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Efficacy of farm-specific inactivated vaccines to boost the humoral immunity of infection-immune sows compared to the currently available commercial vaccines

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Introduction. Porcine reproductive and respiratory syndrome (PRRS) is a devastating disease causing high losses on reproductive pig farms worldwide (1). Safe and efficacious vaccines are important tools to combat the virus. In the past, vaccination programmes have proven to be successful for other porcine viruses (Aujeszky's disease virus, swine fever virus). The currently available commercial vaccines give variable results regarding the efficacy against the genetically diverse field strains (2). To efficiently counter PRRSV, it is necessary to seek the most effective vaccines for sows and piglets. Recently, it was demonstrated in PRRSV-negative animals that by the use of a new procedure, an inactivated PRRSV vaccine could be developed that induces virus-neutralizing antibodies and offers partial protection upon homologous challenge (3). One of the advantages is that with this new method farm-specific vaccines can be made. In this study, the booster effect of such farm-specific inactivated vaccines on humoral immunity in sows with an active immunity will be compared with that of the currently available commercial vaccines.

Materials and methods. Three Belgian PRRSV isolates were used in this study originated from unrelated farms showing clinical signs compatible with PRRS in sows or growing pigs. At the moment of sampling, sows of the three herds were vaccinated with the EU-genotype attenuated vaccine (Porcilis® PRRS). Inactivated vaccines were prepared based on the farm-specific strains (07V063, 08V194 and 08V204) and according to the method described by Delrue et al. (2009). Twenty-five culled sows, from each PRRSV-positive farm were included in the experiment. A first group (n = 5 sows) served as a mock-vaccinated control group and received 1 mL RPMI in 1 mL o/w Suvaxyn. Sows of group 2 (n = 5 sows) were vaccinated with 1 mL BEI-inactivated Marc-145 grown virus (10^8 $TCID_{50}$) in 1 mL o/w Suvaxyn. Sows of group 3 (n = 5 sows) received 2 mL of a commercial European type inactivated PRRSV vaccine (Progressis®, Merial, strain P120: min 2,5 log IF Units). Sows of group 4 and 5 were vaccinated with the European type (Porcilis® PRRS, Intervet, 10^4 $TCID_{50}$/ 2 mL) and the American type (Ingelvac® PRRS MLV, Boehringer Ingelheim, $10^{4,9}$ $TCID_{50}$ / 2 mL) attenuated vaccine, respectively. All vaccines in all groups were administered once (single shot) one week after arrival. All sows were monitored clinically. Blood was taken at 0, 1, 2 and 3 weeks after vaccination for determination of both IPMA and virus-neutralizing antibody titers (SN-test). Antibodies were detected against the PRRSV isolate, that originated from the farm where the sows were obtained.

Results. All sows remained in good health and condition after they were vaccinated and no local or general reactions were observed. Except for Ingelvac® PRRS MLV, all sows developed a virus-specific antibody response after vaccination (results not shown). Compared to the commercial vaccines, the farm-specific inactivated vaccine induced a strong neutralizing antibody response in all three experiments (Figure 1-3). The induction of virus-neutralizing antibodies by the commercial attenuated and inactivated PRRS vaccines agaisnt the farm-specific isolate was variable (Figure 1-3).

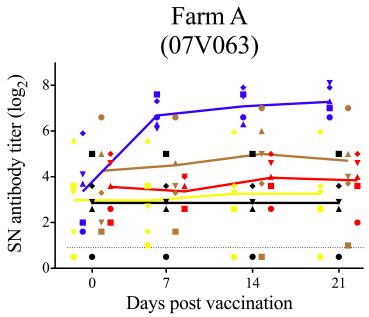

Figure 1. PRRSV-neutralizing antibody titers (log_2) after vaccination for group A (Mock-vaccinated control, black), B (BEI-inactivated 07V063, blue), C (Progressis®, yellow), D (Porcilis® PRRS, red) and E (Ingelvac® PRRS MLV, brown). Symbols represent individual animals and solid lines represent mean SN titers for each group. The dotted line marks the detection limit of the SN test.

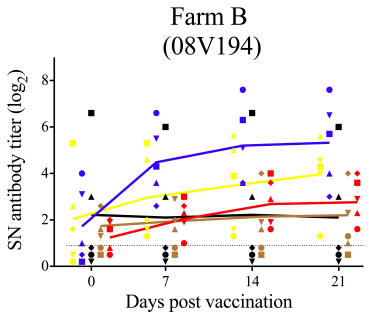

Figure 2. PRRSV-neutralizing antibody titers (log_2) after vaccination for group A (Mock-vaccinated control, black), B (BEI-inactivated 08V194, blue), C (Progressis®, yellow), D (Porcilis® PRRS, red) and E (Ingelvac® PRRS MLV, brown). Symbols represent individual animals and solid lines represent mean SN titers for each group. The dotted line marks the detection limit of the SN test.

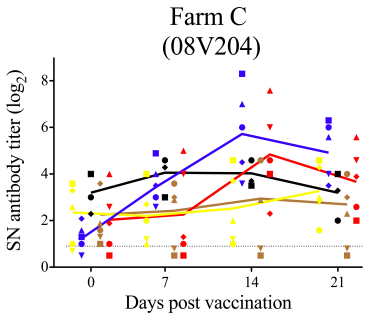

Figure 3. PRRSV-neutralizing antibody titers (log_2) after vaccination for group A (Mock-vaccinated control, black), B (BEI-inactivated 08V204, blue), C (Progressis®, yellow), D (Porcilis® PRRS, red) and E (Ingelvac® PRRS MLV, brown). Symbols represent individual animals and solid lines represent mean SN titers for each group. The dotted line marks the detection limit of the SN test.

Conclusion. A farm-specific vaccine, based on the circulating PRRSV field isolate can be one of the tools to control PRRSV-related problems.

References.
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