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Risk factors for sow farms becoming chronically infected with porcine epidemic diarrhea virus (PEDV)

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Materials & Methods

The questions from the survey were compared to the outcome of the farm at the time of the survey (typically 70-90 days post-outbreak). The outcome of the farm at that time was established to be a subjective, categorical variable based upon the pattern of pre-wean mortality after the outbreak. Farms were evaluated by a single person and categorized into 1 of 3 patterns during the first 90 days after the outbreak. Pattern 1 was determined to be an "Acute" pattern, which would be characterized by 3-7 weeks of high mortality followed by weekly pre-weaning deaths returning to baseline (10 weeks prior to outbreak). Pattern 2 was determined to be a "relapse" pattern, characterized by high mortality during the first 3-7 weeks followed by a return to more normalized production, but then a relapse of clinical signs and elevated pre-weaning mortality for a time period before elimination of clinical signs and return to baseline pre-weaning mortality. The relapse would typically be between 8 and 15 weeks after the initial outbreak and characterized by pre-weaning mortality of 1.5-2.0 times above baseline. Pattern 3 was determined to be a "chronic" pattern, characterized by high pre-wean death loss during the first 3-7 weeks, which then remained elevated for a long period of time after the initial outbreak. Pre-weaning death losses would be from 2-3 times baseline pre-weaning mortality. [please refer to AASV 2015 Proceedings for complete description]

Results & Discussion

Only those parameters that had p-values less than 0.10 were included in the results section. All other parameters were not significant when comparing the parameter against which pattern type it was most closely associated with.

Farrowing house design

The type of farrowing house was very significant where hotel style farrowing barns were associated with more rapid clean-up and return to normal production than walk-through farrowing house design. This is most likely due to more foot traffic through walk-through farrowing barns since the person may have to walk through multiple infected rooms in order to get to the end room in a farrowing barn of this style. It was found to be more difficult to control foot traffic and ensure proper cleaning and disinfection of footwear in this style of barns compared to hotel style, where a common hallway could be easily washed and disinfected and boot changes could be more easily implemented.

Day 1 pig care

Day 1 pig care was generally ceased until the farms attempted to begin to save pigs again (typically 17-21 days after initiation of feedback process). After that period, it was defined as ensuring that all pigs were getting colostrum and then promptly euthanizing any pigs that did not appear to get colostrum or did not have a teat. This was subjective grading done by the attending veterinarian during the survey. This was measured and scored on a scale of "1 – poorly executed" to "3 – well executed." Farms that executed this process well tended to clean up faster than those farms who didn't execute it as well. This is most likely due to the importance of lactogenic immunity transferred and the fact that if pigs didn't get enough lactogenic immunity they would begin to shed virus in high amounts. This would overwhelm the immunity of their litter mates and potentially the entire farrowing barn.

Pigs in crates with no sows

Farms that weaned pigs on-farm early and creep fed for days prior to actual off-the-farm weaning was a risk factor for farms that did not clean up quickly. Those pigs would become clinically affected (many times within hours) after the sow was removed and the lactogenic protection was removed. Farms that ceased that practice during the cleanup phase more commonly had the farm clean up faster than those farms that did not.

All-in/all-out (AIAO) farrowing

Farms that practiced AIAO farrowing rooms tended to clean up faster than those that did not. This was most likely due to the ability to wash, disinfect and dry the rooms prior to the next sows due to farrow being loaded in an effort to break the infection cycle.

Limited foot traffic

Farms that limited and restricted people foot traffic within farrowing barns also tended to clean up quicker than farms that had little to no restriction of movement within infected farrowing rooms. Personnel can serve as an important vector when trying to eliminate PEDV infections from the farrowing house.

Recycle flush water

Many farms use recycle water from the lagoons to flush the farrowing barns. There were a few farms that switched to fresh water to flush the farrowing barns (or did not flush). Those farms that did so, tended to clean up faster from PEDV breaks than those that continued to use recycle water to flush the pits in the farrowing barn.

Other health challenges

Another factor that seemed to correlate to farms having relapses or chronic patterns were those farms that were under other health challenges during the cleanup period. Farms that struggled with PRRS or SIV during the PEDV recovery period were more likely to have relapses or become chronic.

Number of weaning per week

One of the more interesting factors were that farms that weaned more than once per week tended to have more problems recovering from PEDV than farms that weaned only once per week. One potential theory to explain this would be that the more times per week that the farms wean would result in more movement of people, sows and pigs. This would lead to more opportunities for cross-contamination (e.g., dirty hallways) of young piglets, thereby perpetuating the PEDV infection in the farrowing barn.

Non-significant factors

There were some factors that were interesting in that they didn't appear to influence the recovery rate for sow farms. Some that were expected to have an impact that did not upon analysis were: pre-farrow feedback, restricting piglet movements (McREBEL), use of iPEDV (first generation) and changes to processing and vaccination timing.

The factors that appeared to make a difference in what type of recovery pattern a sow farm experienced do reflect some basic principles that are grounded in sound science on what we know about the effect of PEDV viral load in the environment (transmissibility, sanitation, etc.) and the type of immunity (lactogenic) necessary for protection of piglets. While analysis is incomplete (univariate only) and results are only supportive of risk or protective factors, the data presented herein supports the need for further research into those factors that influence the epidemiology of PED (and likely other endemic sow farm diseases) in sow farms. It should be noted that the information compiled through these surveys and analysis by the Murphy-Brown, LLC Veterinary Team actively assisted in providing clear direction to production and contract growers in the efforts to cleanup PEDV on their farms.

Editor's comment: For a complete accounting of this study including full materials and methods, analysis, and results explained please refer to the AASV 2015 Proceedings.

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