Comparison of individual oral fluids, pooled oral fluids and Swiffer™ environmental samples of drinkers for the detection of influenza A virus and PRRS virus by PCR

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Keypoints:

- Pooling oral fluid samples seems to be a good strategy to determine the status of a farm (positive/negative) for influenza A virus (IAV) and PRRSV
- Sampling water cups using environmental Swiffer™ samples appears to be a sensitive approach to detect IAV at the pen level. However, sample size has been limited to one farm.

Introduction

Oral fluids (OF) are a valuable sampling tool to detect swine viruses. One drawback to oral fluids is that young and/or diseased pigs commonly do not chew ropes enough to obtain a sufficient volume for testing. Swiffer™ environmental sampling (ES) of water cups may be a comparable sample. Pooling oral fluids of multiple pens may also be an approach to sample more pigs with the same diagnostic resources. The objective of this project was to compare the sensitivity of pooled pen oral fluids and environmental samples (using Swiffer™ kits) using individual pen oral fluids as the standard.

Materials and Methods

Fifteen paired environmental and individual pen OF were collected at days 3, 7, 10, 17, 24 and 31 post placement in two different nursery farms. Ropes were hung from the front gate of each pen to sample only oral fluids from that pen. Environmental samples were taken using Swiffer™ cloths to sample the bottom of water cups (both pans and bowls), focusing around nipples. Gloves were changed between each sample taken. After individual samples were collected, pen oral fluids were pooled by 3. Individual pen oral fluids were considered the gold standard for true positives and true negatives.

Results and Discussion

Table 1 summarizes the proportion of positive samples across sample type. Environmental samples of water cups had the highest detection rate for IAV followed by pooled OF and individual OF. However, that was not the case for PRRSV as OF either individual or pooled had a better detection rate.

There was an overall sensitivity of 71% (IAV) and 14% (PRRS) for the ES samples compared to individual OF. Pooled oral fluids samples had an overall sensitivity of 50% (IAV) and 80% (PRRSV) relative to individual pen OF.

In summary, ES appears to be a good strategy when sampling for IAV and not a reliable option when trying to diagnose PRRSV. However, further research is needed in order to evaluate other farms and different prevalence scenarios.

		FARM A			FARM B		
		OF	ES	OF Pooled	OF	ES	OF Pooled
IAV	% Pos (# pos/ # total)	29.33% (22/75)	53.33% (40/75)	28% (7/25)	0	0	5% (1/20)
	Avg Ct (min-max)	32.4 (24.76-37.73)	30.27 (24.77-35.98)	31.65 (24.94-36.98)	0	0	36.7
	Sensitivity	-	71.42%	50%	-	NA	NA
	Specificity	-	53.70%	100%	-	NA	NA
PRRSV	% Pos (# pos/ # total)	33.33% (25/75)	5% (4/75)	40% (10/25)	61.66% (37/60)	20% (12/60)	70% (14/20)
	Avg Ct (min-max)	33.77 (28.95-36.62)	35.49 (33.14-39.95)	33.62 (30.75-35.85)	32.78 (30.38-36.13)	35.48 (33.65-36.73)	33.03 (31.06-36.49)
	Sensitivity	-	4%	71.42%	-	21.60%	88.23%
	Specificity	-	94%	100%	-	82.60%	100%
Average time of collection per pen		38.92 min	4.77 min		56.98 min	5.05 min	

Table 1. Percent positive and average Ct values for all sample types (IAV; blue, and PRRSV; green). Environmental Sampling (ES) and pooled oral fluids (OF Pooled) were compared to individual oral fluids (OF) as the standard for sensitivity and specificity (IAV and PRRSV).

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