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Production and diagnostic findings in problem herds where control of the resident virus is difficult to achieve: field observations and data

Gordon D. Spronk^A, DVM, Scott Dee^B, DVM, MS, PhD, Dipl ACVM

^APipestone Veterinary Clinic, Pipestone, Minnesota; ^BUniversity of Minnesota Swine Center, St. Paul, Minnesota

Introduction

In some sow herds, resident PRRS virus may be difficult to control or eradicate. In these herds, PRRS virus continues to shed or circulate in the adult and weaned pig population and may result in reduced reproductive performance in the sow herd and decreased wean-to-finish performance with an increase in clinical disease.

In many cases, once the sow herd has been exposed to PRRS virus, clinical signs subside and production returns to normal. But in some cases, the same production protocols and PRRS control strategies that appear to be successful on some farms, fail to help other, similar sow farms return to normal production.

“Problem herds” that chronically shed PRRS virus and herds with evidence of acute viral infection will continue to challenge veterinary practitioners as the swine industry begins to contemplate PRRS eradication strategies on a herd, regional, or even national basis. Production protocols and disease control approaches used in “problem herds” may be critical to long term PRRS control and eradication success.

This paper will review the history, clinical presentation, diagnostic testing, sampling procedures and control strategies implemented in sow herds infected with known PRRS isolates that have been difficult to control.

Farm history and clinical presentation

The following is a description of variability in field observations of clinical disease presentation and variability in response to similar PRRS control measures. Four sow farms ranging in size from 3,200 to 3,400 sows, located in Midwestern USA, constructed in the early 1990’s as breed to wean sites (site 1) were selected for comparison.

The goals for these farms are to:

- Produce 1350 or more weaned pigs per week.
- Wean pigs greater than 12 pounds (average weight of a wean group).
- Wean PRRS negative pigs as measured by weekly PCR testing at the time of weaning, clinical presentation in the nursery and subsequent testing in the nursery.

Over the past 6 years, the clinical presentation of PRRS across the four sow farms has been characterized as:

- Normal weaned pig production interrupted by episodes of increased abortions (greater than 2% per week) and poor weaned pig performance (greater than 4% mortality 8 weeks after weaning). These episodes of poor performance would typically last for 12 to 16 weeks after which the sow farm and the nursery would return to normal clinical production.
- A history of circulating resident PRRS virus confirmed by PCR testing at the sow site, in weaned pigs; the same virus sequence being routinely re-isolated.
- Variation in the clinical presentation of PRRS between sow farms. Some farms would have very high abortion rates (up to 600 abortions in a 4 week period) while others had no clinical signs in the sow herd, but severe mortality in the nursery.
- Introduction of “new” PRRS isolates by unknown sources. On some farms, once resident virus was circulating, that same virus was consistently found as measured by PCR testing and sequencing. On others, new viruses (as defined by sequence % similarity) would be found upon the onset of clinical signs.
- Inability to predict weaned pig performance by diagnostic testing. In many cases, the nursery technicians would be able to detect problems in the sow farm before clinical signs and diagnostic testing at the sow farm were able to identify a problem.

Production goals in regards to PRRS on each farm over this time period were consistent: to produce PRRS negative pigs as measured by clinical signs, PCR testing at the time of weaning, and ELISA negative serology 6 weeks later in the nursery.

Diagnostic testing

The diagnostic testing protocol for these farms was developed over a period of 6 years as the ability to consistently meet the above goals was not met.

Routine testing included:

- Serum and tissue submissions on any increase in abortion rate.

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- PCR serum testing of pigs at weaning.
- Monitoring of incoming gilts to confirm PRRS status.
- Sequencing of any isolate to confirm presence of any new virus or re-isolation of an “old” virus.

(both killed and MLV) and serum injections containing resident PRRS virus to the entire sow population and all incoming gilts.

For 2 of the 6 years the above strategies were successful on 3 of the 4 farms as measured by:

- Meeting or exceeding the pig production target on 3 farms.
- Consistently weaning PRRS negative pigs.

PRRS control strategies

Various strategies for PRRS control had been implemented over the past 6 years on each sow farm. These interventions included:

- Gilt developer units (GDU) were added to each site to facilitate growth and health of the gilts entering each sow site. The gilts are grown on-site for entry into the sow herd.
- Biosecurity protocols were reviewed and staff educated on the risk and cost of new viral entry onto a sow site. Examples of changes include; outside doors were modified to include coded, keypad entry to prevent unauthorized personnel entry to the site. Entry of supplies and semen at each site was reviewed and changed to reduce possible entry. Later, composting of all dead animals was added at each site to eliminate the risk of contamination via rendering vehicles.
- Health protocols were implemented to ensure that all gilt entries were PRRS negative.
- Semen was purchased from known PRRS negative sources.
- Internal multiplication strategies were used in farms with the most severe PRRS problems. No gilt entries were allowed onto the farms. A genetic program was put into place that would allow maternal-line replacement gilts to be internally raised and grown on the farm. On-site facilities were remodeled to allow more space and growth time from weaning until 25 to 30 kg.
- Whole herd vaccination with commercial vaccines

The PRRS control strategies in place also appeared to be successful as measured by nursery performance. The above strategies consistently failed on 1 out of the 4 farms as measured by:

Meeting the weaned pig production target.

...but...

Failing to meet the PRRS negative status at weaning. This farm consistently would “shed virus” as measured by PRRS PCR testing in the weaned pigs and as measured by performance in the nurseries.

In late 2005 and into 2006 there was another increase in PRRS episodes across all 4 sow farms even though the same PRRS control tactics were being applied on all 4 farms and were thought to be previously successful. Abortions increased and the piglet quality decreased. The clinical presentation in early 2006 is summarized in **Table 1**.

vField observations

All the interventions that were attempted to consistently produce PRRS negative piglets have failed in these four farms over this 6 year time period.

It is possible that each of the interventions that were attempted were not properly implemented and that we failed to execute protocols that have been successfully described by others. However, upon review of the test results and history of each farm, the following observa-

Table 1: Clinical presentation summary

	Farm 1	Farm 2	Farm 3	Farm 4
Start of most recent clinical break	Week 5 2006	Week 51 2005	Week 1 2005	Week 5 2006
RFLP classification	1-4-4	1-8-4	1-8-4	1-2-4
Previous RFLP classification	1-8-4	1-4-4	1-8-4	1-4-2
% sequence new isolate to old (previous) isolate	91%	92%	86%	86%
Primary clinical signs at sow farm and in weaned pigs	Abortions – over 600 in a 4 weeks period	Sow deaths (177 in 4 wks); few abortions	Poor nursery perf. (>10% mortality)	Stillbirths

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tions are noted:

We do not yet fully understand how PRRS virus is moving between farms. Preventing the introduction of new isolates into a sow population is and will be key to success in the future.

The health of the sow farm dictates the health of the wean-to-finish pig. While this seems intuitively simple, we have underestimated the importance of this simple fact. In many cases the nursery has been able to tell the “health” of the sow farm before any clinical signs are evident at the sow farm. In our experience, the nursery performance “precedes” sow farm health by about 1 to 3 weeks. In other words, nursery performance may struggle for that time period before detection techniques are able to detect PRRS viral circulation in the sow farms.

There is variation in the clinical presentation across sow farms. This subtle change in PRRS clinical presentation has become more evident in recent PRRS episodes. At some sow farms there are severe clinical signs in the breeding herd with little or no impact on wean-to-finish production. On other sow farms, sow farm health and production is considered normal while wean-to-finish health is severely challenged.

Certain isolates seem to be the most severe in terms of impact on wean-to-finish performance. But not all isolates present the same clinical picture or act the same. In the farms described here, only one farm has an isolate severe enough to consider de-population of the herd. Classification by RFLP, while helpful, does not fully explain the differences in clinical presentation. For instance, a common highly infectious isolate that is cited in the literature is “1-8-4”. In our field observations, we have seen this isolate classification possibly explain the severe clinical presentation at one site, but at another, a “1-8-4” virus only presented a ‘mild’ clinical picture of PRRS.

In the 4th quarter of 2005, a decision was made that the health of the sow herd was so critical to long term success that a herd closure program was implemented in farm 3.

The goal of the herd closure plan was to eradicate the resident virus from the animal flow on this farm. This plan is now in progress and if successful, will be used to eradicate PRRS virus from the other sow farms.

If this plan to eradicate this PRRS virus via herd closure fails, the herd will be depopulated.

Summary

The ability to control PRRS activity in the sow farm and weaned pigs is critical to long term success in pork production. This statement is self-evident for any farm or system that has suffered through severe PRRS challenges since the late 1980s.

Many cases may be cited where the inability to successfully manage or control PRRS has resulted in the eventual closure of the farm. In some cases this may be due to poor implementation of health and production protocols. In other cases, it may simply be due to the risk of high local pig/farm density. These field experiences have driven many farms and systems to consider and to implement PRRS eradication programs.

However, some farms and systems are able to meet financial and production targets while living with PRRS. The difference in clinical presentation between farms and systems provide opportunities to discover the reasons for the variation in response to control and management protocols.

This variability that we have observed may be due to differences in the virus itself or it may be a response to different management practices. It is also possible that there are other, yet undiscovered explanations for this variation in clinical presentation and financial impact.

