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Correlation between viral load and performance in PCV2 vaccinated or non-vaccinated pigs

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Introduction and Objectives

Porcine circovirus type 2 (PCV2) vaccination is a common practice in North America. In general, the goal of PCV2 vaccination is to protect a pig and/or group of pigs against the negative impact of PCV2 infection, i.e. increased mortality, clinical signs and reduced performance. Prior to the availability of PCV2 vaccines the following paradigm became established: “The higher the PCV2 viral load - the higher the likelihood that a pig is affected by PCVAD.” The objective of this analysis was to examine the impact of PCV2 viral load on average daily gain (ADG) in vaccinated and non-vaccinated populations of pigs.

Materials and Methods

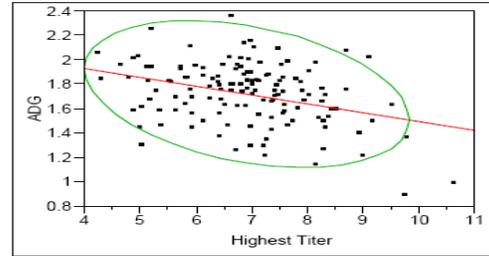
For this evaluation we considered information from 4 different projects conducted in 4 farms. Two of those farms were located in Missouri, 1 in Nebraska and 1 in Illinois. All projects included vaccinated and non-vaccinated pigs. A total of 342 pigs from 4,700 pigs on trial were serially blood sampled at 3, 6, 8, 10, 14, 18 and 22 weeks of age and tested with qPCR for viremia and viral load. Detection limit of the quantitative PCR (qPCR) was 10^4 genomic equivalents/ml serum. In the evaluation samples below the detection limit were counted as 10^4 . Average daily gain (ADG) from these animals was calculated based on individual pig weights on day of inclusion (at weaning) and before first pigs were sent to slaughter. Vaccinated and non-vaccinated pigs were commingled in the same pens. A simple linear regression model (JMP v8.0) fitting highest recorded titer for each tested pig with its own ADG was created.

Results

In each individual project, viremia level was significantly reduced in vaccinated pigs compared to non-vaccinated pigs. In the non-vaccinated pigs there is a significant inverse correlation, albeit weak, between viral load and ADG (Figure 1; $P < 0.0001$, $R^2 = 0.12212$). There is no correlation between viral load and ADG

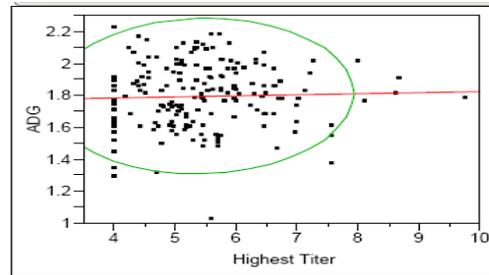
for vaccinated pigs (Figure 2; $P = 0.65$; $R^2 = 0.00112$).

Figure 1 Significant inverse correlation between PCV2 viral load and ADG in non-vaccinates.



Titer values (X axis) are reported as logs of PCV2 virus per ml of serum. $P < 0.0001$, $R^2 = 0.12212$.

Figure 2 Lack of correlation between PCV2 viral load and ADG in vaccinates.



Titer values (X axis) are reported as logs of PCV2 virus per ml of serum. $P = 0.65$, $R^2 = 0.00112$.

Conclusions

It is commonly acknowledged that there is a direct correlation between the amount of PCV2 virus present in the serum and the likelihood of pigs to have or develop PCVAD and associated reductions in ADG. Based upon this analysis, this appears to be true for non-vaccinated pigs but not for vaccinated pigs. A recent study¹ comparing the efficacy of PCV2 vaccines found that all tested vaccines were equally effective in reducing PCV2-associated microscopic lesions even though there were differences in the magnitude of viremia reduction. This raises an interesting question as to the suitability of using relative magnitude of viremia reduction as a surrogate indicator of comparative vaccine efficacy.

References

1. Opriessnig T. *Vaccine* 2009, 27(7)1002-7.