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Effect of attenuated PRRSV mass vaccination on subsequent downstream mortality

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Statement of the problem

Porcine reproductive and respiratory syndrome (PRRS) is a disease known for causing a significant economic impact on swine herds[1]. In response, some veterinarians adopt routinely PRRS modified-live-virus (MLV) vaccinations on sow farms as an attempt to mitigate the PRRS-attributed impact. Recently, our group has reported on a study funded by the AASV Foundation that some individual farms experienced a small increase of 0.26% of pre-weaning mortality 2 weeks after the PRRS MLV intervention, but overall there was no significant impact of the intervention of the herd productivity[2]. However, there is little information on the impact of PRRS MLV vaccination of breeding herds on wean-to-finish performance.

Objectives

The main objective of this study was to assess the impact of PRRS MLV mass vaccination of PRRSV stable[3] breeding herds on wean-to-feeder mortality using natural experiments under field conditions. Our secondary objective was to determine the break-even of preventive PRRS MLV mass vaccination on breeding herds, given the significant impact of the intervention on the whole-herd performance (breed-to-finish).

Brief Materials and Methods Including Statistical Analysis

In this retrospective study we collected information from 331 growing pig groups that fulfilled the following eligibility criteria: a) wean-to-feeder groups, composed of nursery and wean-to-finish flows; b) closed between 2014 and 2018; and c) from PRRSV stable[3] sow farms that adopted routinely PRRS MLV mass vaccination. Closeouts were classified into 5 groups (four treatment groups and one defined as baseline for comparison) based on the period between the MLV intervention and the weaning date. Baseline groups were defined as groups weaned six weeks after the MLV intervention, and treatment groups were the batches weaned every 3 weeks after intervention, as shown in table 1.

Table 1: Description of treatment groups.

Treatment group	Period between MLV intervention and weaning
1	1 to 3 weeks
2	4 to 6 weeks
3	7 to 9 weeks
4	10 to 12 weeks

The effect of the treatment variables on wean-to-feeder closeout mortality was compared to the baseline by regression model (Proc Glimmix), after adjusting for source and production flow, as random effects and weaning season, days on feed, and weaning weight, as fixed effects. Moreover, previously validated economic models[4] were used to access the break-even of preventive PRRS MLV mass vaccination on breeding herds, given the significant impact of the intervention on pig growth performance. Statistical analysis was conducted in SAS 9.4.4.

Significant Results

The study included results from 2,058,487 pigs of 331 wean-to-feeder groups, from 37 sow farms. There was a total of 481 PRRS MLV mass vaccinations, with mean of 2.6 vaccinations per farm per year. There was a significant increase of 1.31% of mortality on treatment 2 (groups weaned 4 to 6 weeks after the MLV intervention) compared to baseline. No significant differences were detected comparing other groups to baseline (figure 1).

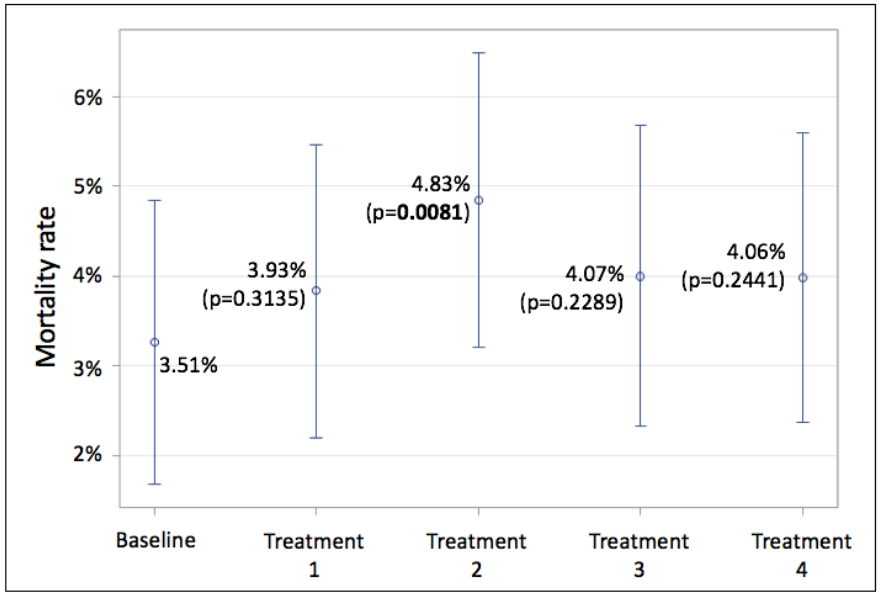

Figure 1: Mortality rate of 4 treatment groups compared to the baseline.

The estimated impact of mass vaccinating breeding herds with PRRS MLV on pig growth performance was $1.52. Based on this value, the practice of vaccination of sow herds, with PRRS MLV was beneficial on herds that report outbreak with PRRSV every 3.7 years or more frequently.

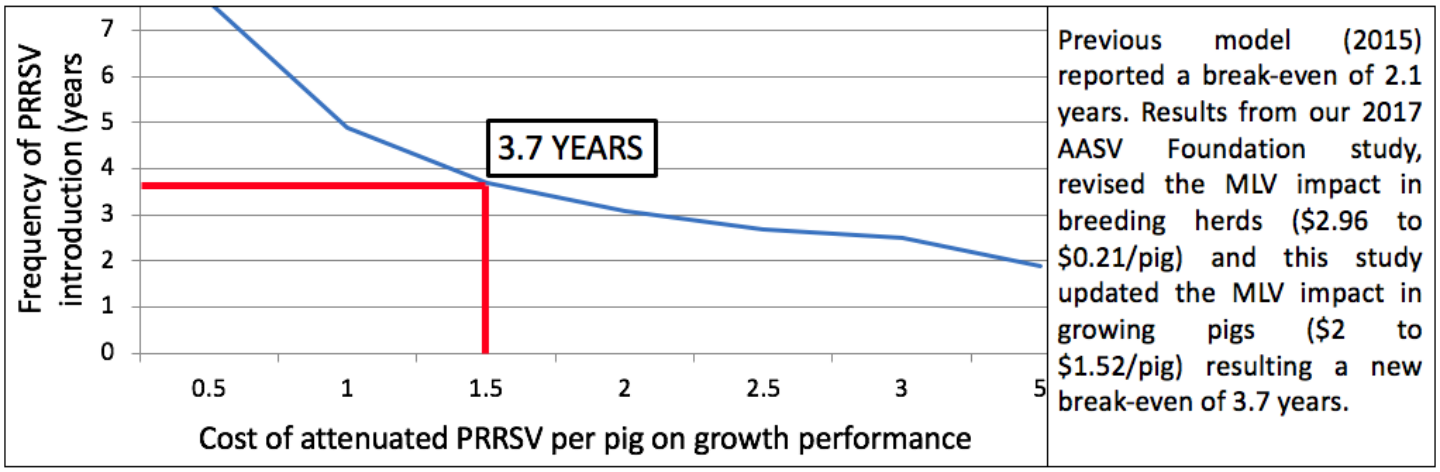

Figure 2: Break-even of PRRS MLV vaccination, given the impact on pig growth performance.

Discussion of how results can be applied by practitioners

Under study conditions, there was a significant increase of 1.31% of mortality on treatment 2 (groups weaned 4 to 6 weeks after the MLV intervention) compared to baseline. No significant differences were detected comparing other treatment groups to baseline. This increased mortality effect on treatment 2 might be due to the fact that these pigs came from the sows that were in the latest gestation stage when MLV intervention took place. Some negative effects of vaccinating late-pregnant sows for PRRS with MLV vaccines have been reported on literature [5-8].

The estimated impact of mass vaccinating breeding herds with PRRS MLV on pig growth performance was $1.52. Based on this value, and on the new estimate of MLV impacting 0.07 pigs per sow per year on breeding herds[2], the practice of vaccination of sow herds, with PRRS MLV was beneficial on herds that break with PRRSV every 3.7 years or more frequently. The analysis updated a validated previous model by Linhares, Johnson, and Morrison (2015) that reported that the break-even was 2.1 years[4]. This change is due to the fact that the impact of the MLV intervention on the whole-herd performance was overinterpreted. As the impact of this intervention is lower than described on the last model, the break-even increased, showing that MLV vaccination is beneficial even in herds that break less frequently.

We decided to work only with wean-to-feeder groups because if there is any significant impact of the MLV intervention on the pig performance we believe that it would be early in the growth phase. Also, to limit

confounders as we did not have any information about wild-type PRRSV diagnostics on study groups. Our group has described on previous study that the frequency of wild-type PRRSV infection on the nursery groups, from PRRSV stable sow farms, is considerably lower (18%) than on finisher groups (80%)[9].

The results of this study provide information to help swine veterinarians make better informed decisions regarding the use of PRRSV MLV vaccine and other interventions in the sow herd to reduce growth mortality.

Plan for dissemination of results

We will make this report available to share with the AASV members through newsletter and/or uploading to the AASV swine library. We will also submit this work in form of abstract/proceedings to major swine conferences including the AASV annual meeting, Leman Conference, and McKean swine disease conference. We will also work on a manuscript to be submitted to a peer reviewed journal, making the work available to the scientific community.

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