HHM-OP-02

DEVELOPING SAMPLING GUIDELINES FOR ORAL FLUID-BASED PRRSV SURVEILLANCE

M. Rotolo 1, L. Gimenez-Lirola 1, Y. Sun 1, S. Bade 1, C. Wang 1, D. Baum 1, P. Gauger 1, M. Hoogland 2, R.

Main 1, J. Zimmerman 1.

1 Iowa State University, Ames, United States; 2 Smithfield foods, Algona, United States.

Introduction

Oral fluids (OF) are a convenient surveillance sample because they are easily collected and tested for nucleic acids and/or antibodies for PRRSV and a variety of pathogens. However, sampling guidelines for OF are not readily available. The purpose of this research was to develop OF sampling guidelines.

Material & Methods

In 3 wean-to-finish barns on one site, OF samples were collected weekly (9 samplings) from every occupied pen (108 pens; ~25 pigs per pen) for a total of 972 OF samples. OF samples were randomized prior to PRRSV RT-rtPCR testing. The binary results of RT-rtPCR testing were modelled using a piecewise exponential survival model for interval-censored time-to-event data with misclassification. Thereafter, simulation studies were used to study the barn-level probability of PRRSV detection as a function of sample size, sample allocation (simple random sampling vs fixed spatial sampling), assay diagnostic sensitivity and specificity, and pen-level prevalence. Site level probability of detection based on sampling ≥ 2 barns on a site was also evaluated.

Results

Statistical analyses showed that the probability of detection increased with 1) sample size, 2) disease prevalence, and 3) repeated sampling over time. Sample allocation likewise affected the probability of detection. Notably, “fixed” spatial sampling was as good as, or better than, random sampling for the detection of PRRSV. Given the estimated barn-level probability of detection (p), the probability of detection on a site (Ps) was optimized by sampling multiple barns/air spaces (n): ($Ps = (1 - (1 - p)n)$.

Discussion & Discussion

This research provided probability of detection estimates for oral fluid samples by sample size, disease prevalence, and test performance at the barn level. Site level probability of detection can be estimated using the approach described above. This research represents initial efforts at developing guidelines for surveillance and monitoring programs using oral fluids.