss with the group how an animal could develop immunity against various diseases (immunizations, developing natural antibodies either from being exposed to the disease and recovering, or from drinking its mother's milk).
10. The Immunity Challenge. Now tell the group they're going to play a game called "The Immunity Challenge," which demonstrates how vaccinations work in an animal's immune system. (For example, through the vaccination process, an animal can build up specific antibodies to help fight off certain diseases. Antibodies provide an animal with a level of protection, but booster shots and revaccination may be required, depending on the situation.)
11. Create boundaries for the play area that provide enough space for learners to escape the disease agents. Set up a veterinary clinic by placing bandanas in a box at one end of the field. On the sidelines at about midfield, scatter the balls or balloons.
12. Tell the group that the bandanas are the vaccinations and the balls are the antibodies. Select one or two learners for about every 10 players to be diseases. Send the remaining learners (the animals) to the opposite end of the field from the vet clinic.
13. Tell the animals that their goal is to avoid the diseases on their way to the vet clinic to receive a vaccination. Explain that if they make it to the vet clinic without being nabbed by a disease, they can tie a bandana around one arm to indicate they've been vaccinated. Once an animal has been vaccinated, it can begin to collect antibodies (the balls or balloons). An animal can collect as many antibodies as it can carry. Try to have at least two antibodies available per animal.
14. Point out that, while the animals are trying to make it to the vet clinic, the diseases will be trying to tag them. Animals who have not been vaccinated and are tagged by a disease must sit out (be quarantined) because they are now contagious. Animals that have been vaccinated and have collected antibodies can have those antibodies knocked away by diseases. (Note: Diseases may not carry antibodies.)

15. If a vaccinated animal loses all the antibodies it has collected, it must return to the vet clinic for a booster. A vaccinated animal that gets tagged when it has no antibodies must go into quarantine for 2 minutes.
16. After 10 or 15 minutes, stop the game and appoint new diseases. Try to end the game while everyone is still having fun.

Check for Understanding:

Bring the group back together and ask the following questions:

- ▶ What are the three ways that diseases spread?
- ▶ What does it mean if an animal is immune to a disease?
- ▶ How do vaccines protect animals?
- ▶ What are antibodies?

Learn More:

- ▶ National 4-H Council's Veterinary Science Helper's Guide: <http://www.4-hmall.org/Product/4-hcurriculum-veterinary-science/08051.aspx>.
- ▶ PAWSitively Youth: A Guidebook About Dogs for Community Outreach Leaders. (2008). D. Palmer, E. Noble and B. Wiesen. Ithaca, N.Y.: Natural Resource, Agriculture and Engineering Service. Online at nraes.org.
- ▶ U.S. Centers for Disease Control and Prevention's "Vaccines and Immunizations" section at <http://www.cdc.gov/vaccines/>.
- ▶ FAQ: Methods of disease transmission. (2007). Toronto, Canada: Mount Sinai Hospital, Department of Microbiology. Accessed from <http://microbiology.mtsinai.on.ca/faq/transmission.shtml>.
- ▶ Ebola – The Plague Fighters Classroom Activity. NOVA Teachers. (2004). Accessed from pbs.org/wgbh/nova/teachers/activities/2304_ebola.html.

Optional:

Visit with a veterinarian to learn more about the kinds of vaccines that are available to protect your favorite domestic animal.

Have the group simulate a disease outbreak in your town. Discuss what learners would do and where they would go to learn more if such an event occurred.

Michigan Grade Level Content Expectations:

Grades 4-7: Generate scientific questions based on observations (S.IP.04.12, S.IP.05.11, S.IP.06.11, S.IP.07.11); communicate and present/defend findings of observations and investigations (S.IA.04.13, S.IA.05.13, S.IA.06.13, S.IA.07.13).

Grade 4: Share ideas about science through purposeful conversation in collaborative groups (S.IA.04.12).

Grade 5-7: Evaluate data, claims and personal knowledge through collaborative science discourse (S.IA.05.12, S.IA.06.12, S.IA.07.12).

Disease Cards

Photocopy and cut apart these disease cards, then fold them in half so the words are hidden.



MEANS OF DISEASE TRANSMISSION: Touching an infected animal	MEANS OF DISEASE TRANSMISSION: Droplets in the air	MEANS OF DISEASE TRANSMISSION: Insect bite
MEANS OF DISEASE TRANSMISSION: Touching an infected animal	MEANS OF DISEASE TRANSMISSION: Droplets in the air	MEANS OF DISEASE TRANSMISSION: Insect bite
MEANS OF DISEASE TRANSMISSION: Touching an infected animal	MEANS OF DISEASE TRANSMISSION: Droplets in the air	MEANS OF DISEASE TRANSMISSION: Insect bite



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ZOONOSIS EDUCATION PROJECT FOR YOUTH IN AGRICULTURE

Activity Kit Contents

SECTION 4

Section 4 **Hand Washing**

1. Glo Germ Handwashing Demonstration
2. Painted Hands: Hand Sanitizer and PPE Glove Use
3. Hand Washing and Hand Sanitizer Use

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Glo Germ Handwashing Demonstration

ACTIVITY MATERIALS

- Glow Germ lotion
- UV black light
- Sink*
- Soap and water*

(* not included in the kit)

WORKING WITH GLO GERM

Glo Germ is a fantastic product which safely and graphically demonstrates to students and adults alike how germs are spread. Glo Germ consists of an odorless lotion (or powder) which glows brightly when exposed to ultraviolet light.

NOTE: A little bit of Glo Germ goes a long, long way! Apply it sparingly.

Objectives

- This activity will help demonstrate how germs spread.
- This activity will also help demonstrate how hands should be properly washed to reduce the spread of germs.

Background Information

Germs are present in many places. They can get on our hands through normal, everyday activities. Germs can be present in higher levels around animals or other people, especially animals or people that are sick. Cleaning your hands with soap and water is one of the most important steps you can take to avoid getting sick and spreading germs.

Proper Hand Washing Technique

Proper hand washing technique:

1. Wet your hands with clean running water (warm or cold) and apply soap.
2. Lather your hands by rubbing them together with the soap.
3. Scrub all surfaces of your hands, including the palms, backs, fingers, between your fingers, and under your nails. Keep scrubbing for at least 20 seconds. Need a timer? Hum the "Happy Birthday" song twice.
4. Rinse your hands under clean, running water.
5. Dry your hands using a clean towel or air dry them. Do not dry on clothes, which may be contaminated by germs!

About Glo Germ

Glo Germ™ is a product sold both in liquid and powder form that contains proven safe ingredients formulated to be the same size as bacteria, basically 5 microns in size. When used in either the powder or liquid-based form, with the use of an ultra-violet light, it simulates the spread of

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germs, teaching how quickly and broadly germs can be spread in a short period of time. (Source: www.glogerm.com)

Glo Germ lotion is applied like a typical hand lotion. Glo Germ lotion works well to demonstrate handwashing. The lotion form is generally easier for youth to apply. Glo Germ powder is more difficult to apply for handwashing demonstrations (very chalky). Glo Germ powder works well to demonstrate germ transmission by cross-contamination.

Conduct the Activity

Begin by engaging the youth participants in a discussion about the spread of disease. The following questions may be used to begin the discussion:

- How can illnesses spread from one individual to another?
- Have you ever gotten sick after you have been near another sick person?
- What is an epidemic? *An epidemic is the quick spread of infectious disease to a large number of people in a population within a short period of time.*
- What are some of the basic steps to staying healthy and not spreading illness?

Next, briefly explain to the youth participants that they are about to experience a visualization exercise that will simulate how germs spread. Explain how fluorescent materials are more visible under an ultra-violet (UV) light. Under normal light some fluorescent materials are hard to see with our eyes. Similarly, germs cannot be seen with our naked eyes (we use a microscope and coloring agents). Finally, describe how the fluorescent Glo Germ lotion will represent germs and the task of this activity is to get rid of all the “germs.”

Activity Part 1: Germ Transmission

1. Place a nickel size portion (about 5mL) of Glo Germ lotion into the palm of each youth participant.
 2. Instruct the youth to rub the lotion into their hands, being certain to cover the tops and bottoms of their hands. Instruct them to be sure to cover the finger tips and between their fingers.
 3. You can now explain that the lotion represents times when they get their hands dirty through coughing, sneezing, shaking hands, touching unclean things, and so forth. Can they see the “germs” on their hand? *No.*
 4. Next, turn off some of the lights to darken the room. Turning out the lights will help the UV flashlight to illuminate the germs better. *Note:* If turning some of the lights off is not an option, you can create a simple “disclosure center”, a cardboard box turned on its side to create a dark environment that allows the students to see the simulation germs on their hands without turning off the lights.
 5. Turn on the UV light to illuminate the “germs”. Wave the UV light over the participants’ hands or other areas they may have (i.e. counters, doorknobs, pencils or other areas where the participants’ hands may have touched). Explain how germs and other unclean particles are often invisible to the human eye just like the fluorescent Glo Germ lotion, but they still exist (hence they show up under the UV light).
-

Activity Part 2: Handwashing Test

1. Have the youth participants wash their hands at the sink and return to the classroom.
2. Once all of the participants have washed their hands, attempting to remove all of the simulation germs, gather them to check their hands again with the UV light.
3. Turn the lights off once again or have them line up at the disclosure center.
4. Turn on the UV light and have them show the palm and back of their hands. Show students that, although thorough cleaning attempts are made, germs and other unclean particles remain. The Glo Germ sticks on like germs. Pay particular attention to the back of their hands, between their fingers, and around their finger nails.
5. Review the proper handwashing technique from the *Background Information* section above with the participants.
6. Have the participants repeat the hand washing steps until all germs are gone and they have learned the proper technique to wash their hands.
7. Teach the following principles: Don't touch the edge of the sink once the hands have been washed. Use warm water that is not too hot or too cold. Regular soap is recommended just as much as antibacterial soap. Liquid soap may perform better. Dry their hands with a pre-prepared paper towel and then turn off the sink with the paper towel.

Activity Wrap-Up

Wrap-up by engaging the youth participants in a discussion about the importance of handwashing. The following questions may be used to begin the discussion:

- How can germs that cause illness spread from one individual to another?
- What important step to staying healthy and not spreading illness was demonstrated in this activity?
- Do you think you do a good job of washing your hands each time you wash? What do you need to do differently?
- Have you had any experiences where you have observed others not washing their hands, when they should have done so?
- Why would you need to thoroughly wash your hands after working with animals, touching their pens or cages, and handling their waste material?



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Painted Hands: Hand Sanitizer and PPE Glove Use

ACTIVITY MATERIALS

- Washable paint
- PPE gloves
- Sink*
- Soap and water*

(* not included in the kit)

WHAT IS "PPE"?

Personal protective equipment, commonly referred to as "PPE", is equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses.

Objectives

- This activity will help demonstrate how germs spread.
- This activity will help demonstrate how hands should be cleaned with an alcohol-based hand sanitizer to reduce the spread of germs.
- This activity will demonstrate the proper method to remove personal protective gloves from the hands.
- This activity can also be used to help demonstrate how hands should be properly washed to reduce the spread of germs.

Background Information

Proper Use of an Alcohol-based Hand Sanitizer

Germs are present in many places. They can get on our hands through normal, everyday activities. Germs can be present in higher levels around animals or other people, especially animals or people that are sick. Cleaning your hands with soap and water is one of the most important steps you can take to avoid getting sick and spreading germs. When soap and water is not available, alcohol-based hand sanitizers can be used to help kill germs on the skin that could cause illness.

An alcohol-based hand sanitizer that contains 60% alcohol should be used. To use, place enough sanitizer in your palm to cover all surfaces of your hands. Then rub your hands together until all surfaces have been covered by the sanitizer. Continue to rub until your hands feel dry. Do not rinse or wipe off the sanitizer before it is dry.

Note: Hand sanitizers will not work effectively on hands that are visibly dirty or greasy. (Source: www.cdc.gov)

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Proper Hand Washing Technique

Proper hand washing technique:

1. Wet your hands with clean running water (warm or cold) and apply soap.
2. Lather your hands by rubbing them together with the soap.
3. Scrub all surfaces of your hands, including the palms, backs, fingers, between your fingers, and under your nails. Keep scrubbing for at least 20 seconds. Need a timer? Hum the "Happy Birthday" song twice.
4. Rinse your hands under clean, running water.
5. Dry your hands using a clean towel or air dry them. Do not dry on clothes, which may be contaminated by germs!

Safe Removal of PPE Gloves

Personal protective equipment, commonly referred to as "PPE", is equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses. These injuries and illnesses may result from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. Personal protective equipment may include items such as gloves, safety glasses and shoes, earplugs or muffs, hard hats, respirators, or coveralls, vests and full body suits. (Source: www.osha.gov)

Individuals should follow recommended practices when putting on and removing all types of PPE. All PPE should be removed using procedures that will avoid contaminating personal clothing, skin and mucous membranes.

With regards to glove removal, it should be assumed the outside of the gloves are contaminated. Therefore, it is important to follow these steps recommended by the Centers for Disease Control and Prevention (CDC) for removing PPE gloves:

1. Using a gloved hand, grasp the palm area of the other gloved hand and peel off the first glove.
2. Hold the removed glove in the gloved hand.
3. Slide fingers of ungloved hand under the remaining glove at wrist and peel off the second glove over the first glove.
4. Discard gloves in a waste container.
5. If your hands get contaminated during glove removal, immediately wash your hands with soap and water or use an alcohol-based hand sanitizer.

For more information about how to properly put on and remove personal protective equipment, check out this CDC website: <https://www.cdc.gov/hai/prevent/ppe.html>.

Conduct the Activity

Briefly explain to the youth participants that they are about to experience two-part exercise that will first demonstrate how to properly use an alcohol-based sanitizer and second how to safely remove PPE gloves without contaminating their clothing or skin.

Activity Part 1: Use of Alcohol-based Hand Sanitizer

1. Have youth participants put on PPE gloves.
2. Place a nickel size portion (about 5mL) of washable paint into each youth participant's gloved palm. The paint simulates hand sanitizer.
3. Have the youth participants close their eyes and "clean" their hands with the paint, again, as if it was hand sanitizer.
4. When finished "cleaning" their hands, participants open their eyes. They will see which areas of their hands they missed. Did the participants cover the tops and bottoms of their hands? How about the finger tips and between fingers? Point out that spots on the back of their hands and between their fingers need to be covered with sanitizer as well. Review the proper technique for applying an alcohol-based hand sanitizer.
5. Have youth participants keep their gloves on for Part 2 of this activity. Remind them to hold their hands up and in front of them, being careful not to touch objects in the room, their clothing or skin (especially their eyes and nose), and other participants.

Activity Part 2: Safe Removal of PPE Gloves

Next, we can use the paint-covered gloves to simulate glove that have been infected with germs. The paint now represents germs. Continue to remind the youth participants to hold their hands up and in front of them, being careful not to touch objects in the room, their clothing or skin (especially their eyes and nose), and other participants. Remember the paint now represents germs, and they don't want to spread the germs.

1. Ask the participants for ideas about how they could safely remove the contaminated gloves.
2. Following the discussion, have one or two youth participants try to demonstrate how to remove the gloves without contaminating their clothes or skin.
3. Review the recommended glove removal technique described in the *Background Information* above.
4. Ask the remaining participants to remove their gloves, following the recommended technique.
5. And then, check to see if anyone has been contaminated, as shown by paint on their hands.
6. If anyone has been contaminated, they should wash their hands with soap and water.
7. Additional teaching point: gloves can be torn or punctured, exposing the skin underneath!

Activity Wrap-Up

Wrap-up by engaging the youth participants in a discussion about the spread of disease. The following questions may be used to begin the discussion:

- How can germs that cause illness spread from one individual to another?
 - Have you ever gotten sick after you have been near another sick person?
 - What is an epidemic? *An epidemic is the quick spread of infectious disease to a large number of people in a population within a short period of time.*
 - What are some of the basic steps to staying healthy and not spreading illness?
 - Do you think you do a good job of washing your hands each time you wash? What do you need to do differently?
 - Have you had any experiences where you have observed others not washing their hands, when they should have done so?
-

Handwashing and Hand Sanitizer Use

at Home, at Play, and Out and About



Germ is everywhere! They can get onto hands and items we touch during daily activities and make you sick. Cleaning hands at key times with soap and water or hand sanitizer is one of the most important steps you can take to avoid getting sick and spreading germs to those around you.

There are important differences between washing hands with soap and water and cleaning them with hand sanitizer. For example, alcohol-based hand sanitizers don't kill ALL types of germs, such as a stomach bug called norovirus, some parasites, and *Clostridium difficile*, which causes severe diarrhea. Hand sanitizers also may not remove harmful chemicals, such as pesticides and heavy metals like lead. Handwashing reduces the amounts of all types of germs, pesticides, and metals on hands. Knowing when to clean your hands and which method to use will give you the best chance of preventing sickness.

When should I use?

Soap and Water

- Before, during, and after preparing food
- Before eating food
- Before and after caring for someone who is sick
- Before and after treating a cut or wound
- After using the bathroom, changing diapers, or cleaning up a child who has used the bathroom
- After blowing your nose, coughing, or sneezing
- After touching an animal, animal food or treats, animal cages, or animal waste
- After touching garbage
- If your hands are visibly dirty or greasy

Alcohol-Based Hand Sanitizer

- Before and after visiting a friend or a loved one in a hospital or nursing home, unless the person is sick with *Clostridium difficile* (if so, use soap and water to wash hands).
- If soap and water are not available, use an alcohol-based hand sanitizer that contains at least 60% alcohol, and wash with soap and water as soon as you can.

* Do **NOT** use hand sanitizer if your hands are visibly dirty or greasy: for example, after gardening, playing outdoors, or after fishing or camping (unless a handwashing station is not available). Wash your hands with soap and water instead.



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How should I use?

Soap and Water

- **Wet** your hands with clean running water (warm or cold) and apply soap.
- **Lather** your hands by rubbing them together with the soap.
- **Scrub** all surfaces of your hands, including the palms, backs, fingers, between your fingers, and under your nails. Keep scrubbing for 20 seconds. Need a timer? Hum the “Happy Birthday” song twice.
- **Rinse** your hands under clean, running water.
- **Dry** your hands using a clean towel or air dry them.



Alcohol-Based Hand Sanitizer

Use an alcohol-based hand sanitizer that contains at least 60% alcohol. Supervise young children when they use hand sanitizer to prevent swallowing alcohol, especially in schools and childcare facilities.

- **Apply.** Put enough product on hands to cover all surfaces.
- **Rub** hands together, until hands feel dry. This should take around 20 seconds.

Note: Do not rinse or wipe off the hand sanitizer before it's dry; it may not work as well against germs.



For more information, visit the CDC handwashing website, www.cdc.gov/handwashing.



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ZOONOSIS EDUCATION PROJECT FOR YOUTH IN AGRICULTURE

Activity Kit Contents

SECTION 5

Section 5 **Biosecurity**

1. Down and Dirty with Biosecurity
2. Biosecurity Lessons
 - Develop a Simple Biosecurity Plan
 - Internal and External Biosecurity Measures
 - Spreading Disease One Touch at A time
3. Building on Biosecurity, Reducing the Risk
4. Basis of Biosecurity

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Down and Dirty with Biosecurity



GOAL STATEMENT:

Students will gain an understanding of biosecurity and develop a biosecurity plan for a hypothetical livestock production facility.

OBJECTIVES:

- Students will define biosecurity.
- Students will make personal connections between biosecurity practices that keep farms safe and security measures that keep them safe in their everyday lives.
- Students will research steps that producers can take to maximize biosecurity.
- Students will create a biosecurity plan for a hypothetical farm and share their ideas with the class.

REQUIRED MATERIALS:

- Healthy/unhealthy animal photographs (printed copies or projected) and teacher key
- Copies of "One Minute Mysteries" worksheet (1 per student)
- Copies of "Biosecurity for Livestock Facilities" worksheet (1 per student)
- "Hypothetical Livestock Production Facility Scenarios" printed with scenarios cut apart
- Markers, colored pencils, etc.
- Chart paper or poster board

AMOUNT OF TIME TO ALLOW:

70 minutes. Extension activities will take additional time.

Background Information



From viruses to bacteria, coccidia to fungi, diseases can be a problem. For this reason, it is important for facilities like schools and even farms to have a plan in place that details how the spread of disease will be prevented. This set of guidelines is called a biosecurity plan. **Biosecurity** is the sum all the management strategies a site practices to reduce the risk that **pathogens** — disease-causing organisms — will spread to that site.

In schools, hand sanitizer is available for use, cafeterias follow strict food safety guidelines, and janitors clean regularly. Just like schools, farms must also implement practices that prevent disease. Disease can spread to people and animals through contaminated food, water, housing, equipment, and air. Some diseases — called **zoonotic diseases** — can spread between people and animals. Modern biosecurity techniques are a key element in disease control, providing a safer and healthier environment for livestock.

Since each farm is different, there is no “one size fits all” biosecurity plan. Biosecurity is a way of thinking as well as the adoption of a set of practices. Farm owners, managers, and employees must all follow the biosecurity plan to prevent the introduction of new pathogens into a herd and limit the spread of established pathogens within a herd.

Engagement

20 minutes



Ask students to define the term “biosecurity” as it relates to people and schools. Have students brainstorm ways we keep ourselves safe from disease in school (i.e. washing hands, cooking food thoroughly) and write them on the board. Next, ask students to apply the ideas they generated to a farm setting. What biosecurity practices may be used on farms to keep livestock safe from disease? Record student ideas on the board.

Divide students into groups and discuss the picture cards showing healthy and unhealthy animals. Once students have examined the photos, ask them to discuss the following questions within their groups:

- How can you tell if an animal is healthy or unhealthy?
- How are diseases spread? List as many ways as you can think of.
- What actions can we take to prevent the spread of disease?

Make a list of student ideas; these will be useful as the students create their biosecurity plans later. You may use the true/false activity provided at the end of this lesson to prompt discussion and help students generate more ideas.

Exploration

25 minutes



1. Distribute copies of the “One Minute Mysteries” worksheet and have students complete the worksheet within their groups. If time permits, discuss each scenario as a class. Ensure that students have a basic understanding of how to diagnose biosecurity problems and generate strategies to remedy them before proceeding.
2. Provide each group with one of the hypothetical livestock production facility scenarios and distribute copies of the “Biosecurity for Livestock Facilities” worksheet. Explain that each group will create a biosecurity plan that will prevent disease from coming onto their farm and ensure that their livestock remain healthy. The questions on the worksheet are designed to help students think through their scenarios and develop their biosecurity plans.
3. Provide groups with poster board and markers or other materials to create a graphic representation of their plan. Instruct students that their illustration should show at least 5 critical points where diseases could spread and at least 5 strategies they will implement to prevent the spread of disease.
4. When students have finished illustrating their plans, have them complete the conclusion and analysis questions on the worksheet.

Explanation

20 minutes



Have each group present an overview of their plan to the class. For each presentation, ask students which parts of their plan are most important for creating a secure environment and why.

Lead a discussion of the importance of biosecurity on farms from both ethical and business perspectives. Livestock producers have an ethical responsibility to keep their animals safe, and diseased animals cost producers money. Diseased animals reduce profits because of increased mortality, reduced performance, and increased medication costs.

Extension



Contact a local large-scale livestock operation, preferably poultry or swine if available. Ask the owner or manager to share their biosecurity plan and how they developed it.

Interview a local large animal veterinarian about biosecurity practices he or she implements.

Have students brainstorm biosecurity practices they could implement to keep their pets safe from infectious diseases.



Career Connections



- **Government Animal Health Specialist** — This person works for the U.S. Department of Agriculture (USDA) or Maryland Department of Agriculture (MDA) checking animals for signs of disease and dealing with disease outbreaks.
- **Farm Manager** — This person oversees the management of a farm and makes decisions about when, where, and how to house, feed, breed, harvest, treat, and otherwise care for the animals.
- **Large Animal Veterinarian or Vet Technician** — This person diagnoses, treats, and helps prevent disease in livestock animals.

Evaluation



Student understanding can be evaluated through class discussion or assessment of completed activity data sheets. The following questions may also be used to evaluate student learning.

1. List three biosecurity practices a farm might use to protect the health of its animals.
2. Imagine you are a farmer speaking to a group of customers who have never heard of biosecurity. Explain why you practice biosecurity on your farm.
3. List the steps a farm owner or manager would take to diagnose and correct a biosecurity problem.

References



“Poultry Facility Biosecurity.” John B. Carey, J. Fred Prochaska, Joan S. Jeffrey. Texas Agricultural Extension Service, The Texas A&M University System. <<http://posc.tamu.edu/wp-content/uploads/sites/20/2012/08/l-51821.pdf>>.

“Security Guide for Pork Producers.” National Biosecurity Center for Animal Health Emergencies. <<http://old.pork.org/filelibrary/biosecurity/securitybook.pdf>>.

United States Department of Agriculture, Animal and Plant Health Inspection Service, <<https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information>>. [Choose species in the right-hand menu; each species page has a link for biosecurity information.]

Down and Dirty with Biosecurity



True/False Activity

Have students stand in a central part of the room. Assign one area of the room as the “true” area and another of the room as the “false” area. Read each statement and have students move to the area of the room that reflects their answer. Ask students to share why they chose the answer they did.

- **It is a good idea to wash your hands after you pet your friend’s cat before you pet your own.**
(True — Your friend’s cat could have an unknown illness that you would not want to transfer from cat to cat. It is a good health practice to wash your hands anytime after you pet an animal.)
- **When you bring a new dog home, it is okay for it to drink out of the same water bowl as your other dog.**
(False — The new dog may have an illness that you are not yet aware of, and the water bowl could transmit the pathogen.)
- **If you notice your dog has been acting like it might be sick, it is still okay to take him to the dog park.**
(False — Your dog could spread disease (even if it is only showing beginning signs of a disease) through the air or by coming in contact with an object or another dog.)
- **If a new animal looks healthy, and its previous owner said it was healthy, there’s no need to quarantine it (keep it separate from other animals for a period of time).**
(False — Infected/diseased animals can look perfectly healthy before signs of illness are present. It is ALWAYS a good idea to keep new animals away from other animals for a period of time.)
- **When introducing a new animal into a herd, it is important to separate that animal from other animals (quarantine) on the farm.**
(True — A quarantine period is a good opportunity to make sure the animal does not have any conditions that you were unaware of before you introduce the animal to the rest of the herd.)
- **Because bottle jaw (the hard swelling under the jaw of goats) is not contagious, it is not important to separate animals who have it from animals that do not.**
(False — Bottle jaw is caused by internal parasites or worms, which are contagious. The goat’s caretaker should deworm all of the goats that may have come in contact with the parasite and separate the affected goats until they are no longer ill).
- **Sore mouth is a disease that only affects a sheep’s mouth.**
(False — Sore mouth can be transmitted to other body parts that come in contact with the sores and can even be transmitted to humans.)





One Minute Mysteries

Read the following scenarios and determine what went wrong and how it could have been prevented. (HINT: more than one thing may be wrong.) Make some notes about each scenario, and discuss with your group.

1. Max owns a large horse barn and often hosts shows. Although Max requires all visiting horses to be up to date on their shots, he normally does not check their paperwork. In fact, Max knows some of his friends' horses aren't up to date, but he trusts that his friends make sure their horses are healthy before they take them anywhere. Max also loans out his horse trailer to whoever needs it. They don't even need to clean it when they're done using it! He notices that his horses seem to be getting sick more often than they did before he hosted shows.
2. Lexi likes to walk her neighbors' dogs on the weekends to earn some extra money. To save time, she often walks more than one at a time. She carries one portable water bowl for them on hot days, and since they all get along well, they drink out of the same bowl. One of the dogs she walked had a runny nose, but she assumed that it was just allergies and walked the dog as usual. A few days later, all of the dogs she walks are sick.
3. Taylor owns two horses that live in a pasture by her house. They are the only horses in the area, and they never travel. However, Taylor takes lessons on horses at a different barn and often rides her friends' horses. She wears the same boots wherever she rides. She has one set of brushes and tack that she uses on whichever horse she is riding. She only cleans the brushes when they are really dirty. Out of the blue, her normally healthy horses are coughing and have runny eyes.



Down and Dirty with Biosecurity



Hypothetical Livestock Production Facility Scenarios

Cut apart these scenarios to distribute to student groups.

You operate a poultry farm that contracts with a large-scale integrated chicken processing company. (The chicken company pays you to grow their birds in chicken houses on your farm.) Your farm has three chicken houses and receives regular health inspections from the company.

You have a small alpaca farm that focuses on selling fiber for crafts and breeding stock. You have frequent visitors to the farm who come to buy your fiber products and tour the farm.

You have a small pig operation with around 80 breeding sows (females). Your facility is in a very rural area and is more than 30 years old.

You operate a dairy farm, milking approximately 200 cows daily. There are not many outside visitors, except for daily visits from the milk hauler, your 5 employees, and occasional visits from the veterinarian, hoof trimmer, milk inspector, and salespeople.

You own and operate a beef farm of about 200 cattle. The cattle are in a rotational grazing pattern where they spend most of their time outside. You sell animals for breeding and also buy calves every spring that you feed through the summer and resell in the fall.

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Down and Dirty with Biosecurity



Name: _____

Date: _____ Period: _____

Biosecurity for Livestock Facilities

1. List at least 5 ways diseases could be brought onto your farm. Be specific.

2. What strategies will you implement to prevent disease from coming onto your farm? Be sure to address each point that you listed in question 1.

3. What is the most important part of your biosecurity plan? Why?

4. What does "biosecurity" mean?

5. Why do livestock producers need to keep their animals healthy?

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Biosecurity

Sarah D. Baker, Extension Educator

Goal (learning objective)

Youth will:

- Learn the definition of biosecurity
- Learn how to create a biosecurity plan
- Learn the differences between external and internal biosecurity procedures

Supplies

- Handout 1, “How to Develop a Simple Biosecurity Plan”. Make the appropriate number of copies for your group
- Handout 2, “Internal and External Biosecurity Worksheet”. Make the appropriate number of copies for your group
- Handout 3, “Did you know?” Make the appropriate number of copies for your group
- Handout 4, “Internal and External Biosecurity Worksheet Questions” Make the appropriate number of copies for your group
- Pens or Pencils (enough for group)

Pre-lesson preparation

Background information:

Quality Assurance: Market livestock projects bring new responsibilities for 4-H youth. Members are providing a product for consumers to eat. Consumers will choose to buy, not to buy, a product from their perception of the value of that product. If your product (steak, roast, etc.) wasn’t “good”, the consumer will not purchase it again. What would happen to a business if no one purchased its products again? This pertains to you as a livestock producer, or producer of food. When quality is high, consumers will buy your product again. Livestock products must be safe, wholesome, and produced in a way that meets consumer approval.

Who is in charge of quality assurance in the livestock industry? When you feed a steer, sheep, pig or goat and sell it in the Livestock Sale at the fair, who is responsible for assuring that the meat eaten by the consumer is a high-quality and safe product? The retailer? The packer? The member? The breeder? Everyone involved in the livestock industry is obligated to do their part to provide a safe, wholesome, and quality product to the consumer.

Biosecurity: Biosecurity is a combination of management practices designed to prevent the introduction and transmission of diseases and disease-causing agents into a herd. The goal of biosecurity is to prevent, minimize, or control cross-contamination of body fluids (feces, urine, saliva, etc) between animals, between animals to feed and between animals to equipment that may directly or indirectly contact animals.

Biosecurity can be either external or internal. External biosecurity is keeping diseases out of a herd, whereas internal biosecurity is keeping diseases already in one more segments of the herd from

spreading to other segments. However, all biosecurity measures should be focused on the prevention of the entry of unwanted diseases!

Maintaining a biosecurity program is the cheapest, most effective means to control disease, and no disease prevention program will be effective without it.

According to the National Beef Quality Assurance Program (NCBA, 2012), implementation of a good biosecurity program should focus on the following:

- Controlling disease within the herd
 - Vaccinate the herd against all endemic diseases
 - Use low stress management for movement and processing
 - Isolate sick animals
 - Maintain a closed herd, if possible
 - Purchase feed from reputable sources
 - Minimize fence line contact with neighboring animals
 - Do not place cattle of different ages in the same pen
 - Keep records of all disease occurrences
- Purchasing replacement animals
 - Quarantine all new animals for 30-60 days
 - Test new animals for disease
 - Purchase animals from healthy and reputable herds
- Environmental and pest control
 - Provide human foot baths at entrances and exits of confinement facilities
 - Provide timely manure and dead animal removal
 - Keep grounds and feed bunks as dry as possible
 - Have an insect control program in practice
 - Have a rodent control program
- Disinfection
 - Clean and remove as much organic material as possible, before disinfecting
 - Choose a disinfectant that will work against the pathogen you want to control
 - Be aware of any toxic, harmful or corrosive effects of the disinfectant
 - Follow the label on the disinfectant package
- Visitors
 - Minimize the number of visitors to the facility and their contact with animals
 - Be sure all visitors have clean clothing/coveralls, boots, and hands
 - Be sure all vehicles or equipment brought on the farm are disinfected
 - Do not allow foreign visitors on the farm until they have been in the country for 5 days. Do not allow foreign visitors to bring clothing, foods, or accessories they have had in another country onto the farm
- Employees
 - Be sure all employees understand and follow the biosecurity protocol
 - Realize that employee owned animals (horses, dogs, etc) can be a possible source of contamination to your facility.

These statements can be applied to swine, as well as sheep and goats.

Conducting the activity (DO)**Activity 1 - Developing a Biosecurity Plan**

1. Distribute Handout 1 “How to Develop a Simple Biosecurity Plan”
2. Have youth share the definition of biosecurity
3. Lead a discussion by asking the following questions (have members write answers on the worksheet):
 - a. What are possible diseases that your animal may come into contact with?
 - b. What is the critical control point or monitoring location for that possible disease?
 - c. What is the corrective action needed to stop or prevent the spread of the potential disease?
 - d. What records should you keep to implement your biosecurity plan?
4. Each biosecurity plan should have the following:
 - a. List of possible diseases
 - b. List of critical control points
 - c. List of methods of protection or corrective action
 - d. List of records to be kept
5. Have members share their plan with others.

Activity 2 - Internal & External Biosecurity Measures

1. Distribute Handout 2 “Internal & External Biosecurity Worksheet”
2. Distribute Handout 3 “Did you know?”

3. Have members volunteer to read out loud the information on both handouts.
4. Discuss the examples.
5. Distribute Handout 4 “Internal & External Biosecurity Worksheet Questions”.
6. Have members provide examples of internal and external biosecurity measures and complete the table on the worksheet.
7. Encourage members to share examples with others in the group.

Activity 3- Spreading Disease One Touch at a Time

Adapted from Dr. Susan Kerr, WSU Extension, What Goes Around Comes Around Biosecurity Activity.

1. Mark off an area that will contain the entire group. Use rope, chairs or land marks to make boundaries.
2. Have the group assemble themselves inside the boundary. There should be enough room so that everyone can move around freely and not bump into each other too much.
3. Have participants raise both hands above their heads.
4. Choose one participant to be the ‘disease carrier’. Make sure the participant is identifiable (wearing a certain color shirt, or have them carry something to identify themselves as the ‘carrier’).
5. The ‘carrier’ will enter the boundary and wander around randomly. Each time the ‘carrier’ touches a member of the group member, that member drops one arm. If a member is touched twice by the ‘carrier’, they must stop moving around and stand still. Each participant standing still represents a sick individual.
6. The activity continues until all participants within the boundary are sick or the time available has run out (the concept will become apparent within 5-10 minutes).

7. Ask participants the following questions:

- a. What did they see happening?
- b. How is this activity similar to what happens when an animal carrying a disease is introduced into a herd?
- c. Why should we be concerned about biosecurity and animal health?
- d. Are there any similarities between disease transmission amongst animals and disease transmission amongst humans (i.e. catching a cold at school)?
- e. How can they reduce the risk of contracting a disease (cold) at school? Is this the same for animals?

What did we learn? (REFLECT)

- Ask: What is your definition of biosecurity?
- Ask: What is the difference between external and internal biosecurity?
- Ask: How is animal biosecurity similar to keeping ourselves healthy?

Why is that important? (APPLY)

- Ask: Why is it important to prevent diseases rather than treat them? Costs?
- Ask: Do you let your friends borrow your supplies at the Fair (brushes, water buckets, etc.)? Why or why not?
- Ask: Can you spread a disease from your animal to your friend's animal?
- Ask: Evaluating quality assurance of your project is something like looking into a mirror - reflect on your project for a moment. Do you like what you see? More importantly, will the person who purchases your animal like it?

Resources

- Beef Quality Assurance. (2010). National BQA Manual (pages 14-15).
- Kerr, S. (2015). Biosecurity Activity: What Goes Around Comes Around. Washington State University Extension. <http://vetextension.wsu.edu/wp-content/uploads/sites/8/2015/05/Biosecurity-Activity-What-Goes-Around-Comes-Around1.pdf>
- National 4-H Council. (2005). Beef Helper's Guide. National 4-H Curriculum. BU-08146 (page 17).
- National Cattlemen's Beef Association. (2010).
- Ohio State University Extension. (2011). Management Practices. *Beef resource handbook* (page 12-2 through 12-5).
- Ohio State University Extension. (2008). Caring for Animals. *Goat resource handbook* (pages 159-163).
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- Ohio State University Extension. (2000). Quality, Caring for Animals, and Swine Resources. *Swine resource handbook for market and breeding projects* (pages 4-1, 24-1 through 24-4, and Resources 3)
- Pork.org. (2014). Establish and Implement an Effective Health Management Plan. *Youth Pork Quality Assurance Plus Handbook Version 2.0*. Chapter 2 (pages 27-39). <http://old.pork.org/filelibrary/youthpqa/plus/2014/ypqahandbook.pdf>

How to Develop a Simple Biosecurity Plan

*Adapted from: Youth Beef Quality Assurance Program Manual for the Pacific Northwest, PNW 593.
Chapter 5. Biosecurity. Page 32.*

1. Conduct a disease potential analysis.

- a. Develop a list of possible diseases that your animal(s) may come into contact with. For example, possible diseases may include ringworm, lice, pneumonia, or foot rot, etc.

2. Determine monitoring locations/critical control points.

- a. Critical control points (CCP) are places at which control or prevention can be applied and are essential to prevent, eliminate, or reduce a disease. The identification of CCP is important in controlling the spread of a disease. An example of a CCP may include the receiving area for new livestock, fence line, feed bunk, or water tank.

3. Prevent disease spread.

- a. The goal of a biosecurity plan is to keep the disease agent from entering and spreading among the herd. Protection may be done in a variety of methods depending on the CCP. For example: increasing immunity of the herd, isolating new animals, quarantining sick animals, using disinfectants, and/or cleaning equipment or clothing. Producers need to determine at each CCP what the correct mode of action is. These actions also need to be understood by all workers within the operation.

4. Record keeping.

- a. Keep records of what was done to facilities and animals. Examples of records may include animal identification, vaccinations given, medications given, visitors, and date of facility cleaning.

Biosecurity Table 1. Examples of monitoring locations, causes of disease spread, and corrective actions.

From: Youth Beef Quality Assurance Program Manual for the Pacific Northwest, PNW 593, Chapter 5. Biosecurity. Page 30.

Monitoring locations/CCP	Disease & Mode of spread	Corrective action
Fence line	Entry of stray animals Entry of people / visitors Example: respiratory and reproductive diseases	- Maintain fences to keep out strays and unknown animals. - Establish fences, gates, signs to stop and inform people.
Facility entrance	Visitors, clothes, footwear Example: foot-and-mouth disease	- Allow public to enter designated areas away from livestock. Restrict visitors who have been out of the US in the past two weeks. - Provide protective covers for footwear or on-farm boots and/or on-farm coveralls.
Barn/Receiving pen for newly arrived animals	Animal carrying disease Example: respiratory diseases, lice	- Isolate for 3-4 weeks. - Know status of herd of origin.
Vehicles – cars, trucks, motorbikes, and trailers Parking lot	Manure on or in vehicle (including tires & undercarriage) Example: <i>E.coli</i> , <i>Salmonella</i> , enterotoxaemia.	- Restrict vehicles to public area only. - Wash vehicle and tires.
Farm personnel	Clothes, footwear Example: <i>E.coli</i> , <i>Salmonella</i>	Wear boots, clothes or coveralls specific for this farm only.
Raw feed products and standing water in pen/pasture	Contaminated feed and water Example: <i>BSE</i> , beef measles, liver flukes, foot rot	- Don't feed ruminant-derived protein. - Remove standing water. - Keep dogs, cats, rodents and wildlife out of feed and feeding areas.
Feed bunks and water tanks	Personnel Contaminated feed and water Example: beef measles, <i>Salmonella</i> and <i>E. coli</i>	Provide clean feed, clean out water source often, and provide restrooms for personnel,
Manure/bedding pile	Contaminated manure in feed and water Example: <i>E.coli</i> , flies	Use separate tractor bucket to move feed than manure. Don't apply lagoon water to hay or grazing areas.
Equipment box/tack room	Brushes, combs, etc. Example: ringworm, lice	Clean equipment.
Pastures/common allotments	Animals Example: brucellosis, leptospirosis, BVD	Vaccinate.
Squeeze chute Clip chute	Needles and equipment Example: anaplasmosis	Exchange needles and clean equipment.

Use Table 1 above to help fill in the following blanks to make your own Biosecurity Plan for your livestock animal:

BIOSECURITY PLAN

(insert your name)

- What are possible diseases that your animal may come into contact with?
 - *Examples: Blackleg, Brucellosis, BSE, BVD, Enterotoxaemia, Flies, Foot Rot, Lice, Liver Fluke, Trichomoniasis, Ringworm, Warts, Other?*

- What is the critical control point or monitoring location for that possible disease?
 - *Examples: Feed bunk/pan, water tank, fence line, barn, squeeze/clip chute, manure pile, pasture, vehicles, equipment box, other?*

- What is the corrective action needed to stop or prevent the spread of the potential disease?
 - *Examples: Vaccinations, isolating new animals, quarantining sick animals, using disinfectants, cleaning equipment, wear clean clothing, feed proper and clean feed, cleaning feed storage area, clean water, other?*

- What records should you keep to implement your biosecurity plan (attach records to this plan)?
 - *Examples: vaccinations given, date equipment was cleaned, etc.*

QUALITY ASSURANCE: BIOSECURITY – HANDOUT 2

Internal and External Biosecurity Worksheet

Adapted from: Establish and Implement an Efficient and Effective Health Management Plan. Youth Pork Quality Assurance Plus Handbook Version 2.0. Chapter 2. Pages 30-32.

External Biosecurity:

- Control wildlife and pests to prevent contact with your animal(s) by including the use of perimeter fencing and bird screening.
- When contemplating the purchase of new animals, ask your veterinarian to discuss the health maintenance program you should start when the new animals get to your home.
- When possible, establish an isolation facility for quarantining new animals at your home that is remote and/or isolated from the existing herd. During the quarantine period, observe and test for diseases, vaccinate, medicate, and acclimate the new animal as recommended by your veterinarian
- Limit the number of visitors to your facility and minimize their contact with your animals. Question visitors about recent contact with other animals.
- Consider supplying disposable plastic boots to all visitors. Require everyone to at least wash hands, before entry to animal areas.
- Change clothes and boots after visiting other farms, livestock markets, or fairs.
- Limit use of equipment and tools, including scales, to those that have been cleaned and disinfected if they have been used on another farm or ranch.
- Clean and disinfect your truck and trailer after each use.

Internal Biosecurity:

- Work with your veterinarian to periodically survey your animals for different disease challenges.
- When possible, operate all-in/all-out (AIAO) with cleaning and disinfecting between groups of animals.
- Establish a traffic pattern for both animals and people that prevents exposure of younger animals to older animals, their manure or people who have recently been in contact with them.
- Develop a routine check of all equipment and have an emergency plan for feed and water delivery.
- Provide dedicated boots and coveralls at strategic sites in the pen. Wash hands when boots and coveralls are changed. Because boot disinfection is sometimes difficult, disposable boots may be better if regular boots cannot be dedicated to a single site.

Did You Know?

Adapted from: National Beef Quality Assurance Program Manual, page 15

Infectious Disease can be spread by:

- The introduction of diseased animals or healthy animals incubating a disease.
- Introduction of healthy animals who have recovered from disease but are now carriers
- Vehicles, equipment, clothing, and shoes of visitors or employees who move between herds.
- Contact with inanimate objects that are contaminated with disease organisms.
- Carcasses of dead livestock that have not been disposed of properly.
- Feedstuffs, especially high risk feedstuffs which could be contaminated with feces.
- Contaminated water (surface drainage water, etc.)
- Manure handling and aerosolized manure and dust.
- Non-livestock (horses, dogs, cats, coyotes, raccoons, other wildlife, rodents, birds, and insects).

QUALITY ASSURANCE: BIOSECURITY – HANDOUT 4

Internal and External Biosecurity Worksheet Questions:

Adapted from: Establish and Implement an Efficient and Effective Health Management Plan. Youth Pork Quality Assurance Plus Handbook Version 2.0. Chapter 2. Pages 30-32.

Name an example of External Biosecurity: *Isolation of new animals to test for unwanted diseases that are not already in your herd.*

Name an example of Internal Biosecurity: *Stopping the movement or cross-fostering of baby piglets that have diarrhea.*

Read the description below and identify the statement as an internal or external biosecurity measure:

Biosecurity Measure	External	Internal
Locate new animals away from livestock herds and major transportation routes		
Work with your veterinarian to regularly survey your animals for different diseases challenges		
Control wildlife and pests to prevent contact with your animal(s).		
Establish an isolation facility for quarantining new animals to your home, farm, or ranch.		
Operate all-in/all-out with cleaning and disinfecting between groups of animals.		
Limit the number of visitors to your facility.		
Establish a traffic pattern for both animals and people that prevents exposure of younger animals to older animals, their manure, or people who have recently been in contact with them.		
Develop a routine check of all equipment and have an emergency plan for feed and water delivery.		
Minimize visitors' contact with your animals.		
Supply disposable plastic boots to all visitors.		
Change clothes and boots after visiting other farms, livestock markets, or Fairs.		
Wash hands when boots and coveralls are changed.		
Use disposable boots if regular boots cannot be dedicated to a single site at your home, farm, or ranch.		
Limit use of equipment and tools to those that have been cleaned and disinfected if they have been used on another farm or ranch.		
Clean and disinfect your truck and trailer after each use.		

Building on Biosecurity: Reducing the Risk



Skill Level:

- Beginner to intermediate

Life Skills:

- Problem solving, critical thinking and disease prevention

Setting:

- An outdoor or indoor space that is out of the wind, has flat work surfaces, and where participants can easily hear; seating is optional

Time:

- 15–20 minutes

Materials:

- ☐ Clock, stopwatch or other timer
- ☐ Flipchart or other large paper
- ☐ Markers
- ☐ Easel or display space
- ☐ Pathogen Packages (one per person or small group)
 - 2 dinner-sized disposable plates with sturdy, slightly raised sides, or 2 pie tins
 - About 1 cup flour or similar substance
 - 1 spoonful brown sugar or similar substance that would be visible against the flour
 - 1 or 2 bite-sized, wrapped chocolate bars
 - 5 or 6 small, flat pieces of candy (such as Smarties, SweetARTS or StarBurst)
 - 6 or 7 fruit-flavored gummy candies
- ☐ Trash bags
- ☐ Disposable spoons (one per person)
- ☐ “The Biosecurity CHIP: Basics of Biosecurity” resource sheet (one per person, optional)

(Volunteer Caution: Check for wheat and other grain-related allergies, celiac disease and gluten intolerance among your group members before preparing the “Pathogen Packages.” Don’t include flour made from wheat or certain other grains if anyone in your group is allergic to or has other problems with them. For more information about food allergies, visit the Food Allergy Research and Education website at foodallergy.org.

To create nonedible Pathogen Packages, replace the edible pieces with inedible objects of roughly the same shape and size.)

Overview:

In the *Building on Biosecurity* lesson, participants will learn how to evaluate the biosecurity risks in the housing and overall environment of their own 4-H project animal and discuss how to reduce those risks. They’ll visually and physically inspect and then decontaminate a “Pathogen Package,” which represents an animal environment filled with biosecurity risks.

Volunteer Note: We suggest that you introduce the topic of biosecurity to your group with the 4-H Animal Science Anywhere activity called *Basics of Biosecurity* (Michigan 4-H Youth Development, 2014). In it, participants learn about the Biosecurity CHIP (cleanliness, history, isolation, proper management practices), a series of biosecurity measures they can take to reduce the risk of their animals getting sick.

Objectives:

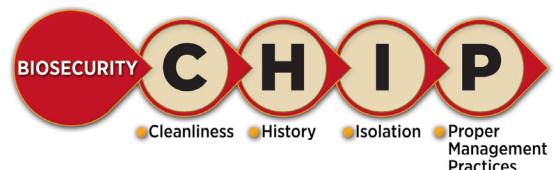
After completing this activity, participants will be able to:

- Describe three animal disease prevention strategies.
- Explain why it’s important for animal agriculture operations to consistently practice appropriate biosecurity measures.
- Evaluate animal housing situations and identify the biosecurity risks in and around them.
- List at least four methods for reducing biosecurity risks in an animal operation.

PROCEDURE:

Before the meeting:

1. Review the *Basics of Biosecurity* lesson (online at http://msue.anr.msu.edu/uploads/236/65684/4H1661_AnimalScienceAnywhere-Biosecurity.pdf) to refresh your memory about the basic biosecurity principles presented in it.





Examples of “Pathogen Packages.”

2. Review this lesson and gather any supplies you will need. (**Note:** It’s okay to substitute supplies you have on hand for those mentioned in the “Pathogen Packages” material list. You may want to adapt the “What’s on the plate” chart that follows to reflect any substitutions you’ve made so it’s easier for you to review it with the group during the meeting.)
3. If you distributed “The Biosecurity CHIP: Basics of Biosecurity” resource sheet to your group as part of the *Basics of Biosecurity* lesson, you could simply review the key concepts from the resource sheet with the group. If you didn’t distribute it during the earlier lesson, you may want to print enough copies to share it with your group during this lesson.
4. Decide whether you’ll have the participants work individually or in two- or three-person teams, then prepare the appropriate number of “Pathogen Packages.” Start by placing one spoonful of brown sugar in the center of a base plate for each kit. Next distribute the following items, representing biosecurity hazards or risks, randomly on each base plate.
 - 6 or 7 fruit-flavored gummy candies
 - 1 or 2 bite-sized, wrapped chocolate bars
 - 5 or 6 small, flat pieces of candy

Note: Each “Pathogen Package” should wind up with about 15 biosecurity risks (counting all of the brown sugar as one item and not counting the flour and plate).

5. Now dump about one cup of flour onto each base plate to hide most or all of the items on it, then put the second, empty plate on top as a lid. Depending on the ages of your group members and whether your meeting space is outdoors and windy or indoors and carpeted, it might be a good idea to secure the lids in place with tape or rubber bands to reduce the risk of flour spills. Move the completed “Pathogen Packages” to a table or other flat surface at the front of your meeting space.
6. (Optional) Print an enlarged copy of the “What’s in the Pathogen Package?” table that follows or recreate it on flipchart paper. If you do print or recreate the table, display it where everyone can see it, but keep it covered until the appropriate point in the lesson.

Table 1. What's in the Pathogen Package?

Item	What it represents	Biosecurity risk it poses	Biosecurity measures to reduce that risk
Plate and flour	The project animals' overall environment, such as barns, trailers, stalls and pens, lots and pastures (including any bedding), paddocks and pastures (including grass).	Can harbor disease-causing pathogens that can transfer to animals if not cleaned carefully or rotated properly (pasture).	► Clean and disinfect animal facilities thoroughly before new animals arrive ► Quarantine new animals for at least 21 days. ► Rotate pastures or paddocks on a set schedule.
Brown sugar	The equipment that project animals come into contact with, such as brushes, clippers, show sticks, blankets, halters, feed buckets and pans, and water troughs.	Can carry disease-causing pathogens from one animal to another if not cleaned carefully between uses.	► Avoid sharing equipment between farms, barns, pens or animals. ► Disinfect any equipment that must be shared before it changes locations or animals. ► Disinfect all equipment (including trailers) when returning from off-farm events like fairs, shows, sales and exhibitions.
Bite-sized, wrapped chocolate bars	People – both visitors and those who live or work on the farm – who haven't followed proper biosecurity measures.	Animals can get sick from pathogens that are airborne or carried on equipment and clothing, and that are in the animals' environment. People can also carry pathogens that spread to other people and animals.	► Establish and enforce strict clothing and footwear rules for everyone who visits the animal facilities, such as: • Everyone must wash hands with soap and water or use alcohol-based hand sanitizer before entering and after leaving the animal care area. • All visitors must wear disposable plastic footwear, footwear covers or footwear that they wear only on your farm. • Consider disposable coveralls or having visitors bring a change of clothing that they wear only on your farm. • Everyone who lives or works on the farm must wear clothing and footwear that is either clean or worn only in the animal area. • Everyone who lives or works on the farm must disinfect footwear when moving from one animal facility to another. ► Limit the number of visitors to your farm.
Small, flat, unwrapped pieces of candy	Wild and domestic animals and insects that aren't supposed to be in the animal facility, such as birds, mice, ticks, mites, deer, raccoons, cats, and dogs.	Wild and domestic animal visitors can bring in pathogens and can pick up and spread pathogens from contact with the facilities, equipment, feed and water supplies, from fecal matter, and from the project animals themselves.	► Store animal feed in covered containers to reduce the risk of contamination by pest animals. ► Clean and disinfect automatic waterers, water tanks and troughs regularly. ► Follow appropriate pest management practices to reduce the number of rodents, flies and other insects in the animal facility. ► Install and maintain fences of the right size and type to reduce wildlife access to animal pastures, buildings, stalls and pens.
Fruit-flavored gummy candies	► Trash such as empty feed bags, empty product packaging, baler twine, contaminated animal feed, beverage containers, food wrappers, and outdated feed supplements and other products. ► Misplaced and surplus equipment.	► Trash that isn't picked up and stored properly provides food for wildlife, insects and other pests that can harbor and spread pathogens. ► Misplaced and surplus equipment left in animal facilities can cause accidental injuries to animals and people. Equipment in the wrong place can provide housing for wildlife, insects and other pests.	► Pick up and store trash in closed containers until it can be taken to a landfill. Keep trash cans away from animal feed storage areas. ► Store equipment in proper locations to limit risk of accidental injury and harboring additional undesired wildlife.

During the meeting:

1. Introduce the activity by reading aloud or paraphrasing the following:

Nearly every animal and human gets sick at some point. Illnesses caused by pathogens (disease-causing viruses, bacteria, fungus and other organisms) can spread quickly through a herd or flock, or from animal to human or human to animal. Some pathogens travel through the air (after a sneeze, for example) and some travel from pen to pen or even farm to farm on people's shoes or on the tools or equipment they move from one site to another.

While it's impossible to remove absolutely every biosecurity hazard from your animals' environment, you can greatly reduce these hazards. The management practices you follow to help prevent the spread of pathogens and keep your animals healthy are called biosecurity measures.

Today we're going to talk about how to identify biosecurity risks in your 4-H project animals' environment and about some of the biosecurity measures you can follow to reduce the biosecurity risks for your own and any other animals you interact with. We'll start by examining a "Pathogen Package" that represents some of the common biosecurity risks in a 4-H project animals' environment.

2. Ask participants to name one biosecurity risk that might exist in a 4-H project animal's environment. Record their answers on flipchart paper and display the paper where everyone can see it. (Examples include humans – whether visitors or animal caretakers – who carry germs into the animal's environment on their shoes, clothes, skin or hair; wild animals and domestic dogs and cats; equipment that is brought in from another animal's environment without being disinfected first; pathogens carried on the wind; trash; misplaced equipment and supplies.)
3. Divide the group into two-or three-person teams or have participants work alone (depending on the size of your group and the number of "Pathogen

Packages" you've prepared). Have each person or team pick up a Pathogen Package and take it to a location where they can work. Have participants leave the lids on their Pathogen Packages after they reach their work location and not touch or move the plates or their contents.

4. Tell the group that when you give the signal, you want them to take the lids off of their Pathogen Packages. They'll then have 1 minute to examine the contents of the package **without touching or intentionally moving anything in or on it**. Keep track of the time (or have a volunteer do it for you) and monitor the participants to make sure they aren't touching the Pathogen Packages during their inspection.
5. When the minute is up, draw the participants' attention back to you, then read aloud or paraphrase the following:

You've just spent a minute visually examining your Pathogen Packages. Now we're going to review what you've seen in them so far.

First, the plates represent your 4-H project animals' environment. That includes the barns, stalls, feedlots, paddocks, pastures, cages, crates and trailers that your animals would commonly be housed or transported in. Second, the flour on the plate represents the bedding in the housing areas, and the grass and other items that are continuously around your animal.

In an ideal biosecurity situation, the housing, bedding material and forage might be the only things in your project animals' environment. That's rarely the case though, and it's not the case in the Pathogen Packages in front of you.

So, did any of you see anything more than the plate and flour during your visual inspection? (A few participants may have seen wrapped and unwrapped candy, fruit-flavored gummy candies or brown sugar [though they may not have recognized the brown specks as brown sugar], while others may have seen only the plate and flour.)

You may not have seen anything but the plate and flour during this first, visual inspection of the environment represented by your Pathogen Package. If you went home right now and inspected your 4-H project animals' environment, you might not see many obvious biosecurity risks there, either. But I can guarantee that there are potential biosecurity risks here in your Pathogen Packages – about 15 of them – and I'll bet there are some in your project animals' environments, too. When you've trained yourself to look more closely for them, you can plan and follow the biosecurity measures that will reduce their potential to harm your animals and you. We're going to start that training right now.

You've already done a preliminary visual inspection of your Pathogen Package. In a moment, I'm going to pass out utensils you can use to conduct a physical inspection. You'll have about 4 minutes to sift through the flour and decontaminate it by moving any foreign objects you find to the collection area using only your spoon – no hands! (The collection area is the plate that was serving as the lid of your Pathogen Package.)

Remember that pathogens and other biosecurity risks can be hard to find because they can be very, very small. So you'll need to keep a sharp eye out for one tiny risk in particular. You'll also need to be careful to keep the animals' environment livable. In this case that means you'll need to keep the flour on the original plate.

6. Give each participant a spoon. Then tell the group to start the physical inspection and decontamination of their Pathogen Packages. Walk around and answer any questions the participants may have as they work. Give them a 1-minute warning when time is running out.
7. When time is up or the participants seem to have finished sifting through the flour, ask them following questions:

- What were some of the things you found? (*Bite-sized chocolate bars, unwrapped candies, brown sugar – or just brown specks if they couldn't identify the specks as sugar, gummy candies*)
 - Were you able to identify all of the biosecurity risks in your Pathogen Package and completely decontaminate it by removing all of those risks? Why? (*Most teams will probably answer that they could identify but not remove all of the biosecurity risks because the brown sugar or brown specks were too small to separate from the flour.*)
 - What was the most challenging part? (*Keeping the flour on the plate, sorting the tiny brown sugar or brown specks out of the flour, not eating the candy.*)
8. If no one has mentioned the brown sugar yet, ask the participants whether they saw any tiny brown specks in the flour and if they did, whether they were able to remove them. If anyone says they managed to remove the brown sugar, ask them to explain to the rest of the group how they did it.
 9. If you have time and if the participants seem to want to, give the group another couple of minutes to work on sorting out the brown sugar. Otherwise, read aloud or paraphrase the following:

People who raise animals aren't the only ones who have to be concerned about pathogens and other biosecurity risks. We all need to be aware of the environment and the biosecurity risks around us and take precautions to avoid exposure to pathogens – even the ones we can't see without a microscope. To make things even more complicated, most pathogens reproduce quickly, so we can't inspect, clean and disinfect our environment once and be done. We have to practice biosecurity measures consistently and continually to keep humans and animals safe and healthy.

Now let's talk about what each item you removed from your Pathogen Package represents in the real world, the biosecurity risks associated with it and the biosecurity measures you can take to reduce those risks.

10. Use Table 1 to guide a group discussion about the contents of the Pathogen Packages (including the plate and flour) and the biosecurity risks and biosecurity measures associated with them.

11. Read aloud or paraphrase the following:

By now you may be thinking that nearly everything in an animal housing facility can be a biosecurity risk. And you're right. That's why it's so important for us to carefully inspect our facilities and then implement the appropriate biosecurity measures related to what we find to help reduce the risk of spreading diseases. We need to inspect:

- ***Animal housing and pasture areas***
- ***Feed storage and delivery systems***
- ***Automatic waterers, water tanks, water buckets and water troughs***
- ***Animal handling equipment (both the everyday and show equipment)***
- ***Products we use with and around our animals, such as healthcare-related products***

We also need to be on the lookout for items that are misplaced or improperly stored in animal housing areas, whether accidentally or on purpose, because of the biosecurity risks they pose. Remember to also practice biosecurity measures in places where your animals tend to spend only a short time, such as trailers and crates. Those areas can also be contaminated and should be inspected, cleaned and disinfected regularly.

12. Remind the group that taking steps to reduce health risks and improve animal care is a great biosecurity practice, then ask for volunteers to name some biosecurity measures that haven't been mentioned yet that animal producers could follow to help reduce disease risks. Record their answers on flipchart paper and display the sheet where everyone can see it. A variety of measures that you could work into the discussion follow:

- Check your animals frequently for signs of sickness or injury.

- Isolate any sick animals and care for them after you've taken care of the healthy animals.
- Separate new animals from each other and from resident animals for 21 to 30 days, if possible.
- Don't wear or store barn boots inside the house.
- Wear different shoes or boots at the fair than you do around your own barn.
- Ask health-related questions about any animals you're considering buying or bringing onto your property before you do so.
- Disinfect any shared equipment between animals.
- Require all visitors to wear disposable boots or shoe covers you provide.
- Require visitors to disinfect their vehicle tires when they arrive at your farm or to park as far away from the animal facilities as possible.
- Create and post copies of an emergency contact sheet in every building and animal facility on your farm that includes contact information for:
 - Local police, fire, ambulance and other emergency services
 - Your local veterinarian
 - Your family (home, work, and cellphone numbers)
 - An emergency contact who doesn't live on your farm
- Maintain sound animal care and management practices such as the following good production practices described in *Youth Pork Quality Assurance Handbook* (Pork Checkoff, 2013), including:
 - Develop an appropriate Veterinarian/Client/Patient Relationship (VCPR) as the basis for medication decision-making.
 - Establish and implement an efficient and effective health management plan.
 - Use antibiotics responsibly.
 - Properly store and administer animal health products.
 - Follow proper feed processing protocols.
 - Establish effective animal identification practices, medication records and withdrawal times.
 - Practice good environmental stewardship.
 - Maintain proper workplace safety.
 - Provide proper animal care to improve animal well-being.
 - Use tools for continuous improvement.

Consider also putting these practices into place:

- Make sure that the rations you're feeding are meeting your animals' nutrient requirements.
- Provide easy access to plenty of fresh, clean water.
- Ensure that your animals' housing facilities are well-ventilated, but not drafty.
- Protect your animals from extreme weather.
- Use the *Michigan 4-H Animal Treatment Record Sheet* to track when animals have received veterinary treatment (http://msue.anr.msu.edu/uploads/236/71492/MI_Animal_Treatment_Record_Book_revised_2.pdf).

13. To summarize, read aloud or paraphrase the following:

Although we can never fully prevent human and animal illness, consistent attention to biosecurity measures will help reduce disease risks, and can also benefit your financial bottom line as a producer. You're part of the agriculture industry, and your efforts to keep your animals healthy ultimately help ensure the safety of our entire food supply.

Keep in mind what we learned from the Biosecurity CHIP diagram, noting the cleanliness, history, isolation and proper management practices that are so important in keeping our animals healthy.

14. (Optional) Distribute the "Biosecurity CHIP: Basics of Biosecurity" resource sheet and encourage the participants to take it home and review it occasionally as a refresher about sound biosecurity practices to follow.

ADAPTATIONS & EXTENSIONS:

For older or more experienced participants:

- Have participants brainstorm a list of ways that they can help reduce risk at the local fair or other animal-related events. Then have them research and prepare a presentation on the topic that they could share with the fair board or 4-H livestock or specie-specific council.
- Challenge teen leaders to travel to younger participants' barns to help them identify ways that they can reduce biosecurity risks. Have the teens help younger members choose one biosecurity practice and work to keep it up throughout the 4-H year.

For younger or less experienced participants:

- Tell the participants before they start searching exactly how many of each item they are looking for in their Pathogen Packages.
- Include fewer pathogen items in the Pathogen Packages. Also consider leaving out the brown sugar or using brown sugar that has dried out and is clumpier so that participants can sort it out of the flour more easily.
- Help participants come up with a creative song, slogan or catchphrase about keeping themselves and their animals safe. For example, a poster could feature a photo or drawing of a pig and be captioned "Be healthy around animals. People and animals can share germs."

TALKING IT OVER:

Ask the group the following questions.

- What steps can you put into place to reduce risks and improve the biosecurity of your 4-H project animals?
- What biosecurity practices can you help put into place at local fairs or other animal-related community events you attend or participate in?
- How can you help reduce risk of animal disease and harm in your community?
- Why is it important for humans to consider animal well-being and health as they plan their own actions and activities related to and around animals?

ALIGNMENT TO SCIENCE & ENGINEERING PRACTICES:

How 4-H Increases Science Literacy

Nationally and in Michigan, 4-H has long enjoyed a reputation for engaging young people in positive, experiential (hands-on), and nonformal activities that are inquiry based. The activities in the *4-H Animal Science Anywhere* series can be used to enhance classroom science education. The activities are aligned with the eight Scientific and Engineering Practices from *A Framework for K-12 Science Education* (National Research Council, 2012, p. 42).

The activities in *4-H Animal Science Anywhere: Building on Biosecurity* were evaluated for their alignment with the Science and Engineering practices by Michigan State University (MSU) Extension Educator Tracy D'Augustino in 2016.

Table 2. How This Lesson Aligns With the Science and Engineering Practices (National Research Council, 2012, p. 42)

Science & Engineering Practices	Action	Activity Step
▶ Asking questions (for science) and defining problems (for engineering)	▶ Participants define the problem – how to decontaminate the area (the plate). ▶ Participants discuss ways to reduce biosecurity risks.	2, 4, 5 10–12
▶ Developing and using models	▶ Participants explain how the model (plate) connects to animal environments. ▶ Participants discuss the limits of their models – the items not included that represent biosecurity risks.	7, 8, 10 10
▶ Planning and carrying out investigations	Participants carry out the investigation – decontaminating the environment.	6–9
▶ Analyzing and interpreting data	Participants look at and discuss how the different items affect biosecurity.	10
▶ Using mathematics and computational thinking	Not applicable.	NA
▶ Constructing explanations (for science) and designing solutions (for engineering)	Participants explain why and how different items represent a biosecurity risk.	10
▶ Engaging in argument from evidence	Participants discuss different environments (such as barns, fairs and livestock pens) and determine ways to reduce biosecurity risks in them.	11–12
▶ Obtaining, evaluating, and communicating information	Participants gather evidence using the model and additional resources and determine ways to reduce risk, then share that information.	9, 10, 12

REFERENCES & RESOURCES:

References

- American Association of Swine Veterinarians & National Pork Board. (2013). *A champions guide to youth swine exhibition: Biosecurity & your pig project*. Des Moines, IA: National Pork Board. Retrieved from <http://porkcdn.s3.amazonaws.com/sites/all/files/documents/NPB%20A%20Champions%20Guide%20to%20Youth%20Swine%20Exhibition.pdf>
- Michigan 4-H Youth Development. (2014). *4-H animal science anywhere: Basics of biosecurity* [4H1661]. East Lansing: Michigan State University, MSU Extension. Retrieved from http://msue.anr.msu.edu/uploads/236/65684/4H1661_AnimalScienceAnywhere-Biosecurity.pdf
- National Research Council. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas*. Washington, DC: National Academies Press.
- Pork Checkoff. (2013). *Youth pork quality assurance plus handbook* (version 2.0). Des Moines, IA: National Pork Board. Retrieved from <http://porkcdn.s3.amazonaws.com/sites/all/files/documents/YouthPQAPlus/2014/YPQAhandbook.pdf>

Resources

Visit these online resources for more information about biosecurity.

Michigan Department of Agriculture and Rural Development

(michigan.gov/mdard/) –

- *Backyard biosecurity – Dr. Nancy Barr, MDARD*. (2015). Retrieved from <https://www.youtube.com/watch?v=BDnWRQynY2w>
- *Fair biosecurity recommendations*. (n.d.) Retrieved from http://michigan.gov/documents/mdard/Resource_2_-_Fair_Biosecurity_Recommendations_449295_7.pdf
- *Generally accepted agricultural and management practices for the care of farm animals*. (2015). Retrieved from http://michigan.gov/documents/mdard/2015_CARE_OF_FARM_ANIMALS_GAAMPs_480521_7.pdf
- *2016 exhibit requirements for livestock exhibited in Michigan*. (2016). Retrieved from http://michigan.gov/mdard/0,4610,7-125-1571_7075---,00.html

Resources, continued

Michigan State University Extension (msue.anr.msu.edu) – MSU Extension offers a variety of resources on biosecurity and animal health. Selected MSU Extension resources related to animal health and biosecurity follow.

- ▶ *Be a zoonotic disease detective* (2014, 4H1671, adapted from Georgia 4-H). Retrieved from http://msue.anr.msu.edu/uploads/236/60789/MI_4-H_Zoonotics-WEB.pdf
- ▶ *Biosecurity sign for visitors*. (n.d.). Retrieved from http://msue.anr.msu.edu/uploads/235/63481/biosecure_sign_lg.pdf
- ▶ *What if we could see germs?* (2013). Retrieved from http://msue.anr.msu.edu/news/what_if_we_could_see_germs

Animal and Plant Health Inspection Service (<https://www.aphis.usda.gov/wps/portal/aphis/home>) – APHIS is a division of the U.S. Department of Agriculture. The APHIS website explains: “Our Mission - To protect the health and value of American agriculture and natural resources. The Animal and Plant Health Inspection Service is a multi-faceted Agency with a broad mission area that includes protecting and promoting U.S. agricultural health, regulating genetically engineered organisms, administering the Animal Welfare Act and carrying out wildlife damage management activities. These efforts support the overall mission of USDA, which is to protect and promote food, agriculture, natural resources and related issues.” Selected APHIS resources related to animal biosecurity follow.

- ▶ *Biosecurity: Protecting your livestock and poultry*. (2007). Retrieved from https://www.aphis.usda.gov/publications/animal_health/content/printable_version/fs_bio_sec_07.pdf
- ▶ *Biosecurity tips for horse owners*. (2014). Retrieved from https://www.aphis.usda.gov/publications/animal_health/2014/fsc_equine_biosecurity.pdf
- ▶ *Biosecurity – Biosecurity principles*. (2013). Retrieved from https://www.aphis.usda.gov/animal_health/emergency_management/downloads/ed_materials/bio_principles_handout.pdf

Center for Food Security and Public Health (<http://www.cfsph.iastate.edu/>) – The center is located at the Iowa State University College of Veterinary Medicine and according to the website, is supported “through grants and cooperative agreements from federal and state governments and industry and nonprofit organizations.” The organization provides a variety of print, online and video resources for veterinarians, agriculture producers and the public. They also offer PDF files (at http://www.cfsph.iastate.edu/Infection_Control/Sign/index.php) of signs and visitors information on a variety of biosecurity-related signs that can be printed, laminated and posted around the farm.

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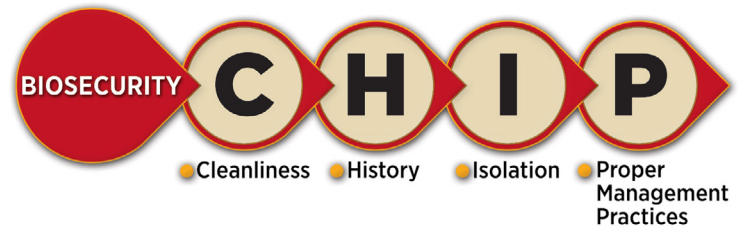
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The Biosecurity CHIP

Biosecurity related to animal and human interactions is broken down into four basic principles. One way you can remember these principles is by thinking of the word “CHIP.”



“C” is for **cleanliness**.

Cleanliness starts with keeping both your animals and the equipment you use on and around them clean. Sharing grooming equipment is one of the most common ways that pathogens spread, because their surfaces can be easily contaminated with hair, dander and other debris. Avoid sharing equipment with others at shows or other animal events without properly cleaning it between animals (for example, by soaking it in a 6-percent bleach solution, then rinsing it thoroughly). If your animals will be sharing equipment such as trailers and feed and water buckets, make sure the items are safe, are clean and have been recently disinfected before using them.

Human health and personal hygiene are also part of the cleanliness step of biosecurity. Ringworm, *E. coli*, salmonella and other pathogens can pass from animals to humans and humans to animals. Wash your hands with soap and water after handling animals, and keep your clothing and shoes clean to help prevent the spread of pathogens.

“H” is for **history**.

Ask questions about any animals you’re considering buying before you purchase them. The first step in disease prevention is to be as familiar as possible with the general animal health and management practices of the operation you’re buying from. Knowing the diseases that animals have been vaccinated against is another way to prevent a variety of pathogens and be more prepared for future health concerns. Again, don’t be afraid to ask questions! They’ll save you time and money in the long run.

Check with all visitors to your farm to see if they have traveled to an area that may be infected with a pathogen that could spread to you or your animals (for example, foot and mouth disease is still a problem in the United Kingdom).

“I” is for **isolation**.

When new animals arrive on your farm, keep them separate from other animals for at least 14 days, and if possible, 30 days. This helps reduce the number of animals that would get sick if a newcomer brought a contagious disease into your facility. When returning from a show or other off-farm event, initially keep the returning animals separate to avoid passing along any infections they may have been exposed to.

Keep your clothes and shoes or boots separate, too. Don’t wear the same boots you wear in your barn to a show or fair, if possible. Diseases like the deadly Porcine Epidemic Diarrhea virus (PEDv) are spread via fecal matter, and shoes and boots are the most common carriers of manure, and therefore, the pathogen. Consider drawing a line that no barn shoes are allowed to cross to help avoid such contamination.

“P” is for **proper management practices**.

Proper animal management practices include observing your animals for signs of sickness, conducting appropriate vaccination programs and providing proper animal nutrition.

Controlling visitors’ access to areas where your animals are housed and often travel is another important management practice. Be sure that your own and all visitors’ shoes and boots are clean before and after visiting any farm. If you’re not sure visitors’ shoes and boots are clean, requiring everyone to wear disposable plastic boots that you provide is a good biosecurity safeguard. Some pathogens can also travel on clothes and on humans, so take extra precautions if there is an animal disease outbreak in your area or anywhere you or your animals are traveling.



Healthy Animals | Healthy YOUTH



HEALTHY ANIMALS | HEALTHY YOUTH
ZONOOSES EDUCATION PROJECT FOR YOUTH IN AGRICULTURE

Activity Kit Contents

SECTION 6

Section 6 **Antimicrobial Resistance**

University programs, activities, and facilities are available to all without regard to race, color, sex, gender identity or expression, sexual orientation, marital status, age, national origin, political affiliation, physical or mental disability, religion, protected veteran status, genetic information, personal appearance, or any other legally protected class.

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MARYLAND
Department of Health



West Virginia University
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Healthy Animals | Healthy YOUTH



HEALTHY ANIMALS | HEALTHY YOUTH

ZOONOSIS EDUCATION PROJECT FOR YOUTH IN AGRICULTURE

Activity Kit Contents

SECTION 7

Section 7 Animal Health Checks

1. MDA Equine Self Certification Form
2. MDA Livestock Self Certification Form
3. MDA Poultry Self Certification Form
4. MDA Rabbit Self Certification Form

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EXTENSION



MARYLAND
Department of Health



West Virginia University
EXTENSION SERVICE



Equine Exhibitor's Self Certification of Animal Health

I, the undersigned, hereby verify the following:

(Parent or guardian must sign for children under age 18)

1. I am the **owner/authorized caretaker/transporter** (*circle as applicable*) of the equine identified on the current, valid, "Equine Infectious Anemia" (Coggins) document.
2. I understand that any equine showing any signs of or having recent exposure to, contagious or infectious disease are not permitted to enter the fair/show premises. These conditions include but are not limited to the following:
 - ☐ SKIN: Visible evidence of skin infections (*bacterial or fungal*) with particular emphasis on *ringworm*.
 - ☐ HEAD: Discharge from the eyes or nose which is excessive in amount or opaque (yellow or white in color) as opposed to the normal clear nasal discharge commonly seen after exercise.
 - ☐ RESPIRATORY: Signs of infectious respiratory disease such as fever, coughing, labored breathing, increased respiratory rate and nasal discharge. Animals originating from premises where there is current infectious respiratory disease and animals with any known exposure to infectious respiratory disease shall be ineligible to show for a minimum of 21 days after exposure. Infectious respiratory disease shall include but not be limited to *Influenza, Rhinopneumonitis, and Strangles*.
 - ☐ INTestinal: Evidence of diarrhea which is watery and/or persistent in nature and more profuse than a looser stool which could be attributed to diet or nervousness.
 - ☐ FEET: Horses exhibiting any type of unsoundness are already excluded from showing by the rules governing horse for shows.
 - ☐ OTHER: Recent exposure to, or clinical signs of, any contagious or infectious disease conditions that would exclude equine from exhibition.
3. I have read and understand the above guidelines.
4. I have visually examined the equine I am presenting for exhibit.
5. I agree not to present for exhibition any equine showing any signs of contagious or infectious disease, or having any known recent (21 days) exposure to any contagious or infectious disease.

Date of inspection: _____ Number inspected _____ Signature _____

Printed Name _____ Event _____

(Parent or guardian must sign for children under age 18)

Date of inspection: _____ Number inspected _____ Signature _____

Printed Name _____ Event _____

(Parent or guardian must sign for children under age 18)

Date of inspection: _____ Number inspected _____ Signature _____

Printed Name _____ Event _____

(Parent or guardian must sign for children under age 18)

Date of inspection: _____ Number inspected _____ Signature _____

Printed Name _____ Event _____

(Parent or guardian must sign for children under age 18)



Livestock Exhibitor's Self Certification of Animal Health

I, the undersigned, hereby verify the following:

(Parent or guardian must sign for children under age 18)

1. I am the **owner/authorized caretaker/transporter** (*circle as applicable*) of the animal(s) identified on the current, valid, "Certificate of Veterinary Inspection" (CVI) document.
2. I understand that animals showing any signs of, or having recent exposure to, contagious or infectious disease are not permitted to enter the fair/show premises. These conditions include but are not limited to the following:
 - ☐ SKIN: Visible evidence of skin infections such as **ringworm, warts, mange, lice, and club lamb fungus.**
 - ☐ HEAD: Discharge from the eyes or nose or evidence of **soremouth, pinkeye, atrophic rhinitis, caseous lymphadenitis.**
 - ☐ RESPIRATORY: Infectious respiratory disease (**pneumonia**)
 - ☐ INTESTINAL: Diarrhea
 - ☐ FEET: Contagious hoof infections such as **footrot.** Exhibition of lame animals is discouraged.
 - ☐ OTHER: Recent exposure to, or clinical signs of, any contagious or infectious disease conditions that would exclude livestock from exhibition.
3. I have read and understand the above guidelines.
4. I have visually examined the animals I am presenting for exhibit.
5. I agree not to present for exhibition animals showing any signs of contagious or infectious disease, or having any known recent (21 day) exposure to any contagious or infectious disease.

Date of inspection: _____ Number inspected _____ Signature _____
Printed Name _____ Event _____
(Parent or guardian must sign for children under age 18)

Date of inspection: _____ Number inspected _____ Signature _____
Printed Name _____ Event _____
(Parent or guardian must sign for children under age 18)

Date of inspection: _____ Number inspected _____ Signature _____
Printed Name _____ Event _____
(Parent or guardian must sign for children under age 18)

Date of inspection: _____ Number inspected _____ Signature _____
Printed Name _____ Event _____
(Parent or guardian must sign for children under age 18)

Date of inspection: _____ Number inspected _____ Signature _____
Printed Name _____ Event _____
(Parent or guardian must sign for children under age 18)

Date of inspection: _____ Number inspected _____ Signature _____
Printed Name _____ Event _____
(Parent or guardian must sign for children under age 18)

Date of inspection: _____ Number inspected _____ Signature _____
Printed Name _____ Event _____
(Parent or guardian must sign for children under age 18)



Poultry Exhibitor's Self Certification of Animal Health

Name of Owner: _____

Address: _____

Telephone Number: _____

I, the undersigned, hereby verify the following:

(Parent or guardian must sign for children under age 18)

1. I am the **owner/authorized caretaker/transporter** (*circle as applicable*) of the poultry identified on this form.
2. I understand that poultry showing any signs of, or having recent exposure to (within 21 days), contagious or infectious disease are not permitted to enter the fair/show premises. These conditions include but are not limited to the following:
 - ☐ FEATHERS: No signs of loss of feather, feather picked, soiled hackle feathers or evidence of egg clusters commonly caused by ***Lice or Mites***.
 - ☐ HEAD: No signs of swelling or puffiness on the head. No watery, large or swollen eyes and or crust on the eye lids commonly caused by ***Mycoplasma or Fowl pox***.
 - ☐ RESPIRATORY: No signs of infectious respiratory diseases such as nasal discharge, rattling cough or distressed breathing commonly caused by ***Infectious Bronchitis or Laryngotracheitis***.
 - ☐ INTESTINAL: No evidence of pasted vents, chalk-white feces or internal parasites consistent with ***Diarrhea***.
 - ☐ OTHER: NO unusual mortality in the last 30 days.
3. I have read and understand the above guidelines.
4. I have visually examined the poultry I am presenting for exhibit.
5. I agree not to present for exhibition poultry showing any signs of contagious or infectious disease.

#	Band #	Series of Band #	Age	Sex	Breed
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Date of inspection: _____ Number inspected _____ Signature _____

Printed Name _____ Event _____

(Parent or guardian must sign for children under age 18)



Rabbit Exhibitor's Self Certification of Animal Health

Name of Owner: _____

Address: _____

Telephone Number: _____

I, the undersigned, hereby verify the following:

(Parent or guardian must sign for children under age 18)

1. I am the **owner/authorized caretaker/transporter** (*circle as applicable*) of the rabbit(s) identified on this form, have been visually examined.
2. I understand that rabbits showing any signs of, or having recent exposure to (within 21 days), contagious or infectious disease are not permitted to enter the fair/show premises. These conditions include but are not limited to the following:
 - ☐ SKIN & HEAD: No visible evidence of skin infections, discharge for the eyes or nose or excessive head shaking with particular emphasis on ***Ear mites, Fur mites, Myxomatosis, and Ringworm.***
 - ☐ REPRODUCTIVE: No signs of sexually transmitted diseases with particular emphasis on ***Syphilis.***
 - ☐ RESPIRATORY: No signs of infectious respiratory disease such as sneezing, white nasal discharge or excessive tearing which are all common signs of ***Snuffles.***
 - ☐ INTESTINAL: No evidence of soft droppings, soiling on rump or hocks consistent with ***Diarrhea.***
 - ☐ OTHER: Recent exposure to, or clinical signs of, any contagious or infectious disease conditions that would exclude rabbits from exhibition. ***Viral Hemorrhagic Disease (VHD)***
3. I have read and understand the above guidelines.
4. I have visually examined the animals I am presenting for exhibit.
5. I agree not to present for exhibition rabbits showing any signs of contagious or infectious disease.

#	Tattoo	Registry Name or #	Date of Birth	Sex	Breed
1					
2					
3					
4					
5					
6					
7					
8					
9					
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Date of inspection: _____ Number inspected _____ Signature _____

Printed Name _____ Event _____

(Parent or guardian must sign for children under age 18)



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ZOONOSIS EDUCATION PROJECT FOR YOUTH IN AGRICULTURE

Activity Kit Contents

SECTION 8

Section 8

Personal Protective Equipment

1. PPE Safe Removal Activity
2. Sequence for Putting On and Removing PPE – CDC
3. Steps to Putting on and Removing PPE, Including Coveralls – World Health Organization

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ZOONOSIS EDUCATION PROJECT FOR YOUTH IN AGRICULTURE

PPE

Safe Removal Activity

ACTIVITY MATERIALS

- Shaving Cream
- PPE (Personal Protective Equipment)
 - Disposable Coveralls
 - Boot Covers
 - Gloves
 - Dust mask
 - Safety glasses
 - Ear plugs

WHAT IS "PPE"?

Personal protective equipment, commonly referred to as "PPE", is equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses.

Objectives

- This activity will help demonstrate the importance of personal protective equipment (PPE).
- This activity will help demonstrate the importance of handwashing

Background Information

What is PPE?

Personal protective equipment, commonly referred to as "PPE", is equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses. These injuries and illnesses may result from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. Personal protective equipment may include items such as gloves, safety glasses and shoes, earplugs or muffs, hard hats, respirators, or coveralls, vests and full body suits. (Source: www.osha.gov)

Individuals should follow recommended practices when putting on and removing all types of PPE. The type of PPE used will vary with the level of protection needed for the situation. Generally, PPE is put on and adjusted to fit in the following order:

1. Coveralls: Wear coveralls or barn clothes whenever you have animal contact. Change immediately following being in the barn. Disposable coveralls are good to use when working with sick or contagious animals.
2. Boot Covers: Rubber boots are great to wear in the barn for everyday tasks. Clean and disinfect regularly. Have visitors wear boot covers to enter your barn or when you are visiting another farm.

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3. Mask: Protect yourself from inhaling dust-borne germs with a face mask or when in contact with sick or contagious animals.
 4. Goggles or Face Shield: Wear to protect your eyes from contact with germs, especially when working with contaminated fluids.
 5. Gloves: Protect your hands from infectious disease by wearing gloves when you work with animals; especially if they are sick.

All PPE should be removed using procedures that will avoid contaminating personal clothing, skin and mucous membranes. Also, be careful to not contaminate surrounding structures of the environment you are in. With regards to PPE removal, **it should be assumed the outside surfaces of all PPE equipment are contaminated**. Therefore, it is important to follow the steps recommended by the Centers for Disease Control and Prevention (CDC) for removing PPE. Generally, following this order for removal:

PPE Gloves

1. Remember, the outside of the gloves are contaminated.
2. Using a gloved hand, grasp the palm area of the other gloved hand and peel off the first glove.
3. Hold the removed glove in the gloved hand.
4. Slide fingers of ungloved hand under the remaining glove at wrist and peel off the second glove over the first glove.
5. Discard gloves in a waste container.
6. If your hands get contaminated during glove removal, immediately wash your hands with soap and water or use an alcohol-based hand sanitizer.

Goggles or Face Shield

1. Remember, the outside of the goggles are contaminated.
2. Remove goggles from the back if held in place with elastic bands or from the earpiece of glasses.
3. If reusable, place in the appropriate location for cleaning.

Coveralls

1. These are difficult to remove. Remember, the outside of the coveralls, especially the front and sleeves are contaminated.
2. Safe removal is more effective if two sets of gloves were put on so that the outer pair can be removed in the previous steps, leaving a clean pair remaining to protect you when unfastening the coveralls front closure. OR have a protected buddy assist unfastening the coveralls and pulling them over the shoulders.
3. Pull the arms out of the sleeves, with inner gloves or the help of your buddy, roll the coveralls from the waist down, from the inside of the coveralls. Step out of the coveralls and dispose.

Mask

1. Remember, the outside of the mask is contaminated.
 2. Remove mask, grasping the elastic band(s) behind the head and pulling forward over the head.
-

For more information about how to properly put on and remove personal protective equipment, check out this CDC website: <https://www.cdc.gov/hai/prevent/ppe.html>. Or this website of the World Health Organization: <https://www.who.int/csr/resources/publications/ebola/ppe-steps/en/>.

Conduct the Activity

1. Ask one volunteer to dress in PPE. Putting on the coveralls, boot covers, mask, goggles, and gloves.
2. Once dressed in PPE, place golf ball-sized (or smaller) amounts of shaving cream on different outside surfaces of the PPE, making sure to apply some to each glove.
3. Ask the volunteer to remove PPE, being careful not to contaminate his or her clothing, skin, eyes, mouth, etc.
4. Lead a group discussion about how “free from contamination” the volunteer was able to keep his/her clothing, skin, etc.
5. Review the proper techniques recommended by the CDC for PPE removal. What could the volunteer do differently next time?
6. If time permits, ask another volunteer to give it a try!
7. Discuss the importance of handwashing even when wearing gloves and other PPE. Even when hands were visibly contaminated, it was hard to stay clean.

Activity Wrap-Up

- For each of the PPE items from this activity, have the participants discuss which transmission method risks could be reduced. Transmission methods include direct contact, indirect contact, aerosol/droplet, oral, vector-borne
- What should you do if your hands become contaminated during PPE removal? Discuss the importance of handwashing following removal of PPE.

Source: Iowa State University, Blue Not Flu – Excellence in Exhibition: Preventing Disease in Animals and People PPE Activity

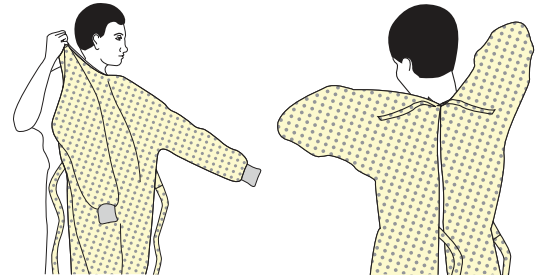
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SEQUENCE FOR **PUTTING ON** PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

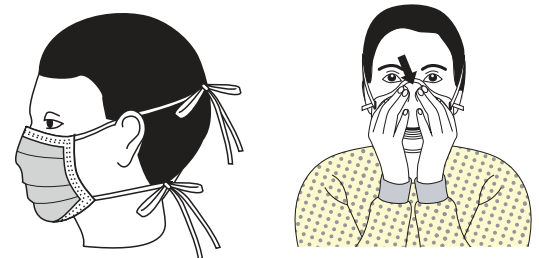
1. GOWN

- Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
- Fasten in back of neck and waist



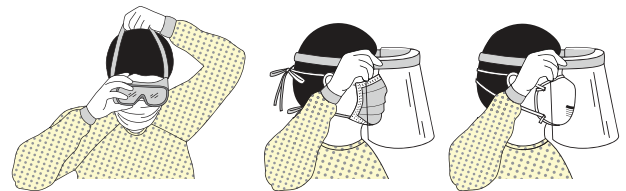
2. MASK OR RESPIRATOR

- Secure ties or elastic bands at middle of head and neck
- Fit flexible band to nose bridge
- Fit snug to face and below chin
- Fit-check respirator



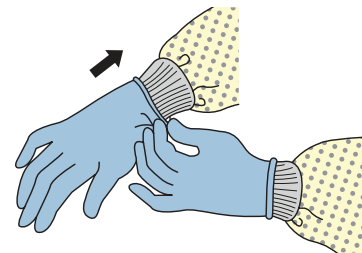
3. GOGGLES OR FACE SHIELD

- Place over face and eyes and adjust to fit



4. GLOVES

- Extend to cover wrist of isolation gown



USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION

- Keep hands away from face
- Limit surfaces touched
- Change gloves when torn or heavily contaminated
- Perform hand hygiene



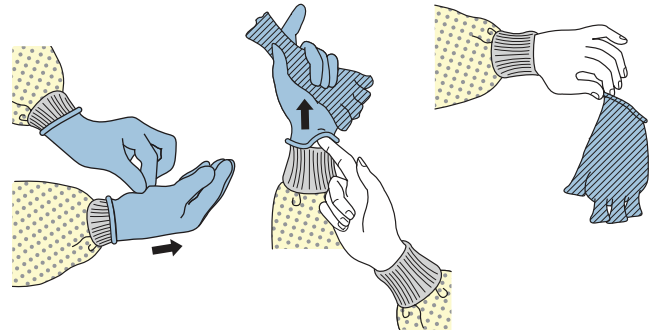
HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE)

EXAMPLE 1

There are a variety of ways to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. Here is one example. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator **after** leaving the patient room and closing the door. Remove PPE in the following sequence:

1. GLOVES

- Outside of gloves are contaminated!
- If your hands get contaminated during glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Using a gloved hand, grasp the palm area of the other gloved hand and peel off first glove
- Hold removed glove in gloved hand
- Slide fingers of ungloved hand under remaining glove at wrist and peel off second glove over first glove
- Discard gloves in a waste container



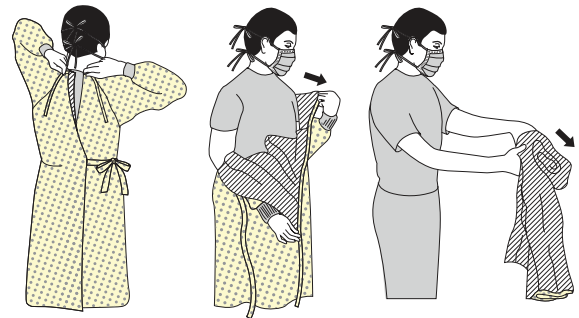
2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band or ear pieces
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in a waste container



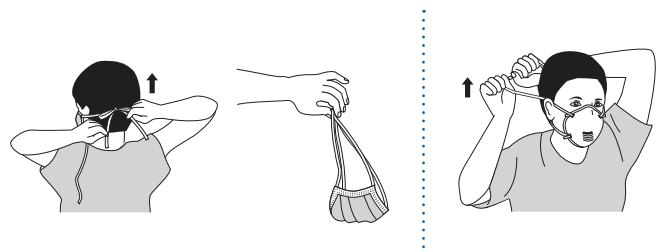
3. GOWN

- Gown front and sleeves are contaminated!
- If your hands get contaminated during gown removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Unfasten gown ties, taking care that sleeves don't contact your body when reaching for ties
- Pull gown away from neck and shoulders, touching inside of gown only
- Turn gown inside out
- Fold or roll into a bundle and discard in a waste container

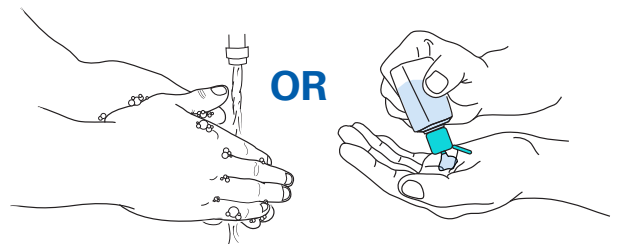


4. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — DO NOT TOUCH!
- If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
- Discard in a waste container



5. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE



PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS BECOME CONTAMINATED AND IMMEDIATELY AFTER REMOVING ALL PPE



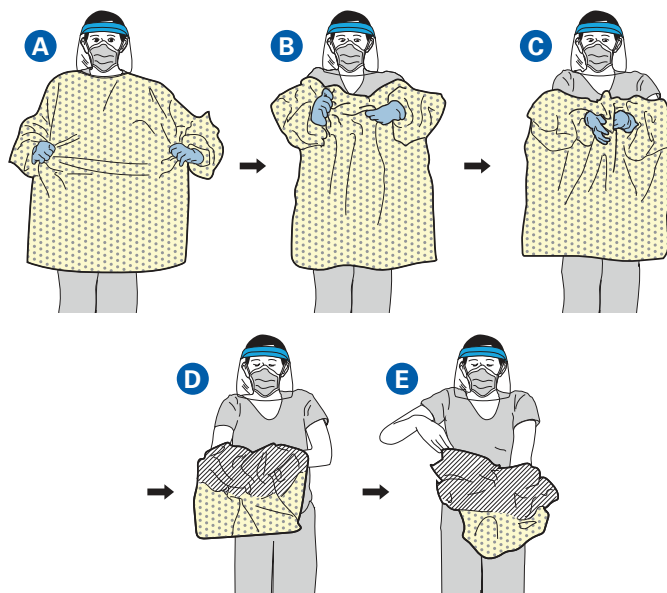
HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE)

EXAMPLE 2

Here is another way to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator **after** leaving the patient room and closing the door. Remove PPE in the following sequence:

1. GOWN AND GLOVES

- Gown front and sleeves and the outside of gloves are contaminated!
- If your hands get contaminated during gown or glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp the gown in the front and pull away from your body so that the ties break, touching outside of gown only with gloved hands
- While removing the gown, fold or roll the gown inside-out into a bundle
- As you are removing the gown, peel off your gloves at the same time, only touching the inside of the gloves and gown with your bare hands. Place the gown and gloves into a waste container



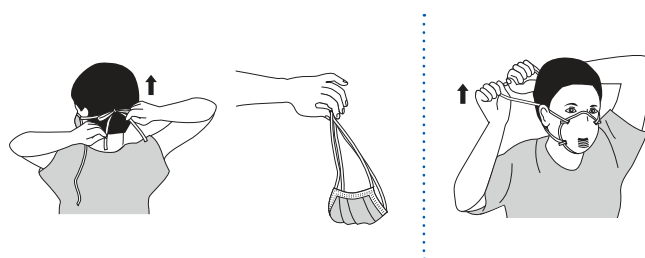
2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band and without touching the front of the goggles or face shield
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in a waste container

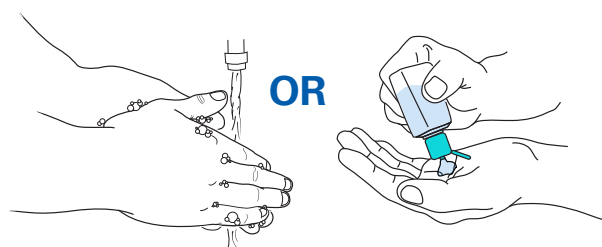


3. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — **DO NOT TOUCH!**
- If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
- Discard in a waste container



4. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE



PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS BECOME CONTAMINATED AND IMMEDIATELY AFTER REMOVING ALL PPE





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Activity Kit Contents

SECTION 9

Section 9 Careers

1. Bridging Human and Animal Health

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Bridging Human and Animal Health



Overview:

The *Careers – Bridging Human and Animal Health* lesson is designed to encourage participant discussion of careers in human and animal health. During this lesson, participants will learn some of the careers important to the One Health concept that recognizes the connection between environmental health, animal health and human health. Participants will also understand how all of these careers must rely on each other to keep everyone healthy. This lesson features two hands-on components to help reinforce the idea that all careers must work together to bridge human and animal health.

Objectives:

After completing this activity, participants will be able to:

- Understand the career opportunities available through One Health.
- Describe how all careers must work together to keep humans and animals healthy.
- Explain how these careers are related to participants' daily lives.

Skill Level:

Intermediate to advanced

Life Skills:

Critical thinking, problem solving, communication, concern for others

Setting:

An outdoor or indoor space where participants can easily hear and are able to move around; seating is optional

Time:

30–45 minutes

Materials:

- ❑ 26 “Career Description” cards
- ❑ Beach ball or similar item

PROCEDURE:

Before the meeting:

1. Review the lesson and verify you have the beach ball and all 26 of the “Career Description” cards. Inflate the beach ball.
2. If you do not have a prepared set of “Career Description” cards, prepare them by cutting apart the cards at the end of this lesson. You may want to laminate these cards so they can be used again.
3. Review the *One Health – Health for One, One Health for All* lesson to make sure you have an understanding of One Health. Review Table 1 to reinforce understanding of first activity.



Table 1. What Each Item Represents and How Each Relates To One Health

Item	What it represents	How it relates
Ball	One Health	All of the participants must work together to get the ball from one end of the line to the other – just as all of the individual careers must work together to keep humans, animals and our environment healthy. One Health is the interconnected relationship between human, animal and environmental health.
Individuals	All of the various careers within human and animal health	Everyone within these careers must work together to form a bridge between human and animal health.

During the meeting:

1. Introduce the activity by reading aloud or paraphrasing the following:

Nearly every animal and human becomes sick at some point. Many diseases can be passed between humans and animals; these diseases are known as “zoonotic diseases.” It takes many specialists from various careers to keep humans and animals healthy. From physician to veterinarian to pharmacist, each career plays an important role keeping us healthy. What we often don’t think about is the hundreds of other careers that connect human, animal and environmental health. The concept that recognizes that environmental health, animal health and human health are all connected is known as “One Health.”

One way to think about the connections between human and animal health is thinking about a bridge. A bridge is needed to connect one place to another or to cross divides. Careers involving human and animal health are strongly connected just as are all of the materials used to build a bridge. To illustrate that connection, we’ll start by demonstrating how bridges work and these careers work together.



Participants take part in the bridging human and animal health ball activity

2. Have the participants arrange themselves in two parallel lines. Have participants face each other with their arms extended forward at chest level. Arms should be parallel to the ground and not touching any other individuals with palms facing down. One individual will extend their arms and another participant will have one arm in between the other individual’s arms. This will be repeated throughout the line with the arms alternating down the line, forming a bridge that doesn’t touch any place. (See photo on the left for clarification.)
3. Read aloud or paraphrase the following:

Your goal is to pass a ball from one end of the line to the other, just as if the ball were crossing a bridge. In the game, you will pass a ball down the bridge to the other side with the ball passing along your outreached arms. To add a challenge, do this without using the palms of your hands and without dropping the ball on the ground. If the ball drops, you should make adjustments to the bridge to make it stronger (move to stand closer together). I will get the ball and bring it back to the original location and you will start the process again.
4. Place the ball at one end of the “bridge” to begin the activity.
5. Once the ball has successfully traveled the entire length of the bridge, have at least two participants standing across from each other drop their arms back down to their sides, removing their arms from the bridge. Those with dropped arms should not move from their places in line. Make sure that you have enough

individuals remove their arms, so the ball will fall through the gap. Have the remaining participants attempt to move the ball back to the other side of the bridge.

6. The ball will drop to the ground unless the other participants move in to help make the bridge stronger. Allow participants to try to move the ball to the other end twice if time allows. End the activity and have participants move back to their seats or area where gathering.
7. Ask the participants the following questions.
 - What happened when some arms were missing or weren't working together? *(The answer should include that the ball fell through the gap, and they were no longer able to pass the ball from one end to the other without making adjustments.)*
 - How is this similar to when careers don't work together? *(Things take longer to complete, information is slow to travel, things are missed, and other similar answers)*

8. Read aloud or paraphrase the following:

In the activity, you represented the careers in animal and human health. If you are able to work together you can form a strong bridge between human and animal health. This bridge keeps everyone and everything in the ecosystem we call Earth working effectively to keep everyone healthy. But, if we have holes in our bridge where careers are not working together, then we cannot maintain the principles of One Health. This is when humans, animals and our environment get sick.

For example, veterinarians work with pork producers to maintain healthy animals. These animals will one day enter our food supply, so it is important to have a healthy meat source for human consumption. Additionally, doctors work with their patients to come up with healthy diets. Humans require high quality protein sources, such as pork, to maintain good health.

9. Review each of the careers listed in Table 2 with participants. Go through the list selecting about ten careers to discuss with participants. As you go through the list, ask participants how the careers could relate to their own lives. These are the same careers that will be on the "Career Description" cards. If you have more time, go through more cards.



Table 2. Career Descriptions and How They Relate to Your Life

Career	Description	How it relates to your life
Behaviorist	Observes behavior habits in animals and uses these observations to develop training techniques	Studies animals in the wild or in captivity
Biologist	Conducts research on infectious diseases with expertise in bacteriology, virology, immunology, molecular biology, biochemistry and many other fields	Studies living organisms such as mammals, reptiles, birds and microbes; can assist in the development of medications including antibiotics
Biosystems Engineer	Develops, designs and adapts structures and systems to help people and animals better coexist with the environment	Works with the biological environment and agricultural sciences to create systems for the community including turning waste products into useable resources for the public
Breeding Technician	Works with caretakers to maximize reproductive success	Suggests mating decisions, determines the optimal time to breed and assists with breeding
Community Health Worker	Oversees public health threats, provides education and promotes healthy lifestyles	Holds events to educate the community about health and safety
Conservation Officer	Protects wildlife and the environment (law enforcement official)	Tracks wildlife movement and population numbers to help design laws and regulations
Environmental Health Specialist (Health Inspector)	Administers and enforces legislation and provides support to minimize health and safety hazards	Ensures that food processing plants and food preparation kitchens are up to federal standards (health code)
Environmentalist	Studies the environment and environmental concerns	Researches ways to minimize human and animal impact on the environment such as improving recycling methods and rebuilding wildlife habitats
Epidemiologist	Specializes in diseases that affect groups of people or animals	Works for agencies to help minimize the impact of disease outbreaks
Extension Educator	Communicates with and educates stakeholders including the agricultural community and the general public with research-based content	Educates the public with information provided by research and creates materials to educate people within communities
Farmer/Herdsman	Manages the health and care of livestock	Produces food consumed by both humans and animals
Geneticist	Conducts research on genes and gene mapping, and applies findings	Helps people who have genetic disorders, helps people understand their genetic pre-dispositions to diseases, helps farmers maximize the genetic progress they make with their livestock
Meat Scientist	Works with processed animal products for human consumption	Develops the best way of cutting and preserving meat so humans are protected from food poisoning and zoonotic diseases while also enjoying new flavorful cuts of meat; assists in creating food safety regulations

Table 2. Career Descriptions and How They Relate to Your Life, continued

Career	Description	How it relates to your life
Nurse	Performs tests, relays information to doctors, educates patients about various medical conditions, and tends to provide direct patient care	Is responsible for the majority of daily patient care and has the most direct interaction with patients
Nutritionist	Develops and formulates diets for animals or humans	Develops diets and guidelines for nutritious, well-balanced food for you and your animals
Pharmacist	Advises and distributes prescription drugs to individuals	Fills prescriptions prescribed by the doctor
Physical Therapist	Examines patients and develops a plan using treatment techniques to promote the ability to move, reduce pain, restore function and prevent disability	Teaches patients how to prevent or manage their conditions so that they will achieve long-term health benefits
Physician	Oversees patient care, diagnosis and treatment (medical professional)	Approves of diagnoses and courses of treatment
Physician Assistant	Performs many of the same tasks as a doctor, but always works under the supervision of a physician (medical professional)	Treats patients performing many of the same tasks as a doctor such as prescribing medication, interpreting lab results and analyzing scans or X-rays
Professor	Educates students at the collegiate or university level	Holds the highest academic rank at universities and research institutions; often works in research, teaching, outreach or all three
Quality Assurance Specialist	Works to ensure the safety of products	Validates the quality of products made available to consumers
Sales Consultant	Sells products, equipment and other materials to clients	Distributes and educates clients about pharmaceutical, medical, feed or other specialty products for companies
Support Staff	Assists other occupations in completing daily tasks	Aids in tasks and can specialize in janitorial, secretarial, maintenance and other positions
Veterinarian	Provides treatment for animals (medical professional)	Diagnoses, oversees treatments and performs surgeries on animal patients
Veterinary Technician	Performs many of the same tasks as a veterinarian but cannot diagnose patients and must always work under the supervision of a veterinarian (medical professional)	Treats patients performing many of the same tasks as a veterinarian such as giving injections, assisting in surgery, and collecting lab samples
Zoologist	Studies animals or wildlife in confinement or natural habitats	Discovers new species and studies the impact of humans on the wildlife

10. Answer any questions that may arise based on the discussion of the career descriptions you selected to discuss.
11. Ask for a volunteer to assist you in demonstrating the activity.
12. Read aloud or paraphrase the following:
Each of you will receive one of the “Career Description” cards once the activity begins. Do not look at the card. During the activity, place the card on your forehead without looking at the text, and hold your card against your forehead. You will then ask other participants “yes” or “no” questions about the careers we just discussed in order to determine what career card you received. Once you believe you have determined the career on your card, ask another participant if your guess is correct. If you are correct, remove your career card from your forehead, but continue to answer questions for other participants until everyone has determined the careers on their cards. If you are incorrect, continue asking questions about what career you may have. Now we will begin by having a volunteer help demonstrate the activity.
13. Pull a “Career Description” card from the pile without looking at the text and place it on your forehead with the text facing the demonstration participant.
14. Then ask the demonstration participant “yes” or “no” questions about the career on your “Career Description” card. (Some questions might include: “Do I work with animals?”, “Do I build things?”, “Do I raise animals?”, “Do I teach people?”)
15. Use the demonstration participant’s “yes” or “no” responses to determine which career is on your “Career Description” card.
16. Once you think you know which career you have, ask the demonstration participant if your guess is correct.
17. Answer any questions about the steps mentioned or demonstrated above.
18. Before passing out the cards, read aloud or paraphrase the following:
The goal of this activity is to determine which “Career Description” cards you have without looking. To play, you will need to work together. Move around the area and read the other participants’ cards to yourself (not aloud). Ask “yes” or “no” questions to other participants to figure out your own card. Once you’ve asked a question, the other person should take a turn asking questions about his or her card. You should respond “yes” or “no” to the questions without stating the career. If another participant guesses his or her career, and if the participant is incorrect, inform him or

her and continue answering questions. If the participant is correct, tell him or her, and continue trying to determine your own career card.

19. Begin the activity by reminding participants that they should not look at the cards you will pass out to them. Give one of the “Career Description” cards to each participant. Without looking at the text on the card, each participant should place the “Career Description” card up to his or her forehead with the text facing other participants.
20. Once all cards are held up against participant foreheads, the activity begins. Allow the activity to run for 15 minutes or less depending on the size of the group. (Smaller groups need less time.)
21. Once all participants have guessed their careers correctly or you have ended the activity, collect the “Career Description” cards. Gather the participants together to continue the lesson.
22. Ask participants the following questions. If participants are not able to think of ideas, share the examples included.
 - What are some examples of careers that you have come into contact with in your everyday life and are important for your health? (*Physician [doctor], Veterinarian, Nutritionist, Environmentalist, Farmer, etc.*)
 - Before today, what are some examples of careers you wouldn’t have thought were important for your health? (*Physician Assistant, Veterinary Technician, Environmental Health Specialist, Biosystems Engineer, etc.*)
 - What are some examples of careers that bridge human and animal health? (*Nutritionist, Community Health Worker, Behaviorist, Epidemiologist, etc.*)
23. To summarize, read aloud or paraphrase the following:

You may not have realized it, but each of you helped bridge together human and animal careers. If we think about the last activity, each of you could have represented the career printed on the card you held to your forehead. You each had to work together to determine which career you were holding, just as each career professional must work with others to bridge human, animal and environmental health (One Health). Additionally, some of the careers that contribute to maintaining One Health aren’t careers we would normally think of. As we saw with the bridge and card activities, all careers are equally important. As you think about your future, consider ways that you can help bridge One Health within your future career.

TALKING IT OVER:

Ask the group the following questions.

- What careers are **directly** related to your health? (*Physician, Physician Assistant, Physical Therapist, Pharmacist, etc.*)
- What careers are **indirectly** related to your health such as those careers keeping animals and the environment healthy? (*Veterinarian, Veterinary Technician, Farmer, Meat Scientist, Conservation Officer, Quality Assurance Specialist, etc.*)
- What are some examples of careers that bridge human, animal and environmental health? (*Environmentalist, Nutritionist, Biologist, Geneticist, Epidemiologist, etc.*)

ADAPTATIONS & EXTENSIONS:

For Older or More Experienced Participants:

- Have participants brainstorm a list of careers not included on the “Career Description” cards. Use the list to create additional cards to use in a similar format.
- Allow participants to read the cards to determine their careers. Then have each participant find a career that links or bridges to the one he or she has. The participant should pair with another participant and then discuss how the careers relate. Once pairs are identified, then have participants gather in groups of four and discuss how those careers relate. Continue this for as many participants are in the group to show that all careers relate.
- Have participants research a career discussed today and have them share the information that they learned in a brief presentation at a club meeting. The National 4-H curriculum *Build Your Future: Choices . . . Connections . . . Careers* will assist with this effort. (See References & Resources section on page 10.)
- Challenge teen leaders to create a game for younger participants by creating a new set of careers with even more basic descriptions or using images.

For Younger or Less Experienced Participants:

- Conduct only the first activity that uses the ball with participants. Then, select five careers from the listing to discuss in depth with participants.
- Conduct both activities but limit the second activity by selecting only 10 careers to use for the “Career Description” cards game. Make additional copies of these careers for larger groups to limit the number of career options participants will need to remember.
- Allow participants to read their “Career Description” cards and sort themselves by a career that is either, animal human or both. Discuss each career and why participants think it relates to each category.
- Invite a local professional in a career listed in the lesson to speak with participants and share how his or her job connects with One Health.
- Help participants come up with a creative song, slogan or catchphrase about careers in One Health. For example, a poster could show a pig with the caption, “Veterinarians, Doctors, Farmers and Researchers. We need all of YOU to keep US healthy!”

ALIGNMENT TO SCIENCE AND ENGINEERING PRACTICES:

How 4-H Increases Science Literacy

Nationally and in Michigan, 4-H has long enjoyed a reputation for engaging young people in positive, experiential (hands-on), and nonformal activities that are inquiry based. The activities in the *4-H Animal Science Anywhere* series can be used to enhance classroom science education. The activities are aligned with the eight Scientific and Engineering Practices from *A Framework for K-12 Science Education* (National Research Council, 2012, p. 42).

The activities in *4-H Animal Science Anywhere: Careers – Bridging Human and Animal Health* were evaluated for their alignment with the Science and Engineering practices by Michigan State University (MSU) Extension Educator Tracy D’Augustino in 2016.

Table 3. How This Lesson Aligns With the Science and Engineering Practices (National Research Council, 2012, p. 42)

Science & Engineering Practice	Action	Activity Step
▶ Asking questions and defining problems	▶ Participants discuss how each of the careers affects the community and the environment.	9
	▶ Participants brainstorm careers that bridge human and animal health.	22
▶ Developing and using models	▶ Participants use the bridge activity to model the importance of careers working together.	1–6
▶ Planning and carrying out investigations		
▶ Analyzing and interpreting data	▶ Participants analyze and discuss the results of removing “careers” from the bridge.	7
	▶ Participants discuss what careers are directly and indirectly related to their health.	Talking It Over
▶ Using mathematics and computational thinking		
▶ Constructing explanations and designing solutions	▶ Participants explain how the model bridge results connect to human and animal health.	7
	▶ Participants explain why careers are directly or indirectly related to their health.	Talking It Over
	▶ Participants explain how careers bridge human and animal health.	22
▶ Engaging in argument from evidence	▶ Participants explain why careers are directly or indirectly related to their health.	Talking It Over
	▶ Participants explain how careers bridge human and animal health.	9, 22
▶ Obtaining, evaluating, and communicating information	▶ Throughout the lesson and activities, participants are learning about One Health careers. They obtain and evaluate information about human and animal health careers.	Whole lesson, Talking It Over

REFERENCES & RESOURCES:

- Michigan 4-H Youth Development. (2014). *4-H animal science anywhere: Basics of biosecurity (4H1661)*. East Lansing: Michigan State University, MSU Extension. Retrieved from http://msue.anr.msu.edu/uploads/236/65684/4H1661_AnimalScienceAnywhere-Biosecurity.pdf
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Career Description Cards

Behaviorist Observes behavior habits in animals and uses these observations to develop training techniques.	Community Health Worker Oversees public health threats, provides education and promotes healthy lifestyles
Biologist Conducts research on infectious diseases with expertise in bacteriology, virology, immunology, molecular biology, biochemistry and many other fields	Conservation Officer Protects wildlife and the environment (law enforcement official)
Biosystems Engineer Develops, designs and adapts structures and systems to help people and animals to better coexist with the environment	Environmental Health Specialist (Health Inspector) Administers and enforces legislation and provides support to minimize health and safety hazards
Breeding Technician Works with caretakers to maximize reproductive success	Environmentalist Studies the environment and environmental concerns

Career Description Cards, continued

Epidemiologist Specializes in diseases that affect groups of people or animals	Meat Scientist Works with processed animal products for human consumption
Extension Educator Communicates with and educates stakeholders including the agricultural community and the public with research-based content	Nurse Performs tests, relays information to doctors, educates patients about various medical conditions and tends to provide direct patient care
Geneticist Conducts research on genes and gene mapping and applies findings	Nutritionist Develops and formulates diets for animals or humans
Farmer/Herdsman Manages the health and care of livestock	Pharmacist Advises and distributes prescription drugs to individuals

Career Description Cards, continued

Physical Therapist Examines patients and develops a plan using treatment techniques to promote the ability to move, reduce pain, restore function and prevent disability	Quality Assurance Specialist Works to ensure the safety of products
Physician Oversees patient care, diagnosis and treatment (medical professional)	Sales Consultant Sells products, equipment and other materials to clients
Physician Assistant Performs many of the same tasks as a doctor, but always works under the supervision of a physician (medical professional)	Support Staff Assists other occupations in completing daily tasks
Professor Educates students at the collegiate or university level	Veterinarian Provides treatment for animals (medical professional)

Career Description Cards, continued

Veterinary Technician

Performs many of the same tasks as a veterinarian but cannot diagnose patients, must always work under the supervision of a veterinarian (medical professional)

Zoologist

Studies animals or wildlife in confinement or natural habitats



Career Description Card

Behaviorist

Observes behavior habits in animals
and uses these observations to
develop training techniques.



Career Description Card

Biologist

Conducts research on infectious diseases with expertise in bacteriology, virology, immunology, molecular biology, biochemistry and many other fields



Career Description Card

Biosystems Engineer

Develops, designs and adapts structures and systems to help people and animals to better coexist with the environment



Career Description Card

Breeding Technician

Works with caretakers to maximize
reproductive success



Career Description Card

Community Health Worker

Oversees public health threats,
provides education and promotes
healthy lifestyles



Career Description Card

Conservation Officer

Protects wildlife and the
environment (law
enforcement official)



Career Description Card

Environmental Health Specialist

(Health Inspector)

Administers and enforces
legislation and provides support to
minimize health and safety hazards



Career Description Card

Environmentalist

Studies the environment and
environmental concerns



Career Description Card

Epidemiologist

Specializes in diseases that affect
groups of people or animals



Career Description Card

Extension Educator

Communicates with and educates stakeholders including the agricultural community and the public with research-based content



Career Description Card

Geneticist

Conducts research on genes and gene mapping and applies findings



Career Description Card

Farmer/Herdsman

Manages the health and
care of livestock



Career Description Card

Meat Scientist

Works with processed animal products for human consumption



Career Description Card

Nurse

Performs tests, relays information to doctors, educates patients about various medical conditions and tends to provide direct patient care



Career Description Card

Nutritionist

Develops and formulates diets
for animals or humans



Career Description Card

Pharmacist

Advises and distributes prescription
drugs to individuals



Career Description Card

Physical Therapist

Examines patients and develops a plan using treatment techniques to promote the ability to move, reduce pain, restore function and prevent disability



Career Description Card

Physician

Oversees patient care, diagnosis
and treatment (medical
professional)



Career Description Card

Physician Assistant

Performs many of the same tasks as a doctor, but always works under the supervision of a physician (medical professional)



Career Description Card

Professor

Educates students at the collegiate
or university level



Career Description Card

Quality Assurance Specialist

Works to ensure the safety of
products



Career Description Card

Sales Consultant

Sells products, equipment and other materials to clients



Career Description Card

Support Staff

Assists other occupations in
completing daily tasks



Career Description Card

Veterinarian

Provides treatment for animals
(medical professional)



Career Description Card

Veterinary Technician

Performs many of the same tasks as a veterinarian but cannot diagnose patients, must always work under the supervision of a veterinarian (medical professional)



Career Description Card

Zoologist

Studies animals or wildlife in
confinement or natural habitats