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.

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.

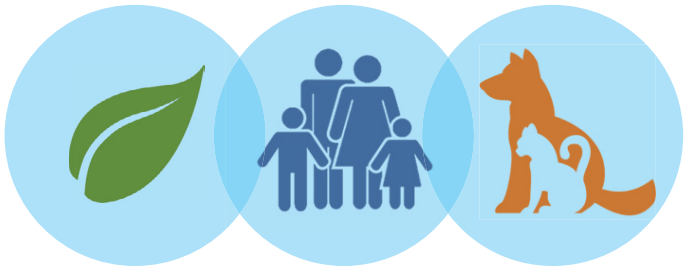
Skill Level:
Intermediate

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)



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.

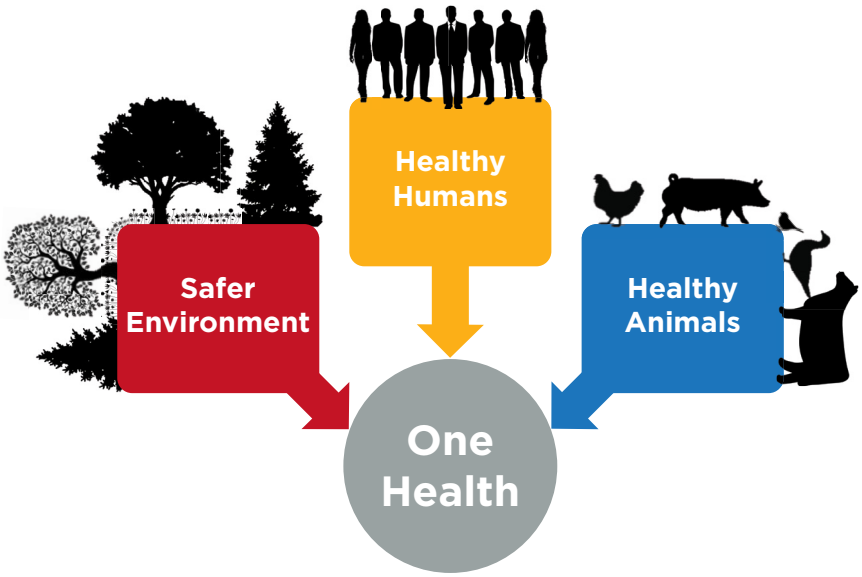


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Table 1. What Each Color Represents and How Each Relates to One Health

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.

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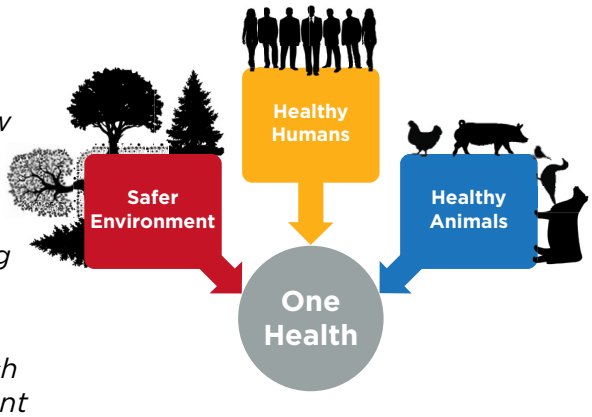
During the meeting:

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 ⅓ of the red water bottle and ⅓ 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*

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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 ⅓ of the blue water bottle and another ⅓ 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 ⅓ of the blue water bottle and another ⅓ 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.

Bottles and cups after mixing is complete

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 ⅓ 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:

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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 liter, 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)*

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- 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)*

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?

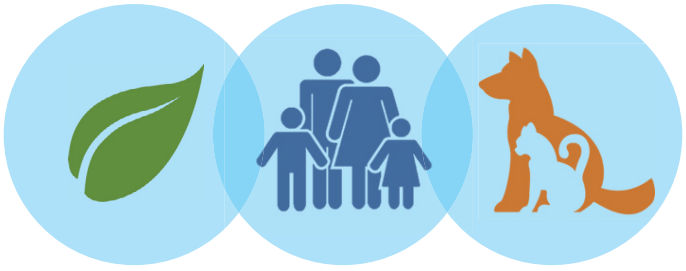
  We must be aware of the impact that our actions have, and remember that everything we do not only affects ourselves but also those around us (environment and animals).

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.



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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.

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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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