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EFFECTS OF BOOST VACCINATION WITH INACTIVATED PRRSV VACCINES

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Background

There are several different vaccination strategies against PRRSV, but vaccination with modified live virus (MLV) vaccines is far more applied than vaccination with inactivated (INV) vaccines. There are limited field data available regarding the prime-boost (MLV+INV) vaccination scheme.

Objectives

The objectives of this study were to investigate if the percentage of ELISA-positive sows and gilts would increase to at least 96% five weeks post boost-vaccination with two different INV vaccines, and if INV vaccination would elicit greater neutralizing antibody (NA) titers and T-cell responses, compared to the immune status in the included animals before boost-vaccination.

Material and Methods

Four Danish sow herds with DanBred Hybrid sows/gilts were included. In each herd, sixty-nine gilts and sows, previously vaccinated with a MLV vaccine in the quarantine, received one dose of either Progressis®PRRS Vet or Suivac®PRRS-IN in late gestation. Ten other dams in each herd were included as INV unvaccinated, control-animals. Blood samples were collected from all included animals at the day of INV-vaccination (day 0) and again at day 35 post vaccination. All samples were tested for PRRSV antibodies by the IDEXX ELISA X3 kit. Samples from 30 of the animals in each herd were further tested for neutralizing antibodies, using a serum neutralization test (SNT).

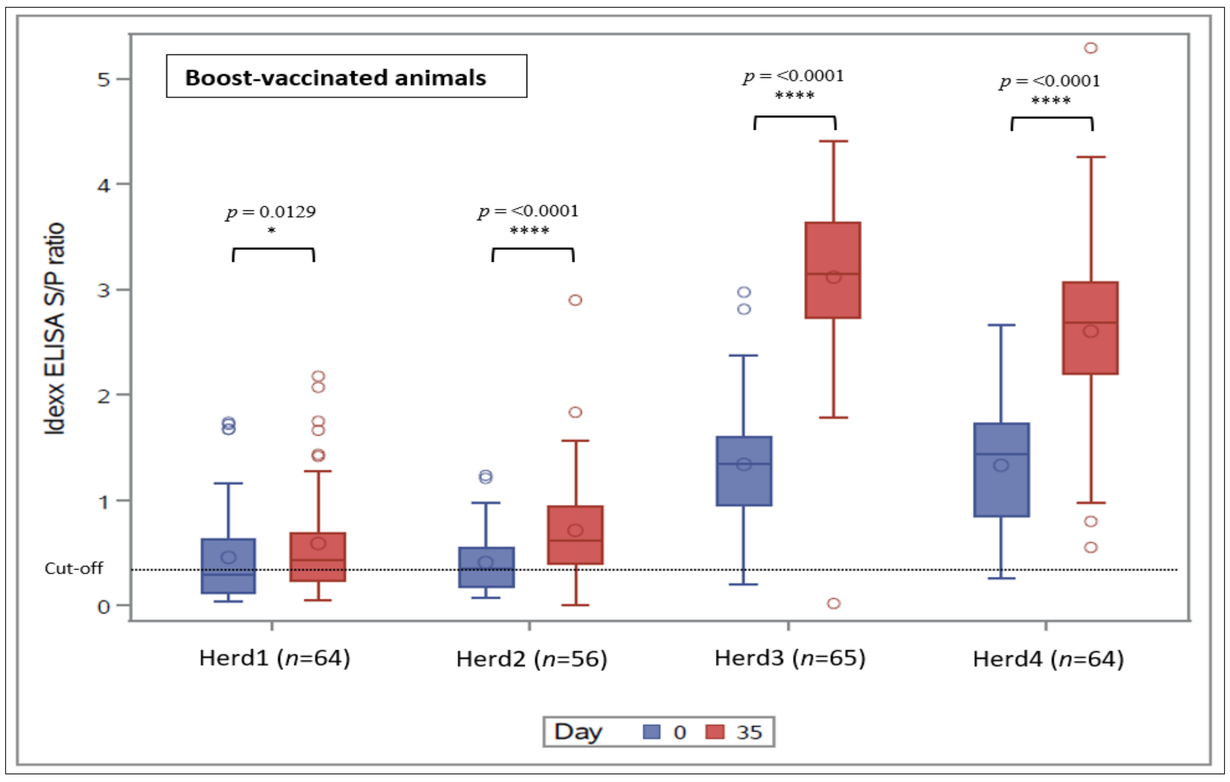

Figure 1. Boxplot showing Idexx ELISA S/P ratio results from boost-vaccinated sows and gilts on day 0 (blue) and 35 (red) in each herd. Minimum, median, mean (dot inside the box), maximum and quartiles of 25, 50 and 75 are shown. The Idexx cut-off value (0.4) is indicated with a black, dotted line. The comparison of the difference in ELISA antibodies day 0 and 35 in each herd is indicated by calculated p values. Dots outside the whiskers represent outliers with distances from the interquartile greater than 1.5 times the size of the interquartile range. n = number of animals with a measured value both day 0 and 35..

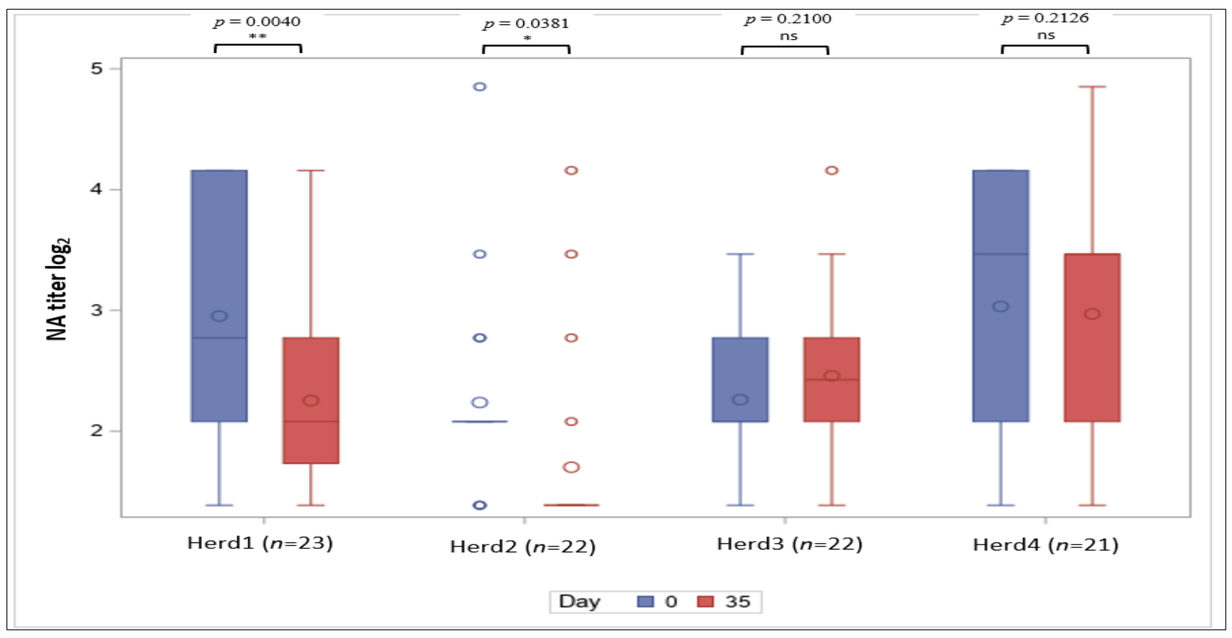

Figure 2. Boxplot showing the NA titers measured at day 0 and 35 in each herd. Minimum, median, maximum and quartiles of 25, 50 and 75 are shown. Dots outside the whiskers represent outliers with distances from the interquartile greater than 1.5 times the size of the interquartile range. Significantly differences are indicated by asterisks. ns = no significance. n = number of animals with a measured value both day 0 and 35.)

Results

Two of the herds increased from 97% and 96% to 98% and 100% ELISA-positive gilts and sows 35 days post INV vaccination, respectively, whereas the percentage increased from 43% and 42% to 52% and 75% in the last two herds (data not shown). All four herds obtained a higher mean ELISA S/P ratio post INV vaccination (figure 1). .

Sixteen gilts and sows in Herd1 had a lower NA titer five weeks post INV vaccination (Figure 2). Six animals had no change in NA titer at day 0 and 35, and only three animals showed an increased NA titer post boost vaccination. A decreasing tendency from day 0 to 35 was seen in 10 animals in Herd2, and eight gilts and sows remained at the same NA titer post boost vaccination. Four animals in Herd2 obtained an increased NA titer at day 35. The animals in Herd3 obtained the highest number (n = 9) of sows and gilts with an increased NA titer at day 35, whereas six animals had a lower NA titer. Eleven animals in Herd3 had the same NA titer at day 0 and 35. In Herd4, 11 gilts and sows had a lower NA titer at day 35 compared to day 0, and 48, six animals developed an increased NA titer post boost vaccination. Four animals had the same NA titer at day 0 and 35.

Discussion and Conclusion

Despite the high boost response in ELISA antibodies in Herd3 and Herd4, only eight animals in Herd 3 and six animals in Herd4 obtained a higher NA titer post boost vaccination. No significant differences from day 0 to 35 were seen in any of these two herds. In contrast, animals in both Herd1 and Herd2 showed a significant decrease in neutralizing antibodies post boost vaccination. These inconsistent immune responses, when the increases in ELISA antibodies is linked to the decreasesin NA titers, can have many different reasons. The commercial Idexx ELISA kit detects IgG antibodies against the PRRSV N-proteins, which constitute the antigen-coating in the plates, whereas the primary target for NAs is GP5. The commercial Idexx ELISA X3 kit make it possible to standardize the analysis, whereas the SN assay involves more steps including the culture of viruses, which is more difficult to standardize. Furthermore, the outcome of the SNT test are highly dependent on the strain used for the test. Due to the lack of time it was not possible to include more technical replicates of the SN assay but appropriate controls were included to secure the reliability of the results even though some of the questionable results need to be confirmed by retest with more replicates

These preliminary results showed that boosting previous MLV vaccinated oigs with an inactivated vaccine resulted in an increase in ELISA antibodies against the PRRSV NP protein, whereas no clear boost in NA antibodies were seen. The results of previous studies on the effect of INVs to boost an increase in NA antibodies have generated conflicting results and therefore it is not possible to make clear conclusions on the efficacy of INV as a boost vaccine in PRRSV positive herds.