

## How long does immunity last?

We are expecting incidence of PEDv to increase as cold weather approaches. This week we had a herd break for its second time, unfortunately. This herd first broke in May, 2013 and experienced a “typical” severe loss due to preweaning mortality. The veterinarian conducted an exposure program and closed the herd to gilts in June. Litters were tested by PCR for PEDv and after 4 sequential negative tests and 140 days closure, the herd was opened to PED naïve gilts. The herd remained clinically quiet and then broke last week and was confirmed on Monday as PEDv infected. A question we all have is, “how long does immunity last?” And specifically for this herd, might the clinical loss be less severe in the sows that were present for the first break? You may recall an earlier SHMP describing a similar herd (SHMP 2014-06-27 [pedv re-exposure case report]). As reported by Dr. Ackerman in that outbreak, so far, the veterinarian in this break believes the older sows have at least some protective immunity.

We performed a challenge experiment in sows recently and Dane will be presenting the preliminary results at Leman Conference on Tuesday (“Last Minute Topics” breakout session). We submitted an abstract for the AASV research session and have printed that below for your information. Watch for more information in upcoming issues of SHMP. Bob Morrison

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### Previous infection of sows with a “mild” (variant) strain of PED virus confers significant protection against infection with a “severe” (prototype) strain

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After whole herd exposure to Porcine Epidemic Diarrhea virus (PEDv), breeding herds rapidly develop immunity which reduces the severe pre-weaning mortality experienced during the acute phase of the outbreak. Cases of infection with a variant of PEDv (OH851) have suggested milder clinical impact and faster return to baseline production. The variant is genetically very similar to the two prototype PEDv clades, but has enough insertions and deletions in the sequence to differentiate it phylogenetically. It is important to discover if infection with this PEDv variant confers immunity to infection with the more severe prototype PEDv.

To evaluate whether previous infection with the variant PEDv offers clinical protection during a prototype PEDv outbreak, an experimental challenge study was performed. Twenty one parity 2+ sows were selected from two similar sow farms within the same production system. Herd “1” had no detectable previous infection with PEDv (evaluated with herd health history, PEDv RT-PCR and PEDv IFA results. Herd “2” had been infected with variant PEDv approximately 6 months prior to the experiment and had since eliminated the virus. Ten sows were chosen from the herds (5 from each) and were transported to a BSL-2 animal isolation facility at the University of Minnesota (UMN) to form experimental group “A: Previously not infected & Challenged,” and group “B: Previously infected & Challenged.” Five more sows were selected and stayed at each herd forming experimental group “C: Previously not infected & not challenged,” and “D: Previously infected & not challenged.” One sow was also transported from the non-infected herd to the isolation unit at the UMN as a negative control.

Sows were delivered to the isolation facility at day 108 (+/- 1 day) of gestation. Challenge-exposure with prototype PEDv was conducted at day 109. Sows in groups A & B were challenged with 15 mL (20 Ct) cell culture prototype PEDv. After monitoring for clinical signs and PED RT-PCR through day 3 post-farrowing, challenge was determined to have failed. Challenge exposure was performed again with 1 mL (18 Ct) mucosal scraping to the piglets orally and 2 mL to the sows. Sow feces, piglet feces, and colostrum/milk samples were collected from each litter 3 times during the first 7 days of lactation to evaluate immune correlates of protection. Piglet weights were taken at farrowing and 7 days lactation. Piglets were euthanized at 7 days lactation and necropsied. Sections of small intestine were collected and IHC was performed.

Groups C & D sows remaining at their breeding herds experienced no signs of clinical infection with PEDv. Preliminary results indicate a significant difference in immunity over the first 4 dpi in suckling piglets from previously infected sows and naive sows. Furthermore, results indicate that infection with variant PEDv as long as 6 months prior to re-infection with prototype PEDv does confer some immunity to infection with prototype strain.

A limitation of the study was the truncated timeline of infection due to the failed initial sow inoculation which prevented natural inoculation of piglets via the environment at farrowing. The first challenge day was intended to be close enough to farrowing to avoid development of sow immunity from the experimental exposure by days post-farrow<sup>1</sup> while assuring that sufficient virus would be shed to infect piglets. Piglets were inoculated 3 days post-farrowing to mimic natural infection once inoculation failure was apparent. Further differences between experimental groups might have been realized with the intended 7 days post-inoculation.

### References

1. Hesse D. et al (2013). Oral/nasal inoculation of four-week-old pigs with PEDV: Tissue tropism, shedding, carriage, antibody response, and aerosol transmission.