RESEARCH ABSTRACT

SWINE HEALTH

Title: Evaluation, optimization, and application of "processing fluids" for PRRSV monitoring in commercial swine herds - **NPB #17-161**

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Date Submitted: 02/04/2019

Scientific Abstract:

Processing fluids (PF) are easily obtained by farm staff under field conditions and represent a unique opportunity to significantly improve current monitoring schemes. Our preliminary work suggests that PF provide the capacity to detect PRRSV at prevalence levels ≤ 5%. The overall purpose of this project was to evaluate the use of PF for PRRSV monitoring through specific objectives: 1) Determine limit of PRRSV detection in PF using a commercial quantitative reverse transcription polymerase chain reaction (qRT-PCR) assay, 2) Optimize serologic assays to detect anti-PRRSV antibodies in PF: compare IgM, IgA, IgG, and IgM+IgA responses and 3) Describe the probability of PRRSV detection using PF tested with qRT-PCR at low prevalence (<5%). Six replications of 8 two-fold serial dilutions were done on a PRRSV-positive PF field sample with known qRT-PCR results using PF from PRRSV-naïve herds and the PRRSV limit of detection (LoD) was assessed. Results from serially diluted PF determined the PRRSV LoD in PF being of only one (1) PRRSV-positive pig out 270 total pigs in the pool, with a 95% confidence level, having only one viremic piglet with a qRT-PCR CT value of 29 in the PF sample. For specific objectives 2 and 3, litter-matched PF and individual pig blood samples were collected from 77 litters under field conditions. Samples were collected from two PRRSV-positive breeding herds at three different sampling points in time after PRRS outbreaks to capture different PRRSV prevalence levels, thus allowing for the assessment of the probability of PRRSV detection in processing fluids using the status of individual pig sera as the reference. Samples were tested for antibody using the IDEXX PRRS X3 Ab ELISA test following the manufacturer's directions, and after making adaptations to the kits. PF samples obtained from PRRSV-naïve herds were used for comparison. IgG, IgA and IgM antibodies were detected in PF. IgG antibody detection showed a clear discrimination between positive and negative samples. The IgA antibody isotype results showed good discrimination between positive and

negative samples, but not all samples detected positives by qRT-PCR were IgA positives. IgM results were not as relevant as IgA results for detection of active or recent PRRSV infection. The probability of PRRSV detection in PF was 72.7% at the individual litter level, as compared with the blood serum (BS) sample qRT-PCR results used as the gold standard method for comparison and to define the true status of the litters regarding PRRSV. However, when pooled by farrowing room or by the whole batch of piglets processed during a day, PF had a probability of PRRSV detection of 100%. At the individual litter level, the Kappa index of agreement between PF and BS sample results was of 0.79 - 95% CI (0.54 – 0.95). PF-based sampling had a lower sensitivity than bleeding all piglets in the litter, but had 100% sensitivity and 100% specificity at the whole room, or whole day level (pooled PF). Data supports that, due to the ease of implementation and the lower cost (relative to individual pig sampling), processing fluids is a robust tool for PRRSV monitoring and surveillance in 3-5 days-old piglets.