

Impact of Repeated Vaccination with a Closely Related Vaccine Virus (Ingelvac® PRRS MLV) on PRRSV VR-2332 Persistence and Transmission in a Population of Pigs

This is a summary of research conducted by Drs. Scott Dee and Jean Paul Cano at the University of Minnesota to evaluate the role of mass vaccination with a modified-live vaccine (MLV) to reduce transmission and persistence of PRRSV.

This study was designed to evaluate the effect of one, two, or three doses of Ingelvac® PRRS MLV on the transmission and persistence of virus within a positive population of pigs under commercial conditions.

Results support that mass vaccination with a MLV can significantly reduce the transmission and persistence of PRRSV within positive populations of pigs. This suggests that MLV can be used to control and potentially eliminate PRRSV within and between populations of pigs.

Study Design and Methods:

Three hundred and thirty two (332), 6 to 8 week-old PRRSV-naïve pigs were divided into 5 different groups and barns. Groups A, B, C and D had 80 pigs each, and Group E (negative controls) had 12 pigs. On day 0, pigs in groups A through D were inoculated intranasally with PRRSV VR-2332 at 10^4 TCID₅₀. On day 7 PI, groups B, C, and D were vaccinated intramuscularly with 2 ml of Ingelvac® PRRS MLV. Groups C and D were re-vaccinated at 37 DPI and the third dose for group D was given on day 67 PI. Group A was inoculated and not vaccinated.

To evaluate transmission, ten PRRSV-naïve age matched sentinels were introduced per group at 30 day intervals beginning 37 PI (Groups A, B, and E), 67 PI (Group C), and 97 PI (Group D). Sentinel pigs were removed and evaluated for antibody response by ELISA 30 days after introduction. To evaluate persistence, 10 pigs per group were randomly selected at 30 day intervals beginning 37 PI (Groups A, B, and E), 67 PI (Group C), and 97 PI (Group D) and assessed for the presence of viral RNA via PCR (TaqMan® RT PCR) of pools of multiple tissue samplings from each animal.

Results:

Transmission (Table 1)

- Group A (*NV*; field virus inoculation only): PRRSV transmission to naïve sentinels was detected at all detection periods through day 127 and termination of study.
- Group C (*V-2X*; field virus inoculation followed by 2 doses of vaccine; day 7 and day 37): No PRRSV transmission to naïve sentinels was detected at evaluation periods 67 dpi – 97 dpi and 97 dpi – 127 dpi. No evidence of virus transmission starting 30 days following the 2nd dose of vaccine.
- Group D (*V-3X*; field virus inoculation followed by 3 doses of vaccine; day 7, day 37, and day 67): No PRRSV transmission to naïve sentinels was detected in this group of animals during the evaluation period following three mass vaccinations.

Table 1. Evaluation of PRRSV transmission to sentinels

Group	Treatment	67 DPI	97 DPI	127 DPI
A	Challenge control	+	+	+
B	V _x 7 PI	+	-	+
C	V _x 7 & 37 PI	NA	-	-
D	V _x 7, 37, & 67 PI	NA	NA	-
E	Strict control	-	-	-

DPI: days post inoculation

NA: not available

+: detection of at least one infected sentinel in the group

Persistence (Table 2)

- Group A had 36% persistently infected pigs at day 127-termination of study.
- Groups B, C and D had 15%, 9%, and 16% persistently infected pigs respectively at day 127-termination of study.
- Groups B, C and D (1x, 2x, and 3x vaccinated groups) had significantly less persistently infected pigs than Group A (field virus inoculated only); $\alpha = 0.05$

Table 2. Proportion of PRRSV persistently infected pigs

Group	Treatment	37 DPI	67 DPI	97 DPI	127 DPI
A	Challenge control	9/10	9/9	8/10 ^a	15/42 ^a (0.36)
B	V _x 7 PI	9/10	9/10	5/10 ^a	6/39 ^b (0.15)
C	V _x 7 & 37 PI	NA	8/10	5/10 ^a	4/46 ^b (0.09)
D	V _x 7, 37, & 67 PI	NA	NA	4/10 ^a	9/57 ^b (0.16)
E	Strict control	0/6	0/6	0/6	0/5

DPI: days post inoculation

NA: not available

Proportions with different superscripts in the same DPI are statistically different ($\alpha = 0.05$) Fisher's Exact Test

Key Points:

- **Two or three mass vaccinations of Ingelvac[®] PRRS MLV at 30 day intervals in an infected population prevented the transmission of virus beginning 30 days following the final dose of vaccine.**
- **Mass vaccination of positive pigs previously exposed to PRRSV significantly reduced the number of persistently infected pigs.**

Take Home

- **The mass vaccination protocol of PRRS positive populations of pigs with modified-live vaccine could significantly reduce and/or eliminate the transmission of virus within the population as well as significantly reduce the prevalence of persistently infected animals within the population. This is a significant finding as we strive to develop protocols to control PRRS virus within populations and between populations in area or regional control strategies.**