

# Replicon Particle Porcine Reproductive and Respiratory Syndrome Virus Vaccine Provides Partial Protection from Challenge

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### Summary and Implications

Replicon particles (RPs) expressing the GP5 and Matrix structural proteins of Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) were created and compared to inactivated PRRSV in a challenge study. Pigs that received the RP vaccine had lower live virus titers and showed lower IDEXX ELISA values following challenge when compared to other groups.

These results show that the RP vaccine provided partial protection against challenge with virulent PRRSV. Also, the RP vaccine allows for differentiation between vaccinated and naturally infected animals.

### Introduction

Porcine reproductive and respiratory syndrome (PRRS) is one of the economically significant diseases facing the swine industry. New strategies for preventing and eliminating the disease are needed. In addition to providing protection, new vaccines should allow for enhanced diagnostic methods that will aid attempts to eradicate the disease locally and nationally.

### Materials and Methods

We created RP vectors expressing GP5 and Matrix proteins of PRRSV. Pigs receiving these RP vaccines were compared to groups receiving inactivated PRRSV, a placebo, and a group of strict negative control pigs. Forty crossbred pigs were obtained at three weeks of age and

randomized into groups of ten. Pigs were immunized on Day 0 and Day 28 of the study. Serum samples were collected at seven day intervals during the course of the study. All pigs except strict negative control pigs were challenged intranasally on Day 49 with 2 ml of  $1 \times 10^5$  TCID<sub>50</sub>/ml of virulent PRRSV strain HLV349. This strain is homologous to the GP5 and Matrix genes used to construct the RP. Pigs were euthanized 21 days after challenge. A necropsy was performed, and tissues were collected for laboratory testing, including: quantitative gross lung lesion scoring, histopathology, IDEXX ELISA, virus titration, and virus neutralization.

### Results and Discussion

Following challenge, mean IDEXX ELISA S/P ratios were significantly lower in pigs that received RP vaccine compared to other challenged groups. The RP vaccinated pigs had significantly lower serum live virus titers at 7 days post challenge compared to placebo- and inactivated PRRSV-vaccinated pigs. No live virus was detected in any pigs at 14 or 21 days post challenge. The strict negative pigs had no detectable live virus at any time post-challenge. Histopathology of tissues showed no differences between groups at necropsy. These results indicate that RP vaccine provided partial protection from challenge with virulent PRRSV. The absence of anti-nucleocapsid seroconversion in RP vaccinated pigs prior to challenge provides a way to serologically differentiate between naturally infected and vaccinated animals.

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