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Description of Herd-Outbreaks Using Killed PRRSV Vaccine with an Attempt to Boost Immune Response

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Abstract

The objective of this study was to describe demographic characteristics, management practices, and live PRRSV exposure methods of herd-outbreaks that adopted a killed vaccine protocol.

Disciplines

Veterinary Infectious Diseases | Veterinary Microbiology and Immunobiology | Veterinary Preventive Medicine, Epidemiology, and Public Health

Comments

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Description of Herd-Outbreaks Using Killed PRRSV Vaccine with an Attempt to Boost Immune Response

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Objective

The objective of this study was to describe demographic characteristics, management practices, and live PRRSV exposure methods of herd-outbreaks that adopted a killed vaccine protocol.

Materials and Methods

A retrospective observational study was conducted, following 38 PRRSV herd-outbreaks from 19 herds reporting vaccination with KV (MJPRRS®). A herd-outbreak was defined as a wild-type PRRSV introduction in a breeding herd, as reported by veterinarians. A survey was used to record key demographic information including herd size (number of breeding sows in the inventory), geographic region, location of gilt acclimation site (offsite or onsite), duration of herd closure (in weeks), prior PRRS status before an outbreak (stable or unstable), frequency of weaning events/week (1 and 2 or 3+), PRRSV exposure combinations in breeding sows and gilts, number of doses (before and after an outbreak)/year and RFLP strains. Moreover, weekly productivity data was gathered.

Outbreaks were considered “clinical herd-outbreaks” as defined by American Association of Swine Veterinarians (AASV) when there was evidence of PRRS-associated changes in productivity such as significant decrease in weaned pigs or spike in the number of weekly abortions. Time to baseline production (TTBP), and total loss/ thousand sows (TL/1000 sows) were reported for clinical herd-outbreaks, as previously established (Linhares et al., 2014). Herd-outbreaks were censored if dropped from the study between enrollment and reaching TTBP or at 52 weeks if not having reached TTBP.

Multivariate analysis was done only for the clinical herd-outbreaks. More specifically, survival analyses were used to compare TTBP and TL/1000 sows between different exposure combinations in gilts and sows. The time-to-event (Kaplan-Meier survival analysis) for TTBP, and Kruskal-Wallis for TL were done. Statistical analyses were performed with SAS version 9.4 (SAS Institute Inc., Cary, North Carolina).

Results

There were 6 different exposure combinations of KV in gilts and 4 different exposure combinations of KV in sows with 0–4 numbers of KV doses/year having been delivered both before and after an outbreak.

The exposure combinations in gilts were (a) natural virus only (n = 2), (b) live-resident virus inoculation (LVI) and KV (n = 12), (c) LVI only (n = 2), (d) MLV and KV (n = 7), (e) MLV and LVI (n = 3), (f) KV and feedback materials (tissues, serum, fecal materials, or other biologically derived products) (n = 1); and the exposure combinations in sows were (a) KV only (n = 16), (b) KV and MLV (n = 8), (c) KV, MLV, and feedback (n = 2), (d) KV and feedback (n = 1).

Regarding gilt exposure protocols, 45% of the clinical herd-outbreaks used an LVI + KV combination, and, regarding sow exposure, 59% of the clinical herd-outbreaks used KV only. The exposure combination of MLV + KV in gilts and the exposure combination of KV + feedback material in sows had a median TTBP and TL of

zero. The herd-outbreaks using KV only as exposure after an outbreak in sows had a median TTBP of 13.5 weeks and median TL/1000 sows of 1305, and the herd-outbreaks using LVI + KV as an exposure in gilts had a median TTBP of 13.5 weeks and median TL/1000 sows of 971. Of the clinical herd-outbreaks, 89% used 3 KV doses/year before the outbreak with median TTBP of 13 weeks, and 67% used 3 KV doses/year after the outbreak with median TTBP of 6.5 weeks. When comparing herd closure protocols, 78% of the herd-outbreaks utilizing KV implemented no herd closure. The herd-outbreaks implementing herd closure had a TTBP 5 weeks shorter than herd-outbreaks not implementing herd closure. The median TL/1000 sows was also significantly smaller in herd-outbreaks implementing herd closure, compared to those that did not.

Table 1. Demographic characteristics of the clinical herd-outbreaks.

Characteristics	Value
Herd size (mean ± SE)	2918 ± 1198 sows
Weaning frequency	1 and 2/week: 10 (37%) 3+/week: 17 (63%)
Gilt acclimation site	GDU offsite: 11 (41%) GDU onsite: 16 (59%)
Prior PRRS status	PRRS unstable: 3 (11%) PRRS stable: 24 (89%)
U.S. region	Midwest: 27 (100%) Southeast: 0 (0%)

Table 2. Exposure characteristics of the clinical herd-outbreaks.

Characteristics	Median TTBP (in weeks) (25th and 75th percentile)	Median TL/1000 Sows (25th and 75th percentile)
<i>Exposure combinations (gilts)</i>		
Natural virus (n = 2, 7%)	21.5 (20, 23)	1182 (1035, 1330)
LVI + KV (n = 12, 45%)	13.5 (0, 15.5)	971 (0, 1962.5)
LVI (n = 2, 7%)	16.5 (13, 20)	0 (0, 0)
MLV + KV (n = 7, 26%)	0 (0, 13)	0 (0, 3696)
MLV + LVI (n = 3, 11%)	13 (0, 27)	1451 (0, 7189)
KV + Feedback (n = 1, 4%)	0 (0, 0)	0 (0, 0)
<i>Exposure combinations (sows)</i>		
KV (n = 16, 59%)	13.5 (0, 18.5)	1305 (0, 2028)
KV + MLV (n = 8, 30%)	0 (0, 10)	0 (0, 517.5)
KV + MLV + Feedback (n = 2, 7%)	15.5 (13, 18)	3978 (3696, 4260)
KV + Feedback (n = 1, 4%)	0 (0, 0)	0 (0, 0)

Table 3. Management practices of clinical herd-outbreaks.

Characteristics	Median TTBP (in weeks) (25th and 75th percentile)	Median TL/ 1000 Sows (25th and 75th percentile)
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<i>Number of KV doses/year (before outbreak)</i>		
0 (n = 2, 7%)	21.5 (20, 23)	1183 (1035, 1330)
1 (n = 1, 4%)	0 (0, 0)	0 (0, 0)
3 (n = 24, 89%)	13 (0, 15.5)	391 (0, 2028)
<i>Number of KV doses /year (after outbreak)</i>		
2 (n = 1, 4%)	0 (0, 0)	0 (0, 0)
3 (n = 18, 67%)	6.5 (0, 18)	0 (0, 1391)
4 (n = 8, 29%)	14 (6.5, 19)	1816 (580, 2559)
<i>Herd closure days</i>		
None (n = 21, 78%)	13 (0, 17)	782 (0, 3090)
≥ 42 days (n = 6, 22%)	7 (0, 20)	518 (0, 1330)

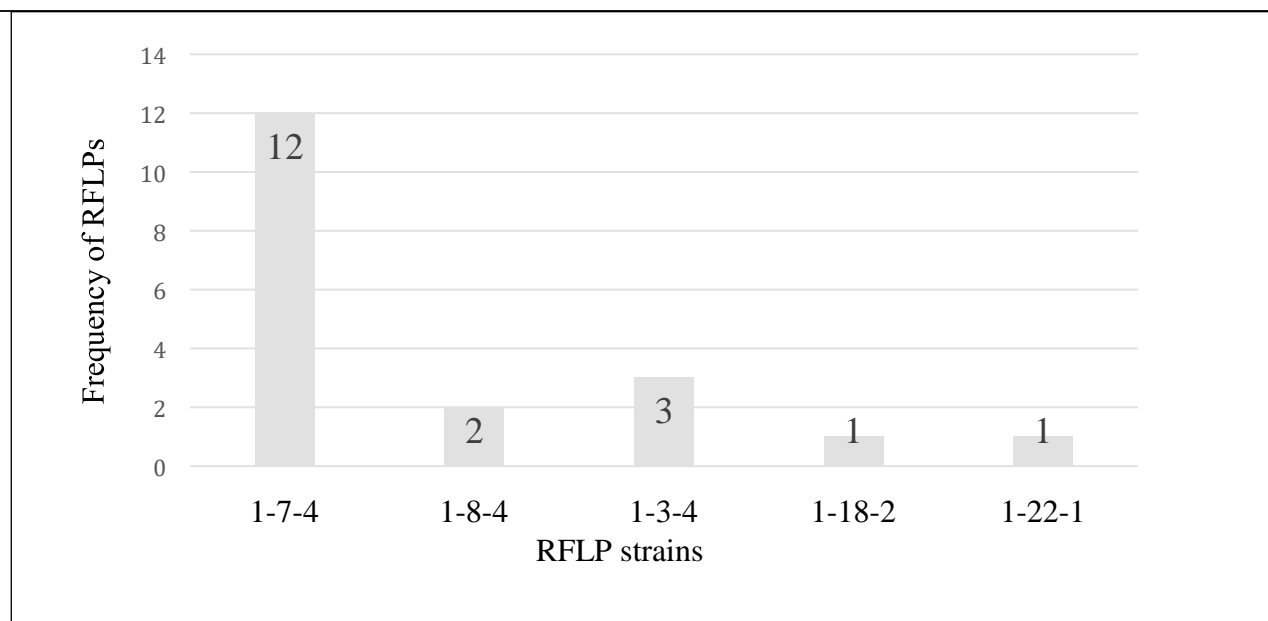


Figure 1. Distribution of RFLP strains in KV clinical herd outbreaks.

Conclusion

This study described for the first-time herd characteristics, management practices, and live PRRSV exposure methods associated with use of KV for PRRS control in infected breeding herds.

Acknowledgment

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Reference

Linhares DCL, Cano JP, Torremorell M, Morrison RB. 2014. Comparison of time to PRRSv-stability and production losses between two exposure programs to control PRRSv in sow herds. *Prev Vet Med* 116 (1-2), 111-119.