How Do Vaccines Work?[1]

Supplies
- 1 Square Antibody card and 1 Triangle Antibody card for each group of 4 youth
- 1 Square Antigen card and 3 Triangle Antigen cards for each group of 4 youth
- Flipchart or hand-outs with definitions from #1 below

Activities
1. Begin by defining the below terms. Present them on a large flipchart/slide or pass out to each group.
   a. **Antibody:** Protein used by the immune system to identify and resist disease-causing organisms such as bacteria and viruses. This increases immunity for a specific disease.
   b. **Antigen:** Disease that causes an animal to produce antibodies. If antibodies are not already present in the animal, this can make the animal sick.
   c. **Vaccine:** Acts like an antigen in that it causes the body to produce antibodies to that specific disease so that the body can identify and resist that disease in the future.
2. Split the youth up into groups of 4. Within each group, have them decide who will be the animal, farmer, Square Antigen and Triangle Antigen. The farmer will need the 2 antibody cards and each youth representing the antigens will need the correct antigen cards (1 for square and 3 for triangle).

Scenario 1
3. Have the animals in each group stand in an open space by themselves. Have the antigens walk up to the animal. Point out that the animal has no way to fight off either disease and is likely to get sick. This is a situation where there is no immunity.

Scenario 2
4. Have the farmer "vaccinate" the animal for Square Disease. They would do this by handing the animal the Square Antibody. Explain to the group that this action of vaccinating the animal is what produces antibodies to give the animal the ability to resist the Square Disease.
5. Next, have the youth with the Square Antigen walk up to the animal. The animal now has the Square Antibody that will match the Square Antigen. This action causes the animal to be able to identify and resist Square Disease. It will likely remain healthy.

Scenario 3
6. Have the farmer "vaccinate" the animal for Triangle Disease (done by handing the animal the Triangle Antibody). Again, reinforce that the animal should now be able to identify and resist Triangle Disease.
7. Next, have the Square Antigen walk up to the animal. This time even though the animal has been vaccinated, it was for a different disease. The animal is likely to get sick from Square Disease.

Scenario 4

8. Have the farmer "vaccinate" the animal for Square Disease and Triangle Disease (hand the animal both antibodies). Explain to the group that this is similar to giving the animal a combination vaccine where they would now be able to identify and resist multiple diseases at the same time.
9. Next, have the Square Antigen and the Triangle Antigen walk up to the animal. Because the animal has both antibodies, it is able to resist both Square Disease and Triangle Disease.

Scenario 5

10. Have the farmer "vaccinate" the animal for Triangle Disease by handing the animal the Triangle Antibody.
11. Then give the youth that is the Triangle Antigen 2 additional Triangle Antigens (should now have 3).
12. Have the Triangle Antigen walk up to the animal. Explain that even though the animal has the Triangle Antibody, it may still get sick as it does not have enough antibodies to resist a large amount of the disease.
13. Explain that this happens sometimes when it has been a long time since vaccination. Some diseases require boosters to keep antibodies high enough to adequately identify and resist disease. Point out that Flu is a very good example of a disease that requires yearly boosters.
14. Ask all students how many of them get a Flu vaccine every year.
15. Have each group spend 3-5 minutes discussing what they have just done. Also, have them tell their group what vaccines that they know have been given to their animals. Then ask a couple groups if they are willing to tell the entire group what they discussed.

[1]Activity developed in collaboration with Dr. Craig Bowen (Purdue University ADDL), Adrianna Gasper and Aaron Fisher (State 4-H Office).