



Vaccination with a porcine reproductive and respiratory syndrome virus vaccine at 1-day-old improved growth performance of piglets under field conditions

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ABSTRACT

A porcine reproductive and respiratory syndrome virus (PRRSV) modified live-virus (MLV) vaccine was evaluated under field conditions for registration as recommended by the Republic of Korea's Animal, Plant & Fisheries Quarantine & Inspection Agency. A single dose of the vaccine was administered to 1-day-old piglets and their growth performance was monitored under field conditions. Three separate farms were selected based on their history of PRRSV-associated respiratory diseases. On each farm, 40 pigs were randomly allocated to one of two treatment groups: (i) vaccinated ($n = 20$) and (ii) unvaccinated ($n = 20$) pigs at 1 day of age. Vaccinated pigs showed an increase of their market weight of 6.23 kg/pig compared to the unvaccinated pigs (98.01 kg in vaccinated group vs. 91.78 kg in unvaccinated group; $P < 0.05$) and exhibited a decrease in mortality rate by 6.7% (3.3% in vaccinated group vs. 10% in unvaccinated group; $P < 0.05$). The pigs had a sufficiently mature immune system for the vaccine to elicit humoral and cell-mediated immunity (as measured by anti-PRRSV antibodies and PRRSV-specific interferon- γ secreting cells, respectively) at 1 day of age even in the presence of maternally derived antibodies. The results presented in this study demonstrate that the PRRSV MLV vaccine is effective in improving growth performance from day 1 all the way to day 182 in endemic farms suffering with PRRSV-2 infection or both PRRSV-1 and PRRSV-2 infection.

1. Introduction

Porcine reproductive and respiratory syndrome (PRRS) is the most economically important disease to the global swine industry. PRRS is a combination of reproductive disorders in sows and gilts such as abortions, premature farrowing, mummified and stillborn fetuses, and respiratory disorders with poor growth performance in pigs from nursery to finishing period (Zimmerman et al., 2012). The causative agent for PRRS is the PRRS virus (PRRSV), which is a single-stranded, enveloped RNA virus belonging to the *Arteriviridae* family. There are two main types, PRRSV-1 (European origin) and PRRSV-2 (North American origin) (Snijder and Meulenbergh, 1998).

In Korean farms, PRRSV vaccines are typically administered into pigs at 21 days of age. However, the age of the first infection with PRRSV in Korean farm has recently been getting younger. During a two year period between 2015 and 2016, serum samples from 352 piglets at 3 to 5 weeks of age were examined by real-time polymerase chain reaction (PCR) at the Department of Veterinary Pathology, Seoul

National University. PRRSV was detected in 153 cases compared to 67 out of 347 samples from the previous two years (2013–2014). Theoretically, all these cases could have been prevented through vaccination 21-day-old which is currently recommended by manufactures. Early vaccination however has its own caveats, (i) the immune system may not be mature enough to efficiently respond to the vaccination and (ii) maternally derived antibodies may interfere with the efficacy of vaccination. Recently, a commercial PRRSV modified live-virus (MLV) vaccine (Fostera™PRRS, Zoetis, Parsippany, New Jersey, USA) was licensed for 1-day-old vaccination in 2015 (<http://www.zoetis.com>). However, no in-depth evaluation of the efficacy of this vaccine when administered to 1-day-old piglets has been performed under field conditions. The objective of this study was to evaluate the efficacy of this commercial PRRSV MLV vaccine when administered at day 1 under field conditions based on clinical, virological, immunological, and pathological criteria.

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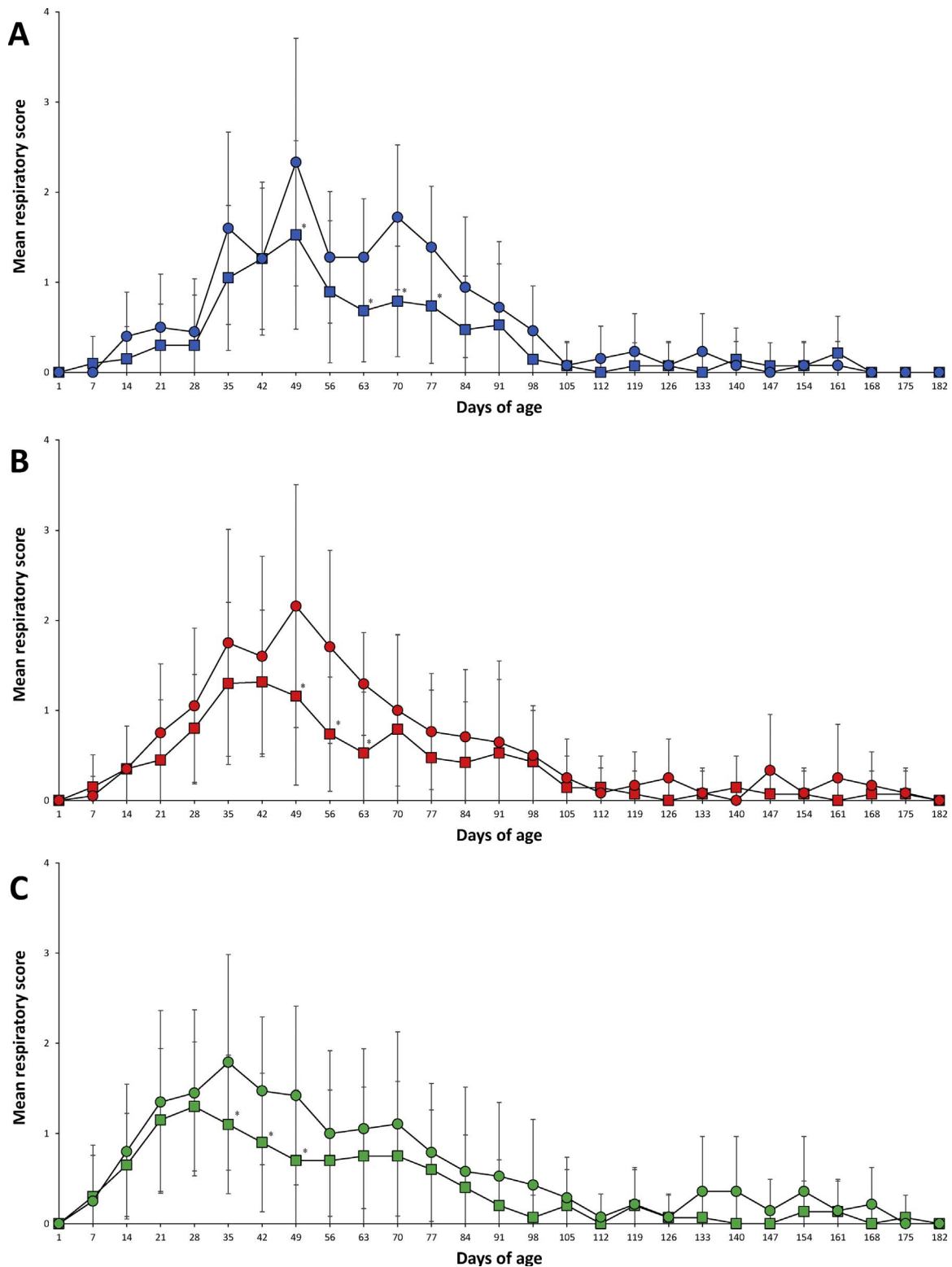


Fig. 1. Mean respiratory score from farm A (A) in VacA (■) and UnVacA (●), farm B (B) in VacB (■) and UnVacB (●), and farm C (C) in VacC (■) and UnVacC (●) groups. Variation is expressed as the standard deviation. *Significant difference ($P < 0.05$) between vaccinated and unvaccinated group within the same farm.

2. Materials and methods

2.1. Farms history

The clinical field trial was conducted on 3 separate farms; farms A (230-sow), B (420-sow), and C (230-sow), respectively. The 3 farms are

one-site and continuous production systems. The three selected farms had suffered recent losses due to respiratory diseases by co-infection with PRRSV-1 and PRRSV-2 in farm A and B, and by infection with PRRSV-2 in farm C in post-weaning and growing pigs.

Prior to the beginning of this study, post-weaning pigs from all farms were submitted to the Department of Veterinary Pathology in

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