This will be the third winter since the porcine epidemic diarrhea virus (PEDV) first found its way into the U.S. swine herd. Thanks to a collaborative effort to help combat this costly disease, the pork industry is warily optimistic that the worst is past. However, questions remain.

“Little was known about PEDV before it was identified in U.S. swine herds,” said Lisa Becton, DVM, director of swine health information and research for the Pork Checkoff. “And what we did know, much of that was from the late 1970s and early 1980s in Europe. In recent years, outbreaks in Asia shed some light on clinical signs and symptoms in animals.”

Today, the pork production sector has many more answers about PEDV than it did in May 2013, but more solutions are still needed. Answers about how PEDV entered the United States remain elusive, but there is a clearer understanding of how the virus is transmitted between farms and the importance of biosecurity, Becton said.

“We have learned a lot about herd immunity and vaccination,” said Harry Snelson, DVM, communications director for the American Association of Swine Veterinarians (AASV). “We have discovered that sanitation is critical during transport and at swine concentration points, such as buying stations and packing plants.”

Of course, PEDV has provided a harsh lesson by showing how susceptible the U.S. pork industry is to the introduction of exotic pathogens and how the domestic production system allows for transmission between farms.

“Production losses from PEDV are bad enough,” Becton said. “But if the outbreak had been Foot-and-Mouth Disease, Classical Swine Fever or African Swine Fever, the fallout would have been multiple times worse.”

“PEDV has highlighted the need to understand the source of on-farm inputs and their potential to carry and transmit pathogens,” Snelson said. “We need to understand vulnerabilities at the national level and at the farm level, and the industry has to take responsibility for its own protection.”

For swine veterinarians, that means continued work with clients to stress the importance of enhanced biosecurity and sanitation, to conduct diagnostics and to advise ways to maintain herd immunity, Snelson said.

Producers need to be cautious about inputs, vehicles, products and people coming onto the farm, particularly from foreign countries, Becton said. They also need to participate in state and federal animal-disease traceability programs by registering premises, recording animal movement, and using premises identification numbers on laboratory submissions.

“Work with your veterinarian to design and evaluate herd health plans,” Becton said. “If something looks wrong on your farm, contact your veterinarian and animal health officials immediately.”
Collaboration Helps Shed Light on PEDV

Once PEDV was identified, understanding more about the virus became a priority for the pork industry in order to expedite effective control and prevention.

“The multi-disciplinary PEDV Task Force was formed in June 2013 and interacted on a weekly basis for over two years to ensure that research efforts were focused and prioritized to produce usable, effective results,” said Russ Nugent, chair of the Pork Checkoff’s Swine Health Committee. Funds were secured and proposals submitted to the Swine Health Committee for review.

“Fourteen projects were funded in 2013, 35 projects in 2014 and two so far in 2015,” Becton said. “Researchers post periodic updates of all of the projects at pork.org/PEDV, which has been key to the quick pace of finding answers.”

Collaboration with other organizations within the United States and Canada also has been part of the ongoing, industry-wide commitment to finding answers quickly.

What We Do Know:

**Virus Characteristics:**
- PEDV affects all ages of pigs, with neonatal piglets the most severely affected.
- After infection, the virus is shed in very large amounts for up to three to four weeks.
- The virus is highly contagious and a very small amount is required to infect a naive pig.
- Symptoms include diarrhea, vomiting, being off-feed and being lethargic.
- Nearly 100 percent death loss occurs in piglets at less than seven days of age.

**Virus Survivability:**
- PEDV survives well at cold temperatures and high humidity.
- It survives in pits, manure slurry, recycle water and feed ingredients.
- PEDV can be killed in trailers heated to 160˚ F for 10 minutes or to 68˚ F for seven days (scraped free of manure).
- Removing manure can reduce virus survival time.
- Commonly used disinfectants can kill PEDV.

**Virus Immunity:**
- Feedback is a viable way to build herd immunity.
- Immunity from feedback can last upwards of seven months.
- Diagnostic tests are available to interpret the herd immunity status.
- Available vaccines can aid management and control.

**Feed Issues:**
- Processed products, such as spray-dried plasma and other rendered products, are low-risk if manufactured using the current Best Management Practices.
- Mechanical contamination of feeds, ingredients and systems can occur; biosecurity measures should focus on how to minimize such contamination.
- PEDV can survive in different feed ingredients, with some feeds or ingredients more favorable for virus survival.
- Point-in-time treatments, such as irradiation or pelleting, can reduce PEDV infection risk, but post-processing contamination still can occur.
- Chemical additives hold promise to eliminate PEDV in feed, but more research is needed.

What We Don’t Know:

- How did the virus enter the United States? Was it through equipment, feed ingredients, transport containers, live animals or something else?
- Will current industry biosecurity protocols prevent the occurrence of yet another new disease?
- Why were PEDV losses much less severe than expected last winter?

“Now knowing that feed ingredients and the entire feed-supply chain can support PEDV transfer, we need to take the biosecurity concept to the mill and emphasize it throughout the entire feed production and delivery system,” said Jason Woodworth, research associate professor at Kansas State University.

“Future research and focus in this area will not only benefit PEDV mitigation, but also will help prevent the unintentional spread of other hazards that we may not realize is happening today,” he said.

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Prepare Now to Prevent PEDV this Winter

For a combination of reasons, PEDV surfaced late last winter and its impact was relatively mild. But is that likely to be the case this year? Both producers and veterinarians are concerned.

“Since sow herds turn over at a rate approaching 50 percent annually, immunity levels may be low as we enter cooler weather in which the virus thrives,” said the American Association of Swine Veterinarians’ Harry Snelson, DVM. “While feedback can stimulate immunity, current vaccines appear less efficacious in naive animals.”

Paul Yeske, DVM, with the Swine Vet Center in St. Peter, Minnesota, suggests producers review and strengthen biosecurity protocols before winter. He emphasizes these areas:

- Manage biosecurity around fall manure pumping. If using a custom applicator, make sure that the schedule moves from PEDV-negative herds to PEDV-positive ones to avoid cross-contamination. Have the discussion now, before the custom applicator shows up at the farm.
- Establish a visible line of separation that restricts outside personnel. Specifically, limit animal haulers’ access to the truck or trailer. Load-out crews should not re-enter buildings without first washing up and changing coveralls and boots.
- Make sure everyone understands and properly executes the line of separation. Don’t let people get complacent.
- Verify animal transport vehicle protocols, including how vehicles are cleaned, disinfected and dried inside and out after every use. Start by removing all bedding and debris. This costs more, takes time and is challenging in the winter, but is critical.
- Remove and contain coveralls and boots worn at a production site or packing plant before entering the truck cab so as not to contaminate it. Wash coveralls and boots at a non-production site.
- Implement a “bench procedure” for entry into the farm. A more distinct line of separation establishes procedures to leave attire on one side of a changing room/bench and clean attire on the other to minimize potential contamination into the barn.

The bottom line: Assume every site, vehicle, feed truck, piece of equipment or other objects are risks. For more biosecurity guidelines, go to pork.org/PEDV.

Don’t Forget the Finishing Phase

With the dramatic impact of PEDV on piglets, other production areas are easy to overlook. But don’t forget about growing and finishing pigs, Yeske said. Here’s why:

1) PEDV will slow finishing pigs down by about five days.
2) The more virus in a system or in an area, the greater the risk to other sites. “PEDV sheds in very high concentrations,” he said. “We’ve seen breaks begin when producers top out a market-hog load and when isoweaned pigs are moved to a site.”

Clinical signs in grow/finish pigs include profuse, watery diarrhea that spreads rapidly. Without an accurate diagnosis, you couldn’t tell it apart from TGE or deltacoronavirus. To do that, send stool samples or oral fluids to a diagnostic laboratory.

“Producers need to think about how to continue to limit risk,” Yeske said. “Fewer positive sites means you’re less likely to contaminate other parts of a system.”

For More Information:

PEDV has challenged biosecurity protocols and added new considerations, such as feed, manure and transportation. To provide on-farm guidance and solutions, the Pork Checkoff offers more than 20 free, downloadable PEDV-related facts sheets at pork.org/PEDV.

Topics include diagnostic and testing guidelines for the breeding herd through the finisher, handling mortalities, manure pumping and land application and truck wash recommendations. Producers can get a complete, bound set by ordering PEDV Resource: PEDV Brings Its Worst. Pork Checkoff Brings Its Best.

Other PEDV resources, including Pork Checkoff-funded PEDV research reports, are available at pork.org/PEDV. The American Association of Swine Veterinarians has established a PEDV section for producers and veterinarians on its website at aasv.org.
PEDV Teaches Hard but Worthy Lessons

During the past two years, Russ Nugent has been in the middle of efforts to fight porcine epidemic diarrhea virus (PEDV). The Pork Checkoff Swine Health Committee chair is director of technical services for the Pork Group, Inc., a wholly owned subsidiary of Tyson Foods, Inc. He’s been impressed by how many diverse groups have come together to share their expertise to help the pork industry. There have been many lessons along the way, but there are two that stand out, Nugent said.

“First, ‘acceptable’ biosecurity is not a static definition,” Nugent said. “Many farms were practicing what was perceived as acceptable levels of biosecurity, yet they were inadvertently dragging PEDV into and around their production systems. The level of risk management and new biosecurity processes to control and prevent PEDV has been a paradigm shift for our industry. We have to constantly update biosecurity and risk-management decisions as the pathogenic landscape evolves.”

The second lesson is that we are truly a global economy and marketplace, he said, with many inputs, such as feed ingredients, imported and exported all over the world every day. Some are directly related to pork production; many are not. But any one of these can present a risk to the U.S. pork industry.

“PEDV has illustrated that we are not necessarily safe from swine pathogens that exist only on other continents,” Nugent said. “We have to aggressively and proactively be vigilant against potential pathways to U.S. exposure.”

To do that, Nugent encourages producers to access the broad portfolio of materials to keep them informed about the battle against PEDV.

“Brilliant researchers and veterinarians are working on this virus on behalf of U.S. pork producers,” Nugent said. “We should all be proud and thankful for their efforts.”