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Use of cross-sectional serum quantitative PCR for profiling PCV2 infection dynamics

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Introduction and Objectives

Porcine circovirus type 2 (PCV2) has emerged as a major contributor to disease and mortality in swine. Diagnosis of porcine circovirus associated disease (PCVAD) on a herd basis relies on the best estimate of the contribution of PCV2 infection within the context of contributions made by other endemic and epidemic agents to overall clinical morbidity and mortality. Herd diagnosis is important because of the range of interventions and economic resources that may be applied. The objective of this project was to characterize PCV2 infection dynamics in clinical PCVAD cases.

Materials and Methods

The diagnostic protocol consisted of cross-sectional serum sampling and targeted post mortem examination of 59 herds affected by PCVAD. Serum was collected from the breeding herd (20 animals) and growing herd (50 animals, 10 per age group at approximately 4, 10, 14, 18 and 22-24 weeks of age), with sample sizes based on detecting at least one positive sample when the estimated prevalence of disease is at least 10%. Serum samples were tested using a quantitative PCR (qPCR) method to quantify the amount of PCV2 virus. DNA was extracted and PCR was performed per a published method¹. Serial dilutions of a plasmid standard were included in every run to create a standard curve for determination of the amount of PCV2 virus present in each sample in viral genomic equivalents/ml. Various serologic and tissue diagnostics were also used to identify the presence of co-infections (data not shown).

Results

Approximately 95% of breeding age animals tested negative (virus was present below the lower detection limit of the test, 10^4 or lower, or was absent altogether) by qPCR. High serum PCV2 viral loads ($\geq 10^6$) were observed from 8-12 weeks of age through 16-20 weeks of age (Table 1).

Table 1. Distribution of serum PCV2 viral loads using qPCR

Stage /age	Negative* (<Log4)	Log classes			
		Log 4-5	Log 6-7	Log 8-9	Log 10-11
Gilts P0	93%	7%	0%	0%	0%
Sows P1	98%	2%	0%	0%	0%
3 – 7 wks	88%	11%	1%	0%	0%
8 – 12 wks	52%	21%	24%	3%	0%
12 – 16 wks	25%	41%	28%	5%	0%
16 – 20 wks	28%	49%	21%	1%	1%
20 – 24 wks	52%	42%	6%	0%	0%

Conclusions

High PCV2 viral loads were present in the serum of pigs during the period leading up to and including clinical PCVAD and increased mortality (8-20 weeks of age). The breeding herd largely remained negative with only a few viremic animals detected. Ante-mortem viral load profiles obtained using qPCR were helpful in illustrating PCV2 infection dynamics associated with PCVAD in clinically affected herds.

References

1. Brunborg, I.M. et al 2004. *J Virol Methods*, 122:171-179.