

Animal Science: Got Immunity?

Activity Series:
Animal Science
Grade: 3-6
Time: 45 min.

Main Idea

The spread of disease can be controlled if we understand how transmission happens.

Motivator

We know to wash our hands and take other precautions to avoid catching a cold. But how do animals protect themselves against diseases?

Pre-Activity Questions

Before you start the activity, ask students:

- What makes disease spread through a group of animals?

Activity

- One disease card per student: One-third of the group should have airborne cards, one-third contact/touch and one-third insect/vector
- Bandanas — at least one per student
- Balls: either tennis, plastic, foam or 3-inch inflated balloons - all the same size, three to five balls per student

Part One:

1. Explain that you will be playing a game about how disease spreads. There are many ways, but in this game participants are going to focus on transmission by contact with the animal (touch), droplets in the air (air) or through insect bites (insect).
2. Divide into two groups. One group will be diseases and the other will be animals. Have each person in the disease group draw one card from the disease pile and keep it a secret.
3. Have the prevention group get together and decide on one tactic to prevent the spread of each mode of disease (i.e. for diseases spread by touch, you could wash your hands). Have the group develop a hand signal for each preventative measure.
4. Have the disease group spread out across the room. Have the animals walk around the diseases until you say stop.
5. When you say stop, the animals must go to the closest disease. One animal per disease.
6. On the count of three, the students with disease cards reveal their cards. At the same time, the animal shows its preventative sign. If the preventative measure is good against that disease, then the animal moves on to the next round. If the preventative measure is not for that disease, then the animal gets sick and sits out the next round.
7. Play until everyone gets sick! Switch animals and diseases.
8. Talk about how an animal could get immunity from the different diseases (immunization, antibodies, etc.).

Objectives

- To learn three modes of disease transmission
- To learn the role of immunization in disease

Learning Standards

(See Matrix)

Common SET Abilities 4-H projects address:

Predict
Hypothesize
Evaluate
State a Problem
Research Problem
Test
Problem Solve
Design Solutions
Develop Solutions
Measure
Collect Data
Draw/Design
Build/Construct
Use tools
Observe
Communicate
Organize
Infer
Question
Plan Investigation
Summarize
Invent
Interpret
Categorize
Model/Graph
Troubleshoot
Redesign
Optimize
Collaborate
Compare

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Part Two: The Immunity Challenge

1. Establish boundaries for the play area with sufficient space for students to escape the disease agents. At one end of the playing field, set up the Vet Clinic by placing bandanas in a box. On the sidelines, somewhere mid-field, scatter the balls. The bandanas are the vaccinations, the balls are the antibodies. Select one or two students per 10 players to be diseases.
2. Tell the animals they must avoid the diseases on their way to the Vet Clinic for vaccination. Vaccinated animals should tie a bandana around their arm. Once an animal has been vaccinated, it can begin to collect antibodies. An animal can collect as many antibodies as it can carry.
3. At the same time, the diseases are trying to tag the animals. Animals who have not been vaccinated and are tagged by a disease must sit out (be quarantined) because they are now contagious. Animals who have been vaccinated can have antibodies knocked away by diseases. Diseases MAY NOT carry antibodies.
4. Once a vaccinated animal has lost all its antibodies, it must return to the Vet Clinic for a booster. A vaccinated animal that gets tagged when it has no antibodies must sit out for a 2-minute penalty.

Science Checkup - Questions to ask to evaluate what was learned

- What does it mean if an animal is immune to a disease?
- What do vaccines protect animals from?

Extensions

- Learn more about the kinds of vaccines that are available to protect your favorite domestic animal by visiting with a veterinarian.
- Simulate a disease outbreak in your town. What would you do and where would you go to learn more?

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 an example of a serious disease that affects animals and humans. If animals are not protected with a vaccination, they can die.

Infection: The damaging growth of an invading organism. In an infection, the infecting organism uses its host to live and multiply. The infecting organism is also called a pathogen.

Immunity: A medical term that describes having sufficient biological defenses to prevent disease or infection.

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 immune system against the microbe, preventing disease. Vaccinations are also called immunizations.

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

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Background Resources

- University of Nebraska 4-H Vet Science curriculum, Unit II, Animal Disease 4-H Veterinary Science 4H48, <http://4hcurriculum.unl.edu/index.html>
- PAWSitively Youth: A Guidebook about Dogs for Community Outreach Leaders, 2008 <http://www.nraes.org>
- Scientific explanation of vaccines: <http://en.wikipedia.org/wiki/Vaccine>
- Scientific explanation of antibody: <http://en.wikipedia.org/wiki/Antibody>
- Methods of disease transmission: From the Department of Microbiology, Mount Sinai Hospital, Toronto, Canada, <http://microbiology.mtsinai.on.ca/faq/transmission.shtml>
- Further lesson plan ideas: Ebola—The Plague Fighters, NOVA Teachers Classroom Activity, 2004, http://www.pbs.org/wgbh/nova/teachers/activities/2304_ebola.html