

Immunization of swine with virus-like replicon particles: proof of concept

Introduction:

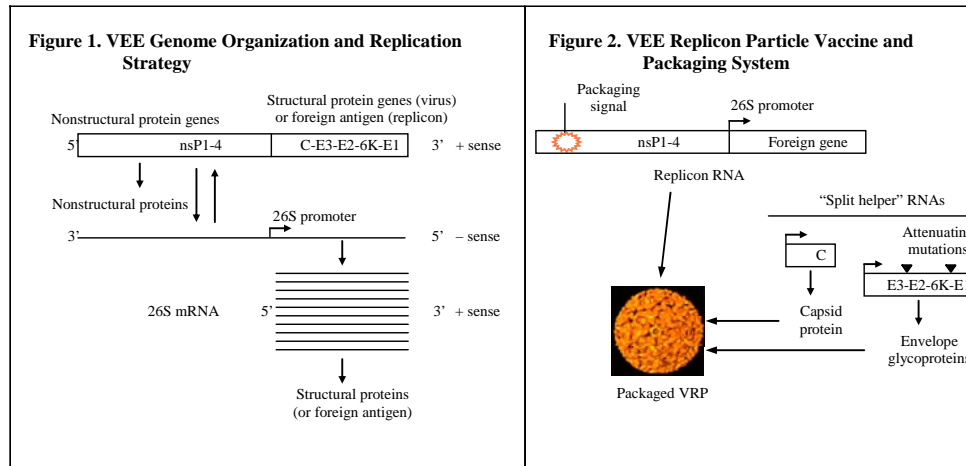
Virus-like replicon particles (VRP) derived from the alphavirus Venezuelan equine encephalitis (VEE) is a single cycle vector not capable of propagating past the initial cell infected (Fig 1-2).¹ VRP have been previously used to show that co-expression of the GL and M proteins of equine arteritis virus are required for protection.² We have recently developed VRP co-expressing GP5 and M proteins of PRRSV³, however there are no previous reports of immunizing swine with VRP vaccines. The purpose of this study was to determine the potential for using VRP vaccines in pigs.

Objectives:

1. Determine the ability of VRP vaccines to induce an immune response in pigs to a foreign antigen.

Materials and Methods:

Pigs were obtained at 3 weeks of age and divided into 3 groups of 4. On Day 0 and again on Day 14, pigs were vaccinated IM with 10⁸ VRP/ml expressing the HA protein from A/Wyoming/03/2003 H3N2 (groups 1-2) or a control VRP (group 3). The VRP in group 1 were derived from VEE 3014 (wt strain) and group 2 from VEE TC-83 (vaccine strain). Serologic response to the HA protein was determined by hemagglutination-inhibition (HI) assay and ELISA.



Results and Discussion:

Prior to vaccination all pigs were HI negative with a geometric mean titer (GMT) of 12 (Figure 3). Negative control pigs in group 3 remained negative through necropsy (GMT=20). An HI response was detected in group 1 (GMT=67) and group 2 (GMT=56) following the priming dose. After the booster dose a strong HI response was detected in group 1 (GMT=2985) and group 2 (GMT=2985) with maximum titers reaching 1:5120. No difference in response was seen between groups 1 and 2 indicating that VRP derived from the non-select TC-83 vaccine strain can be used in future trials.

Conclusions:

1. These results indicate that VRP vaccines can successfully express a foreign antigen in vivo in the pig and induce high antibody titers.
2. This proof of concept work supports the in vivo evaluation of VRP co-expressing PRRSV GP5 and M proteins as a novel vaccine for PRRSV.

References:

- 1 – Rayner et al, *Rev Med Virol*. 2002; 12: 279-296
- 2 – Balasuriya et al, *Vaccine*. 2002; 20: 1609-1617
- 3 – Erdman et al, *Proc PRRS Symposium*. 2006.

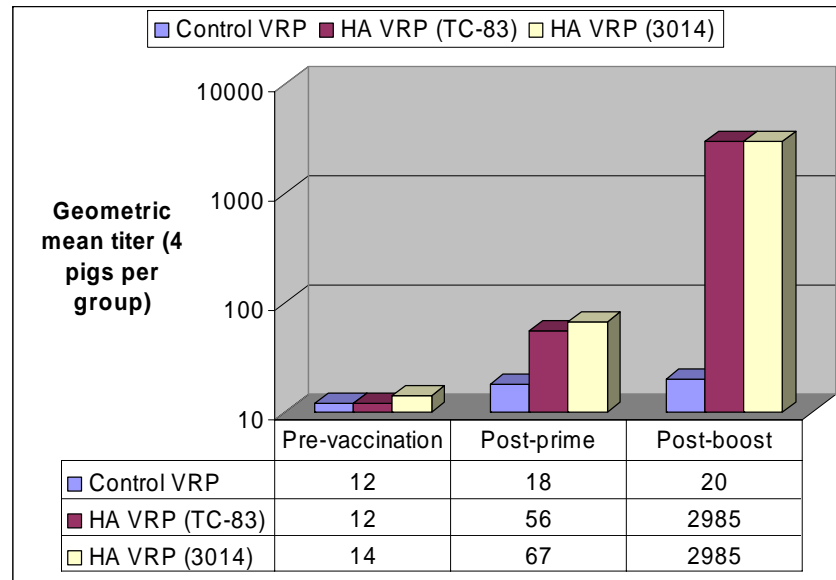


Figure 3: HI response of pigs to VRP expressing the influenza HA protein