



LEADERS GUIDE

Swine

LESSON – FAIR PIG BIOSECURITY PORCINE EPIDEMIC DIARRHEA VIRUS (PEDV)

Author

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BACKGROUND INFORMATION:

Importance of Biosecurity

Swine diseases are a concern for every pork producer, no matter if they have a single pig or thousands. As a 4-H Swine project participant you are part of the United States pork industry. Just as you are responsible for keeping your show pig(s) healthy, you also share responsibility of keeping all pigs in the United States healthy through biosecurity practices. Therefore, 4-H pigs are just as important as large swine herds in terms of biosecurity.

Biosecurity means following management practices to reduce the chances of a disease, such as PEDV, from entering a pig farm and control the spread of disease within that farm. It also means management practices to reduce the chance of disease leaving your farm. Pig diseases can be spread different ways by animals, people, equipment, and vehicles. When pigs are brought to a show and commingled with pigs from other farms with a different health status, the risk of spreading diseases can be high. A biosecurity plan should take into account how diseases are spread and try to minimize exposure as much as possible.

Background of PEDV:

Porcine Epidemic Diarrhea virus was first confirmed in the United States in May 2013. Before 2013, PEDV was first observed in England in 1971 and most recently in Asia. PEDV is a coronavirus similar to Transmissible Gastroenteritis (TGE) virus, which has been around the U.S. industry for numerous years. PEDV is only infectious to pigs and is not a food safety concern.

Clinical Signs of PEDV:

Specifically, PEDV affects a pig's intestine causing severe diarrhea and vomiting. Vomiting is mostly seen in younger pigs. Suckling pigs are affected the most, experiencing extreme dehydration resulting from the diarrhea and vomiting. The dehydration has been known to cause 100% mortality in piglets less than 7 days of age. Feeder and grower pigs and sows typically experience reduced feed intake, slower gains, and body condition loss without experiencing the severe dehydration.

Transmission of PEDV:

Porcine Epidemic Diarrhea virus is spread by the direct or indirect oral contact with contaminated feces. The direct route involves pig to pig contact, with indirect routes including contaminated

clothing, footwear, supplies, equipment, and vehicles. Research completed at the University of Minnesota shows PEDV is highly infectious, meaning a very small amount of the virus will cause a pig to have the clinical signs of diarrhea and vomiting. To be exact, a quarter (1/4) of a teaspoon of infected feces from a PEDV infected pig can contain 10 million viral particles. That amount can easily be carried on the bottom of a shoe, truck tire, or equipment to an entire herd of pigs, infecting them all.

Incubation period of PEDV (*time of exposure to clinical signs*):

A pig can start showing clinical signs (vomiting and diarrhea) only 22-36 hours after being exposed to the PED virus.

Shedding of PEDV (*amount of time pigs can infect others*):

When a pig becomes infected with a disease, in this case PEDV, they will shed the virus for a period of time. This is also referred to them being infectious, meaning they can make other pigs sick, even though they may not be showing signs of PEDV. Pigs can shed PEDV for up to 3 to 4 weeks in their feces.

Treatment and Immunity/Protection:

There is no specific treatment for PEDV, but supportive care through hydration with access to high quality drinking water can be helpful. Electrolytes may be needed for severe dehydration. Additionally, a clean, dry, and draft free environment should be provided. Vaccines have been used in Asia and Europe, but are not available for use in the United States due to concerns over their effectiveness. Instead, producers should work with their veterinarians to best manage the virus by minimizing the negative effects of dehydration caused by the diarrhea and vomiting.

Some ways producers are managing the virus is by weaning piglets earlier than normal and doing an immediate feedback of infected material to the breeding herd as a means to build immunity that can be passed on to piglets after birth through the colostrum. It is still unknown how long this immunity lasts. Vaccine studies are in process.

Prevention

Biosecurity practices must limit cross contamination with anything that comes in contact with manure from infected pigs, such as clothing, boots, supplies, equipment, and vehicles (including trailers). Something as simple as walking into a contaminated barn or trailer can increase risk for disease spread. Assume every pig site is a risk. When working with pigs wear clean clothes or cover-up with coveralls and boots. When done working with pigs, isolate soiled clothing and footwear in a container for transport. Take the container to a place without pigs to thoroughly wash and disinfect before working with pigs again. It is also important to wash and disinfect any equipment, vehicles, and livestock trailers that were used when working with pigs. This includes all show supplies and equipment that visited the fair or other jackpot show.

BIOSECURITY PLAN

It is important for everyone to follow strict biosecurity protocols to help minimize the spread of PEDV. Everyone includes: swine exhibitors, pork producers and farm employees, transporters, manure haulers, feed truck drivers, or any other visitors to a swine farm or show.

Activity 1 – Step Through the Hole

Objective: To illustrate the importance of a biosecurity plan as a means to reduce the introduction and transmission of PEDV to their farm or other swine farms.

Materials:

- Paper (8 ½ by 11)
- Scissors
- Directions for *Step Through the Hole* handout (only 1 or 2 groups need)

Timeframe: 5 - 10 minutes

Instructions:

- Split youth into groups of 2 - 6 people.
- Give each group a plain sheet of letter-sized paper and a pair of scissors
- Instruct them to cut the paper, using only the piece of paper and scissors, in such a way that it makes a ring that each person in the group could step through.
- Quietly give 1 or 2 groups the set of directions found with this lesson plan (Directions for *Step Through the Hole*) and instruct them to quietly follow the directions EXACTLY, while not letting the other teams know that they have been given the instructions.
- Discuss with the youth that the groups that successfully completed the assignment were given clear directions, and therefore had a plan to follow. That is why they were so successful. It is important to have a clear plan regarding biosecurity to reduce the introduction and transmission of PEDV to your farm or other swine farms.

Activity 2 – Transmission of PEDV

Objective: To develop an understanding of what biosecurity means and identify ways PEDV can be transmitted. Specifically participants will identify ways PEDV can be spread through their 4-H pig(s).

Materials:

- *Transmission of PEDV* worksheet
- Pencil or pen

Time frame: 5 - 10 minutes

Discussion Questions:

- What is Biosecurity?
Biosecurity: set of preventative measures taken to reduce the risk of PEDV (disease) introduction or transmission

(Continued on next page)

- What are some ways PEDV can move from one farm to another?
 - ✓ Other pigs - Introducing new animals or if animals have been off-site. *Example - pigs that have contact with other pigs or facilities such as at shows or other commingling events.*
 - ✓ Clothing and footwear - Clothing and footwear can be sources of PEDV transmission. *Example - wearing the same clothing and shoes at one location such as a fair or neighbor's livestock facility without cleaning and disinfecting before wearing them at home. PEDV infected manure can get on clothing and shoes.*
 - ✓ Supplies/Equipment - PEDV infected manure may be present on supplies and equipment. *Example - borrowing a tagger or scale from your neighbor, sharing show equipment, or bringing show supplies and equipment home after the fair without cleaning and disinfecting it.*
 - ✓ Vehicles - PEDV infected manure may be present on vehicles. *Example - livestock trailers and vehicles used to transport people wearing dirty clothing after working with pigs or carrying supplies that haven't been cleaned and disinfected.*

Instructions:

- Have youth work in groups of 2 or more.
- Hand out *Activity 2 - Transmission of PEDV* worksheet to each group
- Instruct the youth to identify and write down potential PEDV transmission risks with their 4-H pig(s).
- Once finished, each group should share one idea with the entire group. Encourage discussion on shared ideas.
- Help the youth identify that the potential PEDV transmission risks they mention should be part of their biosecurity plan for their 4-H pig(s).

CLEANING AND DISINFECTION

Cleaning and disinfection of your show supplies, equipment, facilities, trailers, boots, and clothing should be top priority in your biosecurity plan. Proper cleaning and disinfection can greatly reduce the risk of PEDV spread by removing organic matter (manure, bedding, etc.) that PEDV can live in.

Cleaning, which involves the removal of all organic matter is needed before disinfection can be done. Organic matter acts as a protective barrier to many disease pathogens. Also some disinfectants can be inactivated by organic matter.

In addition to proper cleaning and disinfection, it is important for all things to dry prior to using them again. Allowing items to completely dry will kill any disease pathogens remaining after the cleaning and disinfection process.

How and What Needs to be Properly Cleaned and Disinfected

Clothing: Clothes should be washed prior to and after wearing them at the fair when working with your pigs. This helps reduce the risk of PEDV transfer from the fair to your home. Clothes can simply be washed normally with laundry detergent in the washing machine and dried.

Boots: Boots should be cleaned and disinfected before going to the fair and after the fair prior to bringing them home. This helps reduce the risk of bringing PEDV from one site to the next. Boots should be cleaned and disinfected through the process of proper cleaning and disinfection outlined in this lesson. If disposable boots are used, they should be thrown away promptly after use. It is suggested to have a separate pair of boots for fair use and another for farm use.

Equipment, facilities, supplies, and trailers: All things that were in contact with the pigs, either prior to the fair, during the fair, or after should be thoroughly cleaned and disinfected using the process of proper cleaning and disinfection outlined in this lesson.

Proper Cleaning and Disinfection Process

Equipment and supplies should be cleaned and disinfected at the site of use **or** contained for transport to site of cleaning. NEVER bring soiled equipment or supplies to another pig site before it has been cleaned and disinfected.

1. Wash equipment/supplies with hot water to remove all organic matter. Organic matter includes manure, shavings, straw, etc.
2. Use soap/detergent and a brush for scrubbing to help with the removal of organic matter
3. Rinse with water
4. Repeat steps 1 - 3 until equipment/supplies are free of any visible manure or other organic matter.
5. Disinfect equipment/supplies so all surfaces are thoroughly wet. Use one of the effective disinfectants (listed at right) for PEDV according to label directions with the correct concentration and proper contact time.
6. Rinse and allow equipment/supplies to dry completely prior to the next use.

Effective Disinfectants

- Synergize
- Virkon S
- Tek-Trol
- 1Stroke Environ
- Clorox

To test for cleanliness, Swiffer wipes can be used. If Swiffer wipes are soiled after wiping the equipment and supplies, the items are still dirty and steps 1 - 6 should be repeated.

Activity 3 – Proper Cleaning and Disinfection

Objective: To demonstrate how proper cleaning and disinfection is key to killing disease pathogens and an important component of a biosecurity plan as a way to minimize the risk of PEDV transfer.

Materials:

- Glo Germ kits, containing Glo Germ powder and/or Glo Germ gel and UV light/black light (available through www.glogerm.com or other science supply stores)
- Feed pans, show whips, or other show supplies
- 2 - Pails (1 used for cleaning and the other used for disinfection of item)
- Water source (for cleaning items)
- Brush (for scrubbing during cleaning process)
- Soap (dish soap can be used during cleaning process)
- Disinfectant (Any one of the effective disinfectants against PEDV)

Timeframe: 10 - 15 minutes

Instructions:

- To save time, you may want to split the youth into 2 groups. One group does part 1 of the activity while the other group does part 2 of the activity. Bring both groups together to discuss what each group did and what it means in terms of proper cleaning and disinfection of items.

Part 1

- Have some of the youth walk outside or into another room (prior to the exercise place some Glo Germ on the floor/ground so they walk through it)
- Ask the youth if they think any transmission of PEDV happened by them walking from one area to the next
- Shine the black light on the floor/ground where the youth walked through the Glo Germ and tracked it other places with their shoes. This demonstrates how PEDV can be transferred on our shoes or clothing without us visibly seeing we are tracking PEDV around. (Note if this is done outside, concrete ground surface will work better than grass or gravel.)

OR

- Put Glo Germ on the bottom of the shoes of some of the youth and have them walk to other areas of the room. (Note if this is done outside, concrete will work best for youth to walk on.)
- Ask the youth if they think any transmission of PEDV happened by them knowingly walking around with Glo Germ on the bottom of their shoes. Remind youth the Glo Germ is similar to if they walked around with pig manure on their shoes.
- Shine the black light on the floor/ground where the youth walked. The Glo Germ residue should glow on the floor where they walked. This demonstrates how PEDV can be transferred on our shoes or clothing without us visibly seeing we are tracking PEDV around.

Part 2

- Rub Glo Germ on a feed pan, show whip, or other show supplies you have access to and shine the black light on the item to show the youth the item is contaminated with PEDV. Areas that glow indicate areas that are contaminated with PEDV.
- Clean the item with just water (best not to use a brush, or if used, don't use it to scrub vigorously)
- Ask youth if they think the item got cleaned by only using water.
- Shine the black light on the item. It should glow where the Glo Germ was applied. This demonstrates that cleaning with water alone does not kill PEDV.
- Clean and disinfect the item using the Proper Cleaning and Disinfection process outlined earlier in this lesson.
- Ask the youth if they think the item got thoroughly cleaned this time.
- Shine the black light on the item. If there is still Glo Germ residue on the item, those areas will glow and show the item still isn't clean and is carrying PEDV.
- Repeat the cleaning and disinfection process until all Glo Germ has been removed and residue doesn't glow under the black light. This will demonstrate the importance of proper cleaning and disinfection is needed to kill PEDV.

REFLECTION QUESTIONS

- What did you learn as you did the activities in this lesson?
- What does PEDV stand for? **Porcine Epidemic Diarrhea Virus**
- What clinical signs may you notice from your pigs if they have PEDV? **Diarrhea or feces that is softer than normal. Vomiting may occur, but not always with grow-finish sized pigs. Pigs may also not eat and drink as much as they would if feeling well.**
- How is PEDV transmitted? **Through pig to pig contact, or a pig coming in contact with PEDV contaminated clothing, footwear, supplies, equipment, and vehicles.**
- What is the best practice you, as swine exhibitors can follow to reduce the risk of PEDV transmission? **Have a biosecurity plan, which includes proper cleaning and disinfection of clothing, footwear, supplies, equipment, and vehicles.**
- How can you use what you learned in the future?

SPECIAL NOTE

Even though the focus of this lesson is biosecurity for PEDV, the concepts relate to other swine diseases as well.

GLOSSARY

Clinical signs: indicators of disease seen when doing visual observation of the pig

Commingle: to bring together unrelated pigs into direct contact with each other in one location (by pen, barn, or show ring).

Contaminated: something that contains or carries a disease-causing agent

Dehydration: an abnormal loss of water from the body

Fecal or Feces: manure

Mortality: death

Organic Matter: material such as manure, straw, wood shavings, etc.

Pathogen: causes disease, such as a virus, bacteria, or other microorganism

RESOURCES:

A Champions Guide to Youth Swine Exhibition: Biosecurity and your pig project. National Pork Board and American Association of Swine Veterinarians. 2013.

Masker, C. *Biosecurity for Youth.* Pork Information Gateway. 2012.

Porcine Epidemic Diarrhea Virus (PEDV). U of MN Center for Animal Health and Food Safety. 2013

Porcine Epidemic Diarrhea Virus (PEDV) - What Is It?. National Pork Board. 2013.

Youth PQA Plus manual. National Pork Board, 2014, ed.

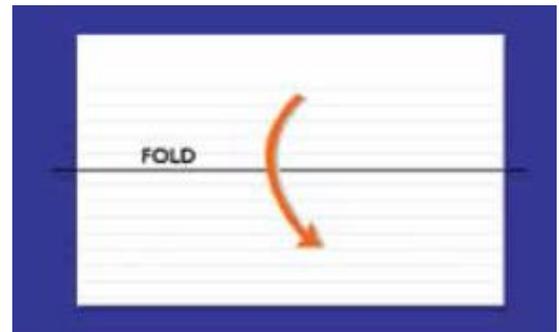


MEMBER HANDOUT – ACTIVITY 1

Swine

STEP THROUGH THE HOLE

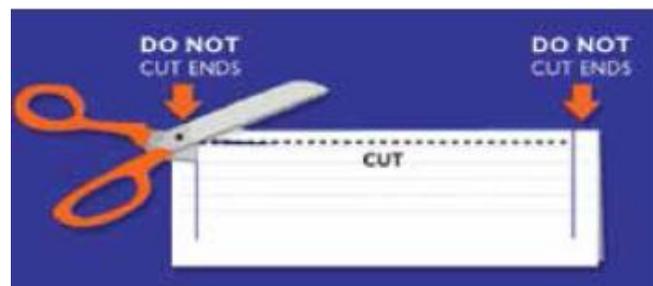
1. Fold the paper in half, the short way (also known as “hotdog” style).



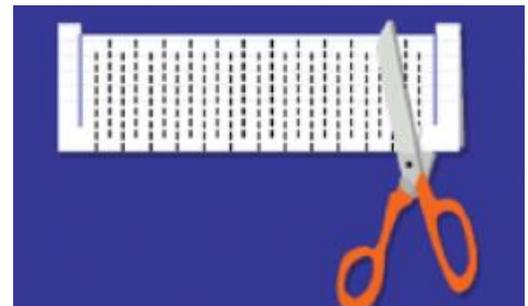
2. Cut two slits near the right and left edges of the folded paper, each perpendicular to the fold. The cuts must come down from the folded half, NOT up from the unfolded edges. Be sure NOT to snip off the ends of the paper.



3. Cut off the folded edge from slit to slit, being careful not to cut the fold at each end.



4. Then, make about 40 cuts (doesn't have to be exact) with your scissors. Alternate each cut, first coming down from the unfolded edge, then coming up from the folded edges. The cuts should be parallel and evenly spaced to each other.



5. Finally, open up the whole sheet. It should unfold kind of like an accordion. If you did it right, the hole is big enough for you to squeeze through!


MEMBER HANDOUT – ACTIVITY 2

Swine

TRANSMISSION OF PEDV

You must identify a potential PEDV transmission risk before you can prevent it.

Identify potential PEDV transmission risks associated with your 4-H pig(s)	How could you prevent the PEDV transmission risk?
<i>Example: pigs brought to the fair can transfer PEDV to other pigs at home or to the neighbor's pigs.</i>	<i>Example: Make arrangements to market pigs directly after fair & DO NOT bring them home. If pigs must return home, isolate them from other pigs & make sure strict biosecurity practices are followed to reduce disease transfer to other pigs.</i>



MEMBER HANDOUT

Swine

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4. How is PEDV transmitted?
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6. How can you use what you learned in the future?