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Modified live PRRS vaccination provides heterologous protection against virulent 1-18-2 challenge

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Introduction and Objectives

A highly virulent strain of PRRS virus (PRRSv) emerged in the upper Midwestern USA during 2007-2008.[1] Initially identified by its unique RFLP pattern as "1-?-2", this strain came to be known as "1-18-2" and proved to be exceptionally virulent with high mortality rates in both sows and growing pigs reported from many herds.[2] Finishers that were vaccinated in the 1-18-2 problem areas reportedly performed better than the previous groups that became infected[1] suggesting that modified-live vaccination provided a useful level of cross-protection. The objective of this study was to assess the efficacy of Ingelvac® PRRS ATP in protecting against challenge by PRRSv 1-18-2 using a well established respiratory challenge model in growing pigs.

Materials and Methods

A randomized, blinded vaccination-challenge study was performed in 25 three-week-old PRRSv and *M. hyopneumoniae* naïve pigs. The study consisted of three groups. Group 1 (Vaccinates, n=10) was vaccinated with Ingelvac® PRRS ATP on Day 0. Group 2 (n=10) was unvaccinated (Challenged Controls). Groups 1 and 2 were challenged on Day 21 intranasally with 2.0 mL (1.0 mL/nostril) of inoculum containing $10^{5.92}$ $TCID_{50}$ virus/mL of a highly virulent PRRSv 1-18-2 isolate. Group 3 (Strict Controls, n=5) was unvaccinated and not challenged.. The study was terminated 14 days following challenge; all animals were euthanized and lungs were scored for lesions. Blood was collected to assess viremia. Data were evaluated by Wilcoxon Two Sample Test and Fisher's Exact Test in a pairwise fashion, respectively.

Results

One pig died in each group 1 and 2 prior to challenge for reasons unrelated to PRRS. Vaccination resulted in a significantly reduced prevalence of viremia and significantly reduced lung lesion scores 14 days post-challenge compared to challenged controls (Table 1).

Table 1. Day 35 viremia and lung lesion scores.

Group	Treatment	N (pigs)	Virus isolation, % positive	Lung lesion score, median % and range
1	Vaccinates	9	33.3[a]	13.8 (0.0-38.0)[b]
2	Challenged Controls	9	88.9[b]	58.13 (0.1-87.0)[c]
3	Strict Controls	5	0[a]	0.0 (0.0-0.1)[a]

Values within columns with unlike superscripts are significantly different at $P \leq 0.05$**.**

Discussion and Conclusions

In the PRRSv respiratory challenge model, the challenge inoculum routinely consists of approximately $10^{4.0}$ $TCID_{50}$/mL of PRRSv as compared to $10^{5.92}$ $TCID_{50}$/mL in the present study. Similarly, four weeks is typically allowed for onset of immunity prior to challenge as compared to three weeks in this study. Even with a more potent challenge and shorter period for onset of immunity, vaccination with Ingelvac® PRRS ATP provided a significant level of cross-protection against a highly virulent heterologous PRRSv 1-18-2 isolate. These findings are consistent with previously published reports of heterologous protection conferred by modified-live PRRS vaccination in 16 of 16 controlled pig challenge studies using one of five different heterologous challenge strains.[3] The reduction in viremia demonstrated in vaccinates is consistent with the findings of previously reported challenge studies.[4,5]

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