PED and boars: Research update

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Introduction

PED shedding and infectivity in boars has not been previously described. In the field, PED has been found in semen from infected boar studs.[1] It is unknown whether the source of PED virus in the semen is from the reproductive organs of the boar, or from cross contamination. The objectives of this stud were to determine:

1. If PED virus can be identified in the semen of infected boars.
2. To determine (if identified) whether the virus is a fecal contaminant or the result of systemic infection or cellular trafficking from an intestinal infection
3. Observe semen quality parameters for relevant changes.

Materials and methods

Ten mature synthetic line boars were used for the study. Two remained at the source stud to serve as controls and 8 were transferred to the research site. All 10 boars were sampled 6 days prior to inoculation via feces, fecal swabs, oral fluids (taken with a disposable syringe from the oral cavity), preputial swabs, and semen. All samples were found to be negative on PCR for PED, TGE, and Delta Corona Virus. The source farm was also known to be negative through routine testing for PRRS virus and *Mycoplasma hyopneumoniae*. All testing throughout the study was performed at the University of Minnesota Veterinary Diagnostic Laboratory. The 8 treatment boars were moved to the research site on day 0, and tested negative on PCR after arrival for PED, Delta Corona Virus, and TGE on feces, fecal swabs, oral fluids, and preputial swabs. The collection dummy was also sampled and tested negative on an environmental swab. All Swab tests throughout the study were performed using a polyester tipped swab and diluting the swab into 0.7 ml of PBS. Fecal swabs were taken by swirling the swab into the feces and then dilution with 0.7 ml of saline. Preputial swabs were taken as follows: prepuce wiped with paper towel, prepuce partial evacuated, prepuce manipulated to expose opening, swab inserted into preputial diverticulum, swab diluted with 0.7 ml of PBS. All oral fluid samples were taken using a disposable plastic syringe and sampling directly from the oral cavity. Dummy Swiffer samples were taken by saturating the Swiffer wipe with 25 ml of PBS and wipe the top and back portion of the dummy. The treatment boars were divided into two groups, to allow for sampling of some boars at 12 hour intervals and the anticipation that the onset of clinical signs could be within 48 hours. Rectal temperatures were taken at each sampling period for all boars. Feces was taken directly from the rectum. The dummy Swiffer sample was taken after each sampling period and also prior to collection on day 6. The dummy was washed with water and sanitized with Virkon after each collection period. The sampling schedule is detailed in Table 1. All treatment boars were euthanized and necropsied at the University of Minnesota at 7 days post-exposure.

Collection method

A three glove collection method, commonly used in boar studs, was utilized. Two different hand grip positions were used to determine if the ideal grip position of a free catch collection would result in less contamination than the non-ideal grip position of having the semen run across the glove during collection. The collection procedure was as follows:

1. Evacuate Prepuce with gloved hand (first glove)
2. Wipe preputial area with paper towel
3. Dispose of towel and glove
4. Grasp penis with paper towel and gloved hand (second glove)
5. Fully extend boar
6. Roll second glove off over penis/paper towel
7. Temporarily grasp with other hand
8. Slide second glove/paper towel off end of penis and re-grasp penis with clean gloved hand (third glove)
9. With shaft of penis elevated, collect semen into cup either
    1. Free catch – 4 boars
    2. Semen allowed to run through gloved hand – 4 boars

Exposure to PED virus

Intestinal feedback material was used from an infected farm and contained the intestines of 20 infected piglets. The material was thawed and stirred to homogenize, weighed and divided into equal portions of 100 grams per boar, and added to 2 lbs. of feed. An equal portion was submitted to the Diagnostic lab and tested at CT = 23.68 on PED PCR and was negative for Delta Corona Virus, TGE, and Salmonella.

Semen quality analysis

Automated morphological assessment was done on day -6 and day 6 using an IVOS II CASA (computerized

automated sperm analysis) equipment at Swine Vet Center. DNA integrity analysis was done by Kuster Research and Consulting.

Results and discussion

The first clinical sign was lethargy, exhibited on 2 of 8 boars at 36 hours. Lethargy and off feed were observed on 4 of 8 boars at 48 hours. 2 of 8 boars showed no clinical signs through day 6. None of the boars had any significant fevers through the time of euthanasia on day 7.

Semen results

PED negative semen samples were obtained using both grip positions. There was 1 positive sample on day 4 and 2 suspect samples on day 6 using the method that allowed semen to run over the glove. There was only 1 suspect sample using the free catch method, which was on day 6. Preputial fluid, environmental (dummy Swiffer), feces, fecal swabs, and oral fluid samples were also positive on the 1 semen positive sample.

Reproductive tissue results

There were no lesions and all samples were negative on reproductive tissues (prostate, bulbourethral gland, seminal vesicle, and testicle). There were some positives on PED on bulbourethral gland and prostate. Those positive results were not associated with lesions however.

Feces and fecal swabs

Feces was the most sensitive sample method for PCR and detected virus the soonest. 2 of 8 boars were positive on feces at 48 hours. Fecal swabs first detected virus at day 4 (samples were not taken on day 3), and were strong positive at that time.

Preputial swabs and oral fluids

Both preputial swabs and oral fluids also detected virus for the first time on day 4, but were not as strongly positive as feces or fecal swabs.

Dummy Swiffer

The dummy Swiffer first detected virus on day 4, and was a strong positive. Disinfecting with Virkon did not eliminate the detection of virus two days later prior to collection.

Semen quality

Two of the boars used in the study had a history of poor semen quality and this remained throughout the study. None of the boars showed any significant differences in automated morphology results 6 days prior to exposure compared to 6 days after exposure. 4 of the 6 treatment boars that had acceptable morphology before the trial showed an increase in the percentage of DNA damaged sperm when comparing the evaluation at 6 days after exposure to the evaluation at 6 days prior to exposure. There was no change in the control boars on DNA integrity.

Conclusions

PED virus can be found in the semen of infected boars. Boars first showed symptoms by demonstrating lethargy at 36 hours after exposure. Following current recommended collection procedures, the detection of virus in the semen was 1 positive and 3 suspect samples out of 32 ejaculates obtained from 12 hours to 6 days post-exposure to PED virus. At necropsy, there were no lesions or IHC positives on any reproductive tissues, although bulbourethral and prostate glands tested weakly positive on 2 of 8 exposed boars. This was believed to be due to cross contamination on the necropsy floor or with virology preparation.

The contamination of semen with PED virus from infected boars could be more likely with poor collection technique, or with boars that present difficulties during mounting and collection and should be considered to be a possible risk to downstream farms. In this experiment, clinical signs presented prior to virus detection. Daily observation of clinical signs as well as sampling of loose, lethargic, or off-feed boars is recommended to stop semen distribution prior to potentially distributing contaminated doses.

References

1. Kurt Rossow. Personal communication.

Table 1: Sampling schedule

Material Sampled	Day -6 all boars	Day 0 all boars	12 hours Group 1	24 hours Group 2	36 hours Group 1	48 hours Group 2	Day 4 all boars	Day 6 all boars	Day 7 Tx boars
Feed at source farm	X								
Feed at study farm	X								
Semen	X		X	X	X	X	X	X	
Feces	X	X	X	X	X	X	X	X	
Fecal swab	X	X	X	X	X	X	X	X	
Oral fluids	X	X	X	X	X	X	X	X	
Preputial swab	X	X	X	X	X	X	X	X	
CASA morphology	X							X	
Flow cytometry	X							X	
Necropsy									X