Investigating PEDv Infections and Lessons to Improve Biosecurity in Finishing Pigs

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Introduction

Since the initial introduction of PEDv into the U.S. swine herd, acclimation and biosecurity practices to protect sow farms have dramatically improved. This has resulted in low yearly sow farm incidence levels. However, the incidence of PEDv infections in the growing herd has not been established on a national basis. Seaboard Foods initiated a rigorous testing scheme to better understand PEDv infection dynamics in the finishing pig population. The long-term goal was to eliminate PEDv from the finishing pig population and therefore decrease the risk of PEDv breaks system wide.

Materials and Methods

At the outset, PEDv status for all commercial finisher farms operated by Seaboard Foods was unknown; a total of 266 sites located in CO, western KS, and the OK/TX panhandles. To characterize and surveil farms, a three-part testing scheme was initiated to establish health status for each finishing site. All samples were tested by Triplex PDT PCR at ISU VDL (Ames, IA). Farms collected samples as follows: 1 oral fluid per barn, 1 week pre-ship (PST); 1 composite Swiffer, 1 week post placement (PP); and, 1 composite Swiffer, any time scours were observed (CS). All samples with a Ct <30 were considered positive while samples with a Ct ≥30 were considered genetic material. If no scours were present at sites with a Ct ≥ 30, the site was considered negative. Farms were classified as stable (PEDv original, PEDv indel and PDCoV neg), line 2a (PDCoV or PEDv indel positive) or line 2b (PEDv original positive) based off the most recent test submitted. After 30 weeks of sample collection, epidemiological analysis of the surveillance data was used to describe new introductions in regards to prior status, region and age of pig. PEDv introductions were defined as anytime a site moved from stable to line 2a or line 2b.

Results

Over the 30 weeks of data available, the virus was introduced into 117 stable sites 123 times. One geographical area had a greater proportion of introductions when compared to the rest of the system. This geographical area is composed of an 800,000 head space finishing complex in western KS which shares multiple resources. The highest percentage of introductions (57.4%) occurred from a negative PP test followed by positive CS (Table 1). The mean time between the negative PP and positive CS was 8.8 weeks (Table 2).

Conclusions

The high percentage of negative PP to positive CS and high proportion of introductions into one geographical area indicated PEDv virus was being introduced via fomites. This justified investment in multi-site and site specific equipment (ex-dead haul trailers, sort boards). After the segregation of equipment, retesting of sites 8 weeks after initial diagnosis was implemented. The overwhelming majority of them returned to a stable status thus implicating shared equipment as a means of disease transmission. There were status downgrades in sites that never showed any clinical signs. This emphasizes the importance of a robust monitoring scheme. Overall, this process shows that it is possible to dramatically decrease PEDv pressure in a system.

Table 1. Overall frequency of parts responsible for status change.

From negative in:	To positive in:				Total
	Missing Data	CS	PP	PST	
Missing	1	1	0	0	2
CS	0	0	0	4	4
PP	0	75	2	14	91
PST	0	16	15	1	32
Total	4	92	17	19	129

category	Freq.	Percent	Time (days)	
			Mean (Std.Dev)	Median (IQR*)
CS_PST	4	3.1	10.25 (6.90)	12 (5 - 15.5)
PP_CS	75	58.14	8.84 (3.61)	9 (6 - 12)
PP_PP	2	1.55	6.00 (1.41)	6 (5-7)
PP_PST	14	10.85	15.50 (4.24)	16 (14 - 18)
PST_CS	16	12.4	6.81 (5.24)	5 (2 - 10)
PST_PP	15	11.63	4.73 (1.58)	4 (4 - 6)
PST_PST	1	0.78	8	8

Table 2. Time between last negative sample to first positive sample responsible for status change.

*IQR=Interquartile range