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Feasibility of pooled-sample testing for the detection of PRRSV antibodies on serum samples by ELISA

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Introduction

PRRSV surveillance in negative sow herds is usually performed by testing for the presence of antibodies against PRRS virus in serum with a commercial ELISA test. However, the performance of this procedure, in terms of its sensitivity, is limited by budget constraints that determine the sample size. In addition, the use of a diagnostic test with relatively low specificity results in a large number of samples testing false positive, which need to be tested with a confirmatory test. Pooled-sample testing has proved to be an effective strategy to increase the sensitivity and specificity of some monitoring protocols for low-prevalence diseases without increasing its cost. Therefore, a study was conducted to evaluate the feasibility of pooling serum samples for detection of PRRS virus antibodies by ELISA.

Materials and Methods

The effect of pool size on the sensitivity and specificity of the ELISA test was evaluated by testing 113 true positive samples and 100 false positive samples, respectively, diluted in negative sera. All samples were tested undiluted and diluted 1:2, 1:4, 1:6, 1:8 and 1:10 in negative sera to simulate the effect of pooling in pool sizes from 2 to 10. The results were evaluated at 3 different cut-off values of 0.4, 0.3 and 0.2. Furthermore, the obtained sensitivity and specificity estimates were used to calculate the herd sensitivity and herd specificity of surveillance protocols in different scenarios.

Results

The results showed that pooling serum samples to detect PRRSV antibodies resulted in a decrease in sensitivity and an increase in specificity, compared to testing individual samples, while the reduction of the s/p cut-off value recommended by the manufacturer (0.4) had the opposite effect. Sensitivity estimates ranged from 0.92 (undiluted sample, cut-off 0.2) to 0.42 (pools of 10, cut-off 0.4). Specificity estimates ranged from 0.952 (undiluted sample, cut-off 0.2) to 0.999 (pools of 10, cut-off 0.4). At the herd level, most of the protocols evaluated were superior to the standard protocol (undiluted samples, cut-off 0.4).

Discussion

We describe an approach that can increase the herd sensitivity of a surveillance protocol for breeding herds, while maintaining high herd specificity and low testing costs. This can be achieved by sampling a larger number of animals and running the samples in pools. Therefore, the conventional monitoring protocols based on ELISA on individual samples can be improved by using pooled-sample testing.

Acknowledgements

We thank Dr Dudley, Dr Torremorell and Dr Goyal for providing diagnostic samples for this study. This project was funded by the National Pork Board grant 05-163.