Observations of sustained PRRS control by modified-live vaccination of sows and pigs

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Introduction

Porcine reproductive and respiratory syndrome (PRRS) is the most damaging disease in the swine industry with negative effects typically observed in breeding herd reproductive performance as well as pig productivity parameters.[1,2] Adequately controlling the infection involves stabilization of sow herd immunity as well as actively protecting pigs, particularly in pig-dense regions where exposure of pigs to wild-type virus post-weaning is likely.[3] Modified-live PRRS virus (PRRSv) vaccines have consistently proven to be a reliable and efficient tool for the stabilization of breeding herds[4] as well as providing robust heterologous protection of growing pigs.[5] This paper reports in-process observations from a multi-site farm in which modified-live PRRS vaccination of sows and pigs was implemented for a 4 year period with the goal of achieving sustained PRRS control.

Materials and methods

The objective of this project was to evaluate a PRRS control program based on the use of a modified-live PRRS virus vaccine (Ingelvac® PRRS MLV, Boehringer Ingelheim Vetmedica, Inc.) in both the reproductive and growing pig herds. A conventional multi-site farm with 750 sows with a history of clinical PRRS located in Northwestern Mexico participated in the project. The farm is also M. hyo, PCV2 and SIV positive. Recurrent clinical PRRS problems had been observed since 2005. Various control strategies were implemented based upon changes in farm management. Use of live (virulent wild-type) virus inoculation (LVI) in gilts and sows was tried with unsatisfactory results, ie the continuous production of viremic pigs at weaning. At the beginning of 2007 a PRRS control program utilizing modified-live PRRS virus vaccine was initiated with two main objectives: 1) stabilization of the breeding herd (measured by the production of PCR-negative pigs at weaning) and, 2) improved survivability and productivity of pigs.

The vaccination program included:

- initial mass vaccination of the breeding herd twice with a four week interval between vaccinations
- repetition of breeding herd mass vaccination every 4-5 months
- piglets were vaccinated at weaning (approximately 21 days of age) with a single dose of vaccine

Various reproductive (abortion rate, mummification rate, stillborn rate, total born pigs per litter) and growing pig parameters (pre-weaning mortality rate, nursery mortality rate, finishing mortality rate) were recorded and evaluated from 2007-2010. In addition, 30 randomly selected weanling pigs per week were tested by PRRS PCR until the point negative results were consistently achieved. Weanling pig testing was then conducted at less frequent intervals to evaluate the consistency of production of non-viremic pigs. In addition to the vaccination program, 6 weeks of nursery production were diverted to a different flow to create a break in production to prevent exposure of vaccinated pigs that were developing immunity to the continuous circulation of PRRSv from non-vaccinated older pigs. Biosecurity measures were also reinforced and continuously monitored.

Results

The use of a consistent modified-live PRRSv vaccination program resulted in breeding herd stabilization (production of PCR-negative pigs at weaning) within 14 weeks following the second mass vaccination (Table 1). During weeks 142 and 155, a new PRRSv strain (RFLP pattern 1-18-2) was detected resulting in additional variation in the performance data.

During the 192 week post-vaccination observation period, the observed mean:

- abortion rate (%) decreased from 4.16 to 3.28% (Figure 1)
- mummification rate (%) decreased from 2.93 to 1.46 pigs/litter (Figure 2)
- pre-weaning mortality rates decreased from 8.23 to 7.31% (Figure 3)
- nursery mortality rate decreased from 3.77 to 1.84% (Figure 4)

Table 1: Piglet PRRS PCR monitoring results following breeding herd mass vaccination.

wk	% Viremic	wk	% Viremic	wk	% Viremic	wk	% Viremic	wk	% Viremic
1	17 of 30	11	5 of 30	22	0	88	0	170	0
2	19 of 30	12	3 of 30	23	0	97	0	174	0
3	14 of 30	13	2 of 30	25	0	110	0	178	0
4	16 of 30	14	0	25	0	112	0	180	0
5	19 of 30	15	0	30	0	122	0	182	0
6	11 of 30	16	0	37	0	142	5 of 30*	188	0
7	7 of 30	17	0	45	1 of 30	155	1 of 30*	192	0
8	10 of 30	18	0	58	0	158	3 of 30*		
9	8 of 30	19	0	68	0	162	1 of 30*		
10	7 of 30	20	0	75	0	166	0		

* A new PRRS virus strain (1-18-2) was detected in the farm and in the entire region. It's the first time that this new strain was detected in Mexico.

Figure 1: Abortion rate results.

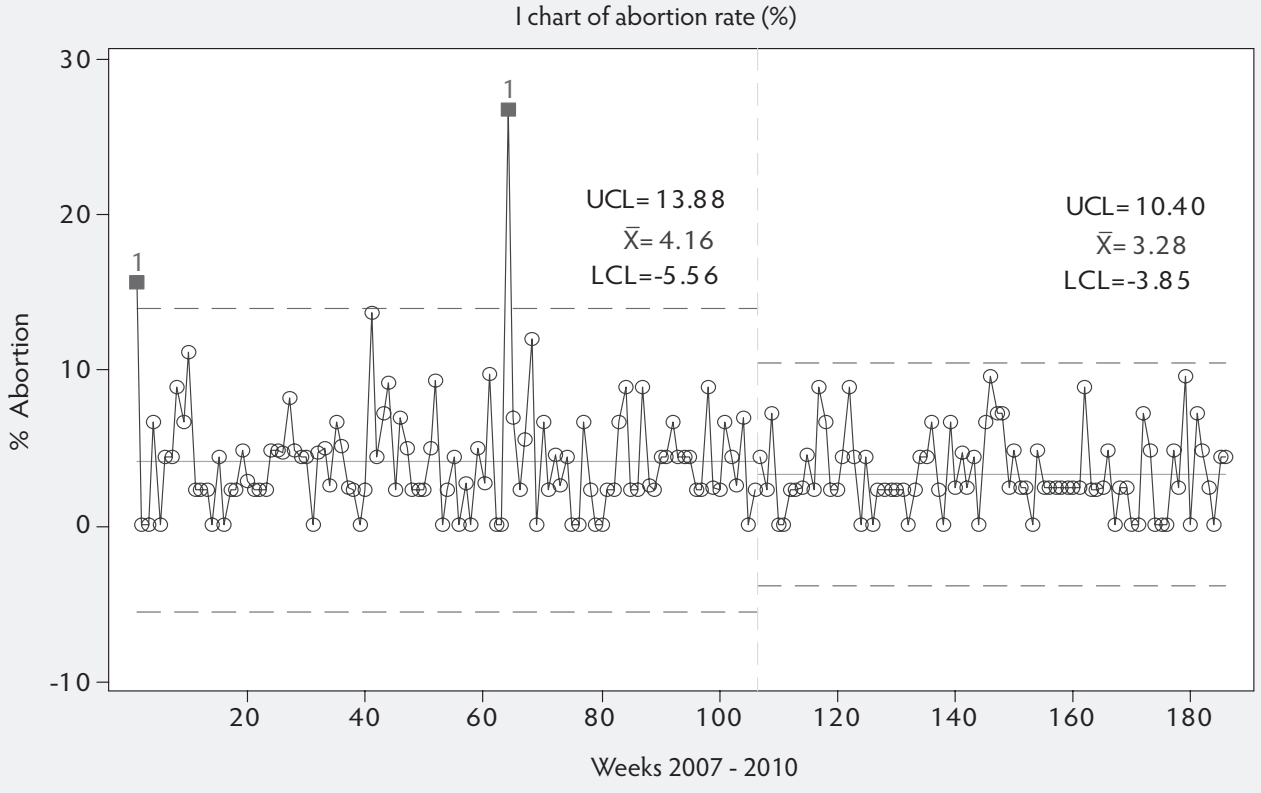


Figure 2: Mummification rate results.

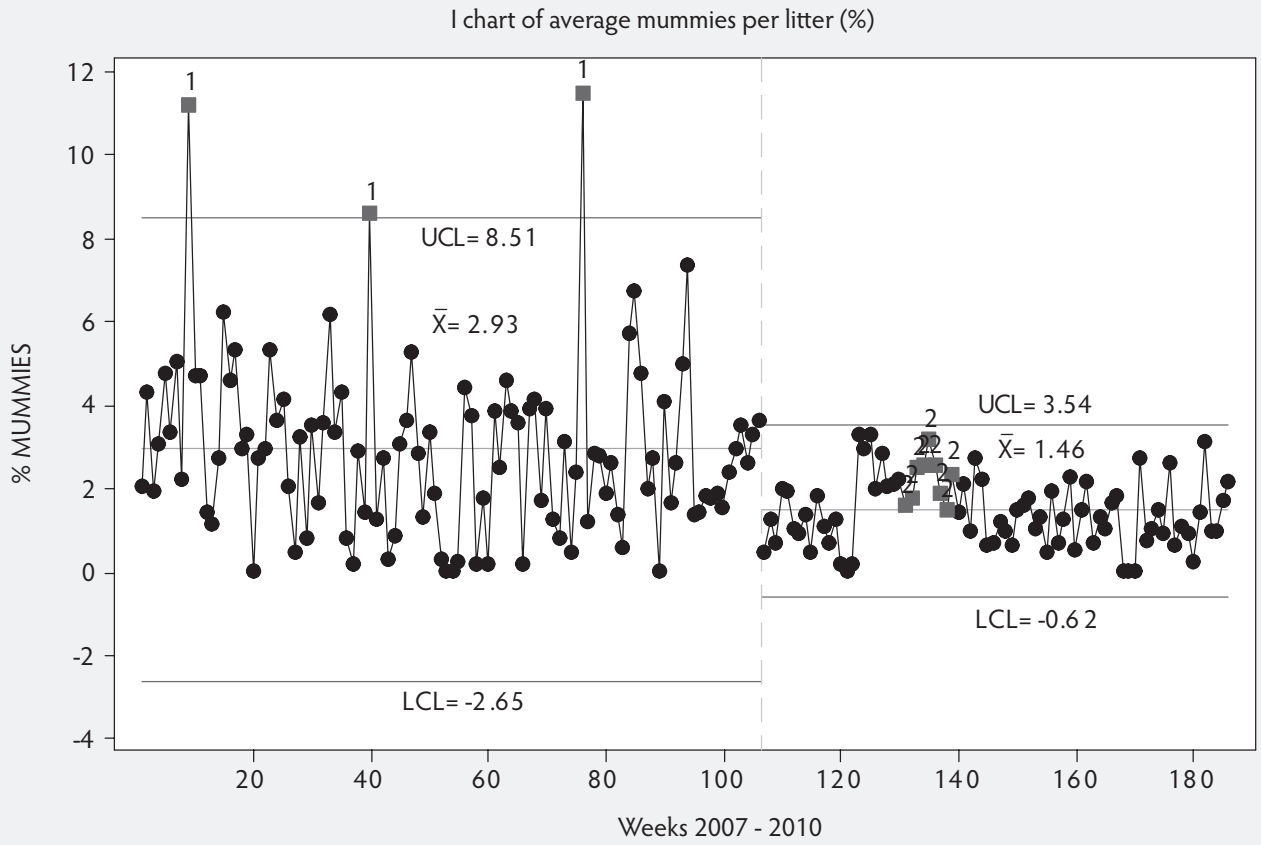


Figure 3: Pre-weaning mortality rate results.

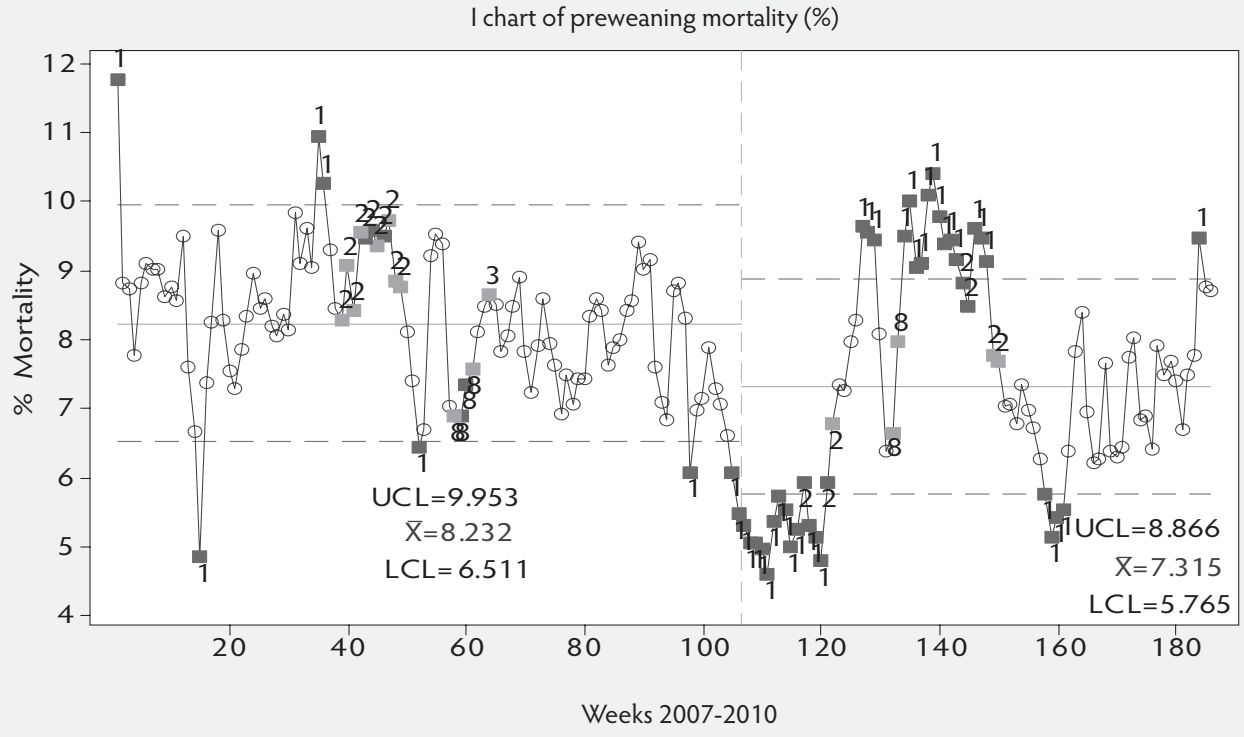
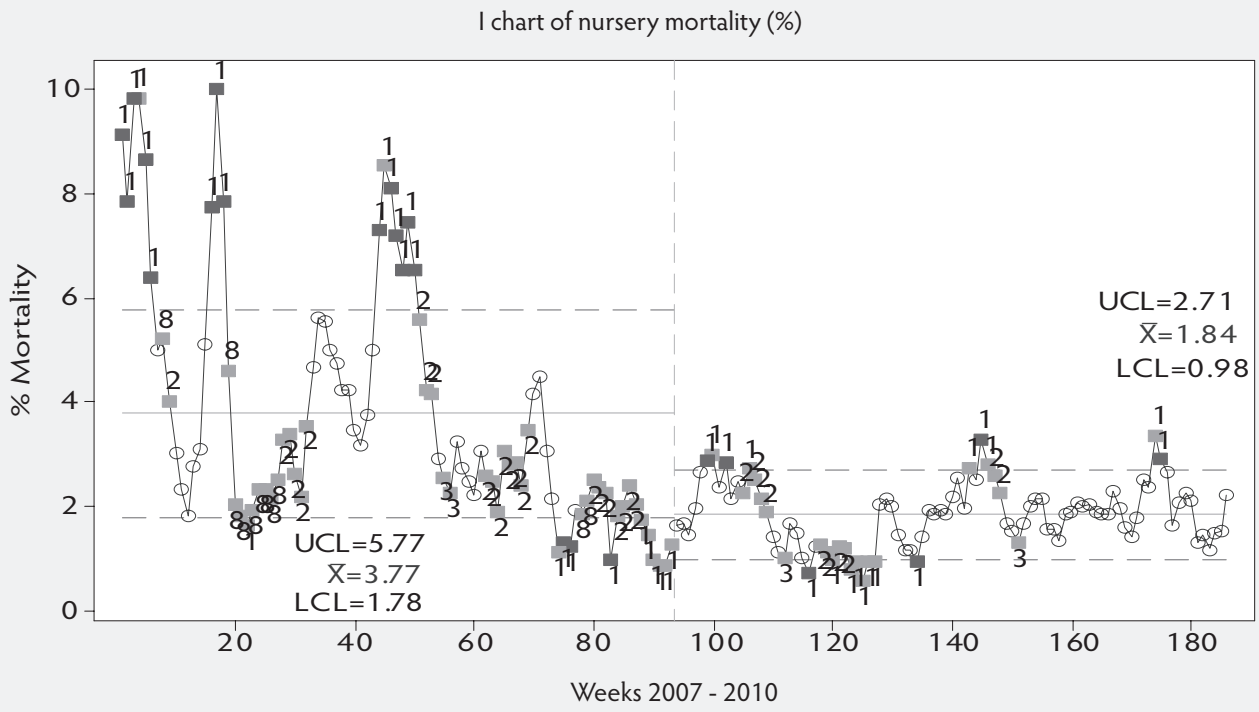


Figure 4: Nursery mortality rate results.



- finishing mortality rate decreased from 5.89 to 4.68% (Figure 5)

A summary of all the parameters is presented in Table 2

As we can observe on table 1, at week 142 the farm was exposed and experienced clinical signs following the introduction of a new heterologous PRRSv strain (1-18-2). This strain wasn't detected previously in the farm or in the region (first detection of this strain in Mexico). The introduction of the new strain impacted some production parameters. Normal production parameters were re-established in 7 weeks and re-stabilization of the breeding herd with the subsequent production of PCR negative pigs at weaning was re-established in 10 weeks.

Conclusion

The modified-live PRRSv vaccination program resulted in sustained, acceptable PRRS control in the breeding herd and post-weaning pig production.

References

1. Neuman et al, J Am Vet Med Assoc 2005;227:385-392.
2. Dee SA,et al 1994 JSHAP. 3:64–66.
3. Philips, R et al 2000.16° IPVS Proc 590.
4. Turner M et al, IPVS 2008 P01:133.
5. Roof M, Leman Conference 2008:30–40.

Figure 5: Grower-finisher mortality rate results.

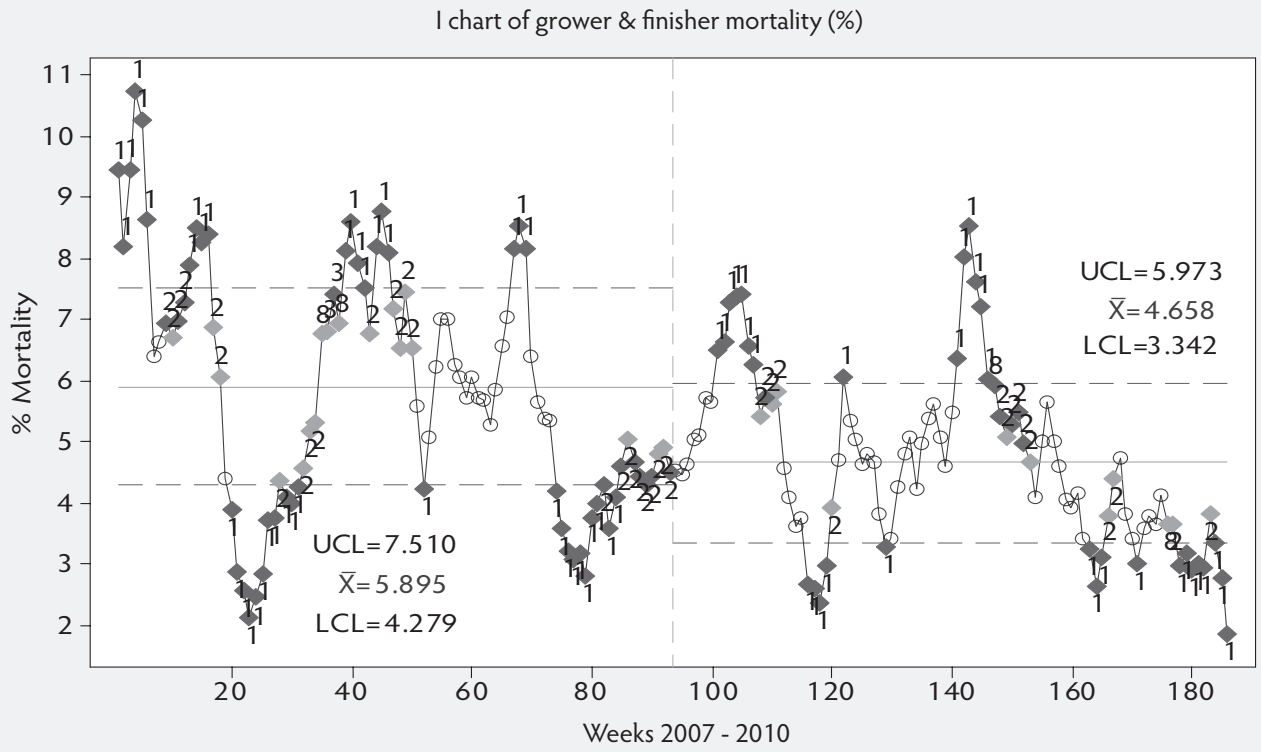


Table 2: Observed performance parameter means before and after implementation of the modified-live vaccination program.*

Parameter	Before	After
Abortion rate (%)	4.16[a]	3.28[b]
Mummification rate (%)	2.93[a]	1.46[b]
Pre weaning mortality (%)	8.23[a]	7.31[b]
Nursery mortality (%)	3.77[a]	1.84[b]
Finishing mortality (%)	5.89[a]	4.68[b]
Total mortality (%)	17.89[a]	13.83[b]

* Actual data plotted as statistical process control charts in Figures 1-5.

[a,b] $P < 0.05$