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PCV2 infection dynamics in vaccinated versus non-vaccinated groups of pigs from 5 farms

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Introduction and Objectives

Porcine Circovirus Type 2 (PCV2) has emerged as a major contributor to disease and mortality in swine. It has been demonstrated that reduction in PCV2 viral load is associated with reduction in the severity of clinical disease.^{1,2} One of the objectives of this project was to better understand the dynamics of PCV2 viremia in clinical PCVAD situations in vaccinated and non-vaccinated farms.

Materials and Methods

Five farms, all of which had both PCV2-vaccinated and non-vaccinated populations of pigs available for sampling, were included in this evaluation. PCV2 vaccination (Ingelvac[®] CircoFlex[™], Boehringer Ingelheim Vetmedica, Inc., St Joseph, MO) was administered at 3 weeks of age in all farms. The diagnostic protocol consisted of longitudinal (serial) serum sampling of the growing herd (120 pigs, 10 vaccinates and 10 non-vaccinates per age group at approximately 4, 10, 14, 18 and 22 weeks of age). Sample sized was based on detecting at least one positive sample when the estimated prevalence of disease was at least 10%. Serum samples were tested using a quantitative PCR (qPCR) method to determine the quantity of PCV2 virus. DNA was extracted and PCR was performed per a published method.³ Serial dilutions of a plasmid standard were included in every run to create a standard curve that allowed for determination of the amount of PCV2 virus present in each sample as viral genomic equivalents / ml. Quantitative PCV2 PCR values were analyzed using two-sample t-test (JMP v.5.1, Cary, N.C., USA) comparing the log values for both treatment groups for each individual farm from each bleed date.

Results

The vaccinated groups had significant reductions in serum PCV2 viral load in comparison to the non-vaccinated groups in all farms (Table 1). Viral load was significantly higher at 10 weeks of age in Farm 1. In Farms 2-5, viral load in

non-vaccinates was significantly higher at 18 weeks of age (Table 1).

Table 1. Distribution of serum PCV2 viral loads in vaccinated and non-vaccinated groups of pigs from 5 farms.

Age group	Vaccination status	Farm				
		1	2	3	4	5
4 wks	Vaccinated	4.1	<4	<4	4.1	4.1
	Control	4.1	<4	<4	<4	4.3
6 wks	Vaccinated	4.1	<4	<4	<4	4.2
	Control	<4	<4	<4	<4	4.1
10 wks	Vaccinated	5.2	<4	<4	<4	4.1
	Control	6.7	<4	<4	4.2	4.4
14 wks	Vaccinated	4.4	4.1	4.4	4.2	
	Control	5.3	4.5	6.2	4.6	
18 wks	Vaccinated	4.4	4.3	4.4	5.6	4.3
	Control	5.1	5.9	6.9	6.8	5.8
22 wks	Vaccinated	4.2	4.1	4.1	<4	4.1
	Control	4.8	5.3	5.3	4.5	5

Values represent logs of viral genomic equivalents/ml (ie $4.4=10^{4.4}$). Age- and farm-matched values within dashed cells are significantly different, $P<.006$. For the quantitative PCV2 PCR test used, "Negative" results mean either virus was present below the lower detection limit of the test (10^4 or lower) or was absent altogether.

Conclusions

PCV2 vaccination significantly reduced serum viral loads in all 5 farms. PCV2 was clearly present at high levels in non-vaccinated pigs around the respective age of peak mortality (10-18 weeks of age) in all farms. Viral load profiles obtained by qPCR illustrated PCV2 infection dynamics in farms clinically affected by PCVAD.

References

- 1.Segales J. 2002 *Vet Rec* 149:357-361.
- 2.Segales J. 2007 *Proceedings Emerging Diseases Seminar*, Krakow, Poland, p35.
- 3.Brunborg, I.M. et al 2004. *J Virol Methods* 122:171-179.