Key Points:
- Lactating sows and the farrowing environment can be sources of PRRS virus
- Sampling the farrowing environment and the udder skin of lactating sows can be used to monitor for PRRSV although the sensitivity is lower than that of serum samples.
- The farrowing environment and the lactating sow may serve as a source of infection for PRRSV.

Background and Objective

The farrowing house and especially the piglets prior to weaning play an important role in maintaining PRRS virus in infected herds. More sensitive, cheaper and easier to collect samples are needed to evaluate the PRRSV status of the herds. Sampling the environment has been shown to be a sensitive approach for detecting PEDV and influenza but it has not been explored for PRRSV. The objective of this study was to evaluate the sensitivity and specificity of sampling the farrowing environment and lactating sows at processing to detect PRRSV in an infected farm.

Materials and Methods

Sampling started 2 weeks after a PRRSV outbreak was reported in a sow farm. Sampling was conducted from 10 litters every 3 weeks for a total of 24 weeks. Samples were collected at processing (~ 3 days of age) and included:
- Surface wipes of farrowing crates (feeders, waterers) – 1 gauze/crate (n= 10/visit).
- Surface wipes of the udder skin of lactating sows – 1 gauze/sow (n=10/visit).
- Blood samples from all piglets within the selected litters.
There were 77 complete sets of samples collected. A set included the serum of all piglets in a litter, the wipe of the udder and wipe used to sample the surface of the farrowing crate of a sow/litter. All environmental and sow samples were collected with a gauze previously impregnated with transport media (cell culture media with antibiotics), stored at 4ºC and tested for PRRSV RT-PCR (Ct cut off = 37.5). Agreement between the test results for each sample type was measured using the kappa statistic. Sensitivity and specificity were also calculated. Serum was used as a gold standard and a litter was considered positive if at least 1 piglet was positive.

Results

· 16 (20.77%) surface samples and 11 (14.28 %) udder skin samples tested positive. 111 (11.9 %) serum samples tested positive which corresponded to 24 positive litters.
· Udder skin average Ct values (33.23) were higher than the surface average Ct values (32.86) (Figure 1).
· Surface wipes (SW) had a sensitivity and specificity of 50 % (29-71) and 92 % (82-98) respectively (Table 1) which was similar to that of the udder wipes (UW) (sensitivity 42 % CI: 22-63 and specificity 98 % CI: 90-100).
· Both sampling approaches had a moderate kappa agreement with the gold standard (serum).

Conclusions and Implications

PRRSV was detected in the farrowing crate environment and the skin of the lactating sow at processing. The surface and udder skin wipes were less sensitive at detecting PRRSV than serum PCR at processing. In this study all pigs in the litter were bled which is not the standard practice in the field. By comparing surface and udder wipe samples to serum samples it was possible to establish an understanding of the sensitivity of these alternative options. Comparison of the sensitivity of the sampling methods described in this study with processing fluids or oral fluids and time from PRRSV outbreak is needed. The results show that the environment and the lactating sow may serve as a source of infection for PRRSV, indicating a need to further understand their roles to establish herd level stability.
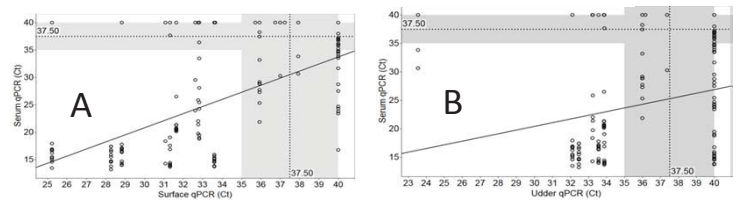

Figure 1. Scatter plot of the individual RT-PCR Ct values in serum (all piglets) compared with those from surfaces (A) and udder skin (B). The cycle threshold positive value was 37.5 (dotted black line). Grey area represent suspect range.

A

		Gold Standard		
		Litter +	**Litter -**	
Test Result	SW +	12	4	PPV 75% (52-89)
	SW -	12	49	NPV 80% (73-85)
		Se 50% (29-71)	Sp 92% (82-98)	Kappa 0.47 (0.25-0.68)

B

		Gold Standard		
		Litter +	**Litter -**	
Test Result	UW +	10	1	PPV 91% (57-98)
	UW -	14	52	NPV 79% (72-84)
		Se 42% (22-63)	Sp 98% (90-100)	Kappa 0.47 (0.27-0.66)

Table 1. Contingency table comparing RT-PCR results in serum (gold standard) with surface wipes (SW) (A), and udder wipes (UW) (B). Se: sensitivity, Sp: specificity, PPV: positive predictive value and NPV: negative predictive value. A litter was considered positive if at least one serum sample was positive.