RESEARCH ABSTRACT

SWINE HEALTH

Title: Evaluation of the intranasal route of MLV vaccination for large scale applications – **NPB - #18-171**

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Scientific Abstract

Circulating strains of porcine reproductive and respiratory syndrome virus (PRRSV) are genetically diverse; while PRRSV-2, comprising nine genetic lineages, predominates in the US, a lower incidence (<2%) of the PRRSV-1 strain is also found. Current modified-live virus (MLV) vaccines against PRRSV are effective in mitigating the disease burden associated with PRRSV infection at the farm level, although they are deficient in their cross protection against infection by heterologous strains. The current PRRSV MLV vaccines that are administered by intramuscular injection have two major issues: (1) lack of cross protection and (2) shedding of the vaccine virus. The objective of this study was to evaluate the efficacy of a commercial MLV vaccine after delivery by the intranasal route utilizing a specially engineered prototype high-pressure device suitable for high throughput vaccination in farms. The obtained results were compared to the conventional intranasal vaccine administration via syringe and the intramuscular route. Fifty-four PRRSV free pigs were obtained and divided into five treatment groups: A group was vaccinated intranasally with a specially engineered prototype high-pressure device, which automates the vaccine administration process and results in a jet stream capable of distributing the vaccine virus deep into the nasal cavity (Device-VAC group, n=12). Another group was vaccinated intranasally with a syringe fitted with an MDA adaptor (IN-VAC group; n=12), and a group was vaccinated via the intramuscular route (IM-VAC; n=12). All vaccinated groups were challenged intranasally with a 2014 PRRSV field isolate 28 days post vaccination. In addition, there was a positive control group not vaccinated but challenged with PRRSV (POS-Controls, n=12) and a negative control group, which was not vaccinated or challenged (NEG-Controls; 6 pigs). Blood and nasal swabs were collected at regular intervals, all pigs were necropsied at day 10 post challenge (dpc) and gross and microscopic lesions were assessed. Prior to challenge most vaccinated pigs had serovonverted to PRRSV. Fever was significantly reduced in vaccinated groups compared to the POS-Control group at dpc 7 and 9. The IM-VAC and Device-VAC groups were not significantly different in regard to PRRSV viremia, seroconversion, and average daily weight gain, indicating a comparable

performance. In contrast, the IN-VAC group was often not different from the POS-Control group and in general appeared to have a reduced vaccine efficacy compared to the other two vaccine groups. The challenge virus used for this study was a contemporary 1-7-4 field strain and, according to ORF5 sequencing, was 87.7% identical to the vaccine used. Based on the obtained data, the vaccine used in this study did not protect the pigs from developing gross and microscopic lesions regardless of the vaccine administration route. Future studies should include side-by-side trials of the Device-VAC and IM-VAC groups using additional heterologous PRRSV isolates to better assess differences in lung lesion reduction. Under the conditions of this study, nasal administration of a commercial PRRSV vaccine using a device designed for mass-vaccination worked well and data are comparable to those obtained after vaccination by the IM route. The device worked better and was easier to use compared to manual intranasal administration via a syringe. The pilot study data indicate that the intranasal administration route may pose an alternative option for PRRSV vaccination on pig farms, regardless of size.