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Production Leader
Steven Claas

Production Assistant
Steven Claas
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Sarah Summerbell

Layout and CD-ROM
David Brown
Tina Smith

Logo Design
Ruth Cronje, and Jan Swanson;
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PRRSV vertical transmission dynamics in an endemically infected sow-herd

Jean Paul Cano, Scott Dee, Albert Rovira, Robert Morrison
College of Veterinary Medicine, University of Minnesota, St. Paul, Minnesota

Introduction

After a PRRS outbreak, the production parameters of the breeding-herd may return to levels similar to those prior to the infection, but some individuals may continue shedding virus to suckling piglets[1]. Thus, the endemically infected or "unstable" herds continue "leaking" or "trickling" viremic piglets to the nurseries. Today, a "traditional sampling protocol" used by swine practitioners to detect PRRSV shedding from the sow-herd is to sample 20 or 30 piglets at weaning, pool samples in groups of 5, and test them by PCR[2,3]. However, in the chronic stages of the infection, the prevalence may be very low; thereby reducing the probability of detecting infected piglets. A commercial herd of 1500 sows recently infected with PRRSV. No reproductive clinical signs had been reported in the population for the last 3 months, but PCR-positive piglets continued to be weaned. The owners and the veterinarian decided to inject serum containing live PRRSV in an attempt to control the disease. This scenario gave us the opportunity to design a study with the objective being to determine the prevalence of PRRSV PCR-positive piglets and litters at birth and at weaning in an endemically infected sow-herd.

Materials and Methods

Serum samples were collected from every piglet of 38 litters at birth and at weaning, 4 weeks after the exposure (*acute phase*). The procedure was repeated 12 weeks after serum injection (*chronic phase*). Serum samples were collected from the sows before the serum injection and after farrowing and were tested by PRRSV ELISA. The required sample size of 38 litters from a farrowing group (n=60) was estimated based on a desired confidence interval of 95%, an expected prevalence of 6.3% (1 positive pool / 4 tested pools), and 1.66 % (1 positive / 60 litters) as the lowest possible prevalence (*Epi Info Version 6,* Stone Mountain, GA). The proportion of viremic litters and piglets was compared using the *Fisher's Exact Test* (*Statistix® 8*, Tallahassee, FL).

Results

Sows - All 120 of the sows sampled the day prior to serum injection were ELISA positive. Of the sows, 10% were seronegative 4 weeks after the exposure and 56% were seronegative 8 weeks later. The mean PRRSV ELISA s/p ratio did not change 4 weeks after serum injection (P=0.205) but it significantly decreased 12 weeks after the exposure (P=0.001).

Table 1. Prevalence of PRRSV infection (PCR)

Phase	% PCR-pos litters (≥ 1)		% PCR-pos piglets		% litters 1-2 pos
	Birth	Wean	Birth	Wean	
Acute	24[a]	55[a]	8[a]	22[a]	67[a]
Chronic	8[a]	21[b]	2.4[b]	3.9[b]	66[a]

Values are percentages. Different superscripts on the same column were statistically different (P < 0.05).

Litters and piglets – The detection of PRRSV was significantly lower during the chronic phase of infection (Table 1). A significant increase in prevalence of PCR-positive litters (P=0.005) and piglets (P=0.001) was observed during the acute phase of infection. A high proportion of litters with 2 or less PCR-positive piglets were detected (Table 1).

Discussion

Reduction of the prevalence of PCR-positive piglets after exposing the sows to serum containing live PRRSV may have been the consequence of the natural course of the disease, herd closure, the virus exposure itself or the combination of several factors. In most of the litters, only a small proportion of the piglets were PCR-positive. The "traditional sampling protocol" may not detect the low prevalence determined during the chronic phase of this study. Increasing sample size and targeting specific individuals may help to improve the sensitivity of monitoring protocols.

References

1. Zimmerman J. 1998 PRRS Comp. NPB. Des Moines, IA.
2. Dudley S. 2006. Proc 37th AASV:351-355.
3. Spronk G and Dee S. 2006. Proc 33rd Leman:126-128.