Porcine reproductive and respiratory syndrome prevalence and processing fluids use for diagnosis in United States breeding herds

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Key Points:

- Processing fluids have been recently adopted by the U.S. swine industry as a breeding herd PRRS monitoring tool due to its increased representativeness of animals within the herd.
- Processing fluids diagnostic submissions started in 2017, around which time the overall PRRS prevalence seasonal pattern changed.
- A higher proportion of system-wide processing fluids use in the year in which the outbreak occurred was associated with increased time to stability (i.e. weaning PRRS-free pigs).

Processing fluids have been recently adopted by the U.S. swine industry as a breeding herd PRRS monitoring tool. The increased sensitivity to detect the presence of PRRS in a given farm when using processing fluids, particularly at lower within-farm prevalence, may rely on the increased representativeness given this sample is generated through routine practices in a large number of 3- to 5-day-old pigs. PRRS prevalence in breeding herds, or the proportion of breeding herds weaning PRRS PCR-positive piglets at a given point in time, is a product of both the incidence (number of new herds where a new PRRS strain is detected) and the time it takes for a herd to eliminate the within-herd transmission of a wild-type or vaccine strain (time to stability).

Here, we used the Morrison Swine Health Monitoring Project (MSHMP) database, representative of approximately 50% of the U.S. swine breeding herds to describe processing fluids submissions for PRRS diagnosis to the University of Minnesota (UMN) and Iowa State University (ISU) Veterinary Diagnostic Laboratories and their relations to PRRS prevalence and time to stability over time between 2009 and 2020.

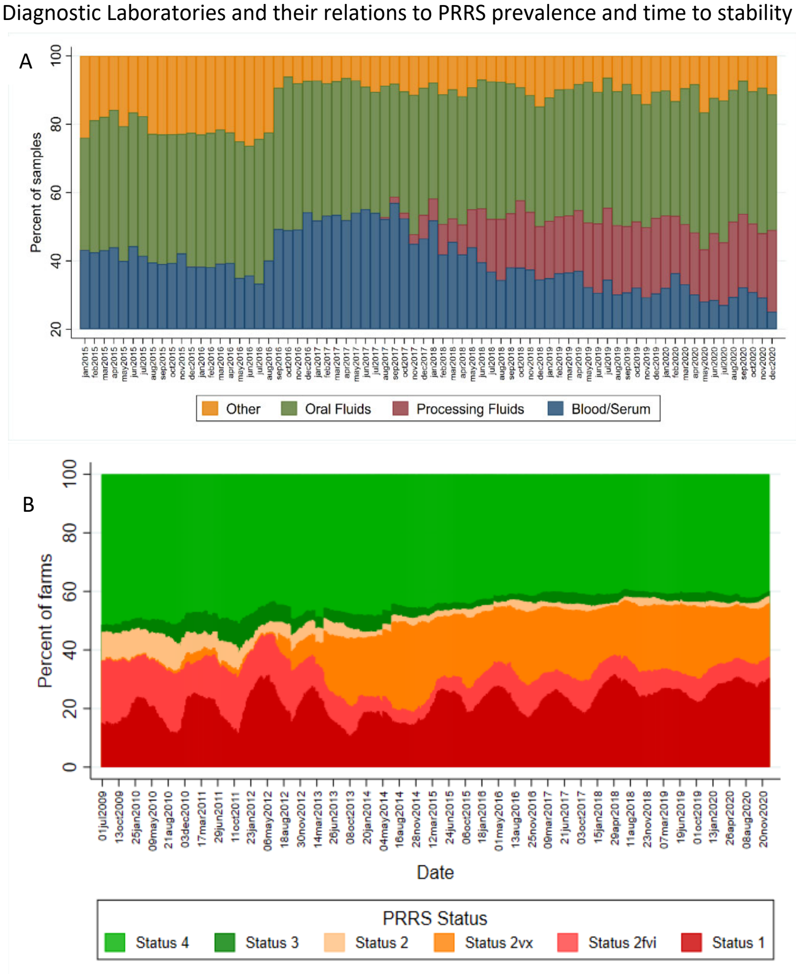

Figure 1. Percentage of sample type specimens submitted for PRRS RT-PCR diagnosis at the UMN and ISU Veterinary Diagnostic laboratories amongst MSHMP participants (A); PRRS prevalence of MSHMP participating sow herd statuses (B).

We illustrated that processing fluids diagnostic submissions increase starting in 2017 (Figure 1A), around which time the overall PRRS prevalence seasonal pattern changed (Figure 1B). The difference between each year's highest and lowest weekly prevalence averaged 10.9% between 2009 and 2017, whereas it averaged 5.0% in the 2018-2020 period. The lowest weekly prevalence in each year ranged from 11.3% to 19.5% in 2009-2017 and from 22.4% to 29.2% in 2018-2020. According to this dataset, processing fluids specimens were submitted starting August 2017 and were frequently used during 2018-2020, comprising 15.2% to 26.5% of all diagnostic specimen submissions for that period.

A total of 1,436 herds had a PRRS outbreak of which 1,203 reached stability within the study period. The median time to stability was lower in sites that detected the PRRS outbreak between 2015-2016 (median 32 weeks; interquartile range (IQR): 19 – 48), before processing fluids started being used, than between 2017-2020 (median 35 weeks; IQR: 22-56; p=0.002), after they were adopted. We also detected an increasing proportion of breeding sites that did not reach stability within one year of reporting an outbreak (chi-square for trend p=0.01). The total time to stability was not associated with the region of the country the site was located, the air filtration status of the site, the PRRS status before the outbreak, or the different statuses a site achieved to be classified as stable, when accounting for the production system in the multivariable model. However, the higher the system-wide use of processing fluids in the year in which the outbreak was detected, the lower the rate to reach stability (i.e. longer time to stability).

Altogether, the temporal concurrence of processing fluids used for PRRS virus monitoring suggests that the adoption of this sampling strategy may help explain the observed changes in PRRS status 1 prevalence since 2018, although further studies are still needed.