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A Preliminary Investigation into Possible PRRSV Anergy Induction from Repeated Immunization with a Modified Live Vaccine

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A study was conducted to investigate the observation that sows in porcine reproductive and respiratory syndrome virus (PRRSV) infected herds which have received multiple doses of modified live (ML) vaccine often fail to elicit a measurable antibody response following re-vaccination.

Our study used sows from a herd that had been on a "6-60" vaccination program for nearly 5 years where gilts received two doses of ML vaccine prior to breeding and thereafter received two doses per parity at 6 days after farrowing and 60 days after breeding. The sows were in the third to tenth parities and at 34-47 days of gestation at the start of the study. A preliminary blood sample was drawn from 50 sows to ascertain their serum antibody level as determined by a commercial ELISA. Eight days later, thirty-six, parity 4 or greater sows were selected and randomly assigned with stratification by parity and serostatus to three treatment groups (12 per group) with equal numbers of seropositive (n=6) and seronegative (n=6) animals in each group. Treatment groups received either 2 vaccinations (20 days apart) with a commercial, killed PRRSV vaccine (according to label direction), revaccination with the modified live vaccine at the time of the second killed vaccination, or no vaccine. Blood was collected 16 days following the last vaccinations and ELISA and serum neutralizing (SN) antibody levels were assessed. ELISA values are reported as the optical density readings and SN titers are reported as the reciprocal of the geometric mean.

There was no correlation between the ELISA values and SN titers at the beginning of the study as the SN titers of the ELISA seronegative pigs were similar to the seropositive pigs (2.7 vs.2.4, respectively).

Vaccination with the killed vaccine increased both the ELISA antibody levels and the SN titers. Group mean ELISA values increased from .333 to 1.282. Group mean SN titers increased from 3.0 to 8.5. These increases were of similar magnitude, regardless of the initial ELISA serostatus. The ELISA antibody levels and the SN titers of the ML vaccinated and control pigs did not change between the initial and the final serotests.

A common field observation is that minimal to no increase in serum antibodies occurs in PRRSV positive herds following multiple vaccinations with ML vaccine. The results of this study substantiated this observation. A common explanation is that ML vaccines don't elicit an antibody booster effect because of lower antigen concentration or lack of adjuvants compared to killed vaccines. Another possible explanation is that repeated vaccination of sows with MLV vaccine may induce lymphocyte anergy, although the mechanisms for anergy have not been established. In this study, the sows were able to produce antibodies as measured by the ELISA and SN assays following vaccination with a killed vaccine. However, anergy may be influenced by the genetic/antigenic relatedness of the viruses that the animals have been exposed to and the virus used to stimulate the booster effect. In this study, the killed virus vaccine may have been unrelated to the field variants that were present in the herd and the ML vaccine.