

## PRRS monitoring by processing fluids in Italian swine breeding farms

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### Key points:

- Twenty-five Italian breeding herds were monitored for 4–5 months by RT-PCR performed on both processing fluids and blood serum.
- Processing fluids and blood serum agreed in discriminating between herds with stable and unstable PRRSV circulation, but there was a slight discrepancy in classifying high- and low-prevalence within unstable herds.

### Background and methods

Porcine reproductive and respiratory syndrome (PRRS) control strategy within swine breeding farms is based on herd classification related to PRRSV infection status. This study aims to assess the efficacy of a monitoring plan based on processing fluids (PFs) by comparing it with the classification of herds based on the analysis of blood serum.

Twenty-five commercial breeding farms in Northern Italy with herd size ranging from 250 to 1200 sows were enrolled in this study. All herds followed a 3-weeks-batch-management-system and administered a PRRS vaccination protocol using a MLV every four months. The monitoring plan was carried out through two simultaneous sampling protocols: PFs protocol and blood protocol. PFs protocols consisted in collecting PFs from all male piglets aged 3–4 days. Tails have not been collected as routine tail docking is forbidden in Italy. The Blood protocol sampled blood from 30 pre-weaning (at 28 days) pigs following the Holtkamp protocol to determine the PRRSV status. Each batch of pigs was therefore tested with both protocols. To assign a herd to a PRRSV category, at least five consecutive batches were tested with both protocols. Following testing, each herd was assigned to a category. The three categories were, category I-A (Positive Unstable, High Prevalence) when less than 75% of batches tested negative, category I-B (Positive Unstable, Low Prevalence) when more than 75% of batches tested negative, and category II (Positive Stable) when 100% of batches tested negative. The agreement between the two testing protocols in defining the PRRS status was estimated using the caret package in R Statistical Software.

### Results and discussion

Overall, the two testing protocols assigned the same PRRSV category to 18 out of 25 herds (72% accuracy; 95%CI: 51% – 88%;  $p=0.013$ ). In four cases (16%), the blood serum protocol assigned the herds to category I-A, while they were assigned to category I-B based on processing fluids. The reverse occurred in three cases (12%). The sensitivity of processing fluids relative to serum in assigning categories I-A and I-B was 67% (with an intra-class specificity of 77% and 75%, respectively). However, the two testing protocols always agreed in discriminating between unstable (I-A or I-B) and stable (II) herds, both identifying the same four herds as stable and the other 21 as unstable (100% accuracy; 95%CI: 86% – 100%).

PFs are thus reliable for assigning PRRS categories in Italian breeding farms, especially for distinguishing stable (II) from unstable (I-A and I-B) herds, given Italy's widespread PRRSV circulation with a high proportion of positive farms. Since PRRSV viremia is known to change over time and the purpose of monitoring programs is to identify at least one positive sample per sampling event, combining PFs and blood sampling protocols would increase the sensitivity of the monitoring program. This strategy has been suggested by previous research, especially in farms that are in a virus elimination stage or in case of an unstable epidemiological scenario.

PFs and blood samples collected at different piglet life stages capture diverse epidemiological pictures. The PFs protocol may miss PRRSV from piglets infected during the second or third week of life, while using blood sample at three weeks, piglets that were positive at birth but have no detectable viremia at the pre-weaning stage might be missed. Specifically, PFs alone are considered as an effective diagnostic material to promote a herd from I-A to I-B and maintain I-B, III and IV categories. However, to promote to or to maintain a herd in II category, concurrent testing on blood serum is required, while PFs are not considered a valid sample to promote a herd to III or IV.

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