MJ PRRS vaccine: Field efficacy

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Introduction

Finding the right porcine respiratory and reproductive syndrome virus (PRRSV) control program is very important. This case study shows one example of going from a goal to eliminate PRRS virus, to a virus control program that did not work, and finally, using MJPRRS® as part of a program to produce full-value PRRSV negative pigs.

PRRSV elimination or eradication programs can be very difficult to implement and achieve. In the fall of 2008 a 4-5 year old 6400-sow farm had a history of at least two previous PRRS virus outbreaks. Each break followed with PRRS virus serum therapy of both the sow herd and the attached gilt development unit (GDU). The farm was in the process of trying to eradicate the virus through redesigned animal and personnel flows as well as stricter biosecurity procedures. However, after a period of time with poor quality pigs and short pig placements there were disgruntled owners, disgruntled workers, and higher costs. The frustration level was at an all time high. Suddenly the owners changed their focus from PRRSV eradication to PRRSV control. The goal was to improve the number of good quality pigs regardless of the PRRSV status of the sow herd. Scrapping the PRRSV eradication program led us to explore other PRRSV management strategies. The decision was made to try a killed PRRSV vaccine in the sow herd. The results of using that vaccine did not show an improvement in production.

Finally, the herd virus was sequenced and a grouping was determined at MJ Biologics®. An inactivated vaccine containing the same virus group linked by an epidemiological profile was used with very positive results. The outcome of these efforts and highlights of recent research results are presented here.

Production – 3rd quarter 2008

The farm is a 6400-sow breed to wean site with two gestation barns and common farrowing rooms. There are two isolation nurseries capable of handling 360 gilts delivered PRRSV naïve to the farm every four weeks at 3-4 weeks of age. After an 8 week stay, the gilts are moved into the gilt grow-finish facility attached to the gestation barn. At 28 weeks of age, gilts move into the breeding/gestation barns. In the 3rd quarter of 2008, the herd performance was at 10.9 total live born, 7.4% still born, 22.1% pre-weaning mortality and 8.5 pigs per sow weaning average. The farrowing rate was 77.1% and average pigs weaned per week was 2448 (Table 1).

Production after killed PRRS vaccination

The first attempt at PRRSV control was to give two doses of a killed PRRS vaccine to replacement gilts during acclimation. Additionally, the killed vaccine was given to all sows in weeks 44 and 48 of 2008. We targeted production at 2700 quality pigs per week rather than the 1900 to 2100 quality pigs per week produced over the previous nine months. Approximately 12 weeks after beginning the killed vaccination program (week 4 of 2009), there was an increase in the pre-weaning mortality, stillborn and mummy rates, and there were 37 late term abortions. Blood was drawn from 1) symptomatic sows in gestation, 2) baby pigs in farrowing and 3) gilts (delivered naïve and exposed naturally) leaving the isolation nursery after their 8-week stay. All three sampled areas yielded 100 percent PRRSV PCR positive results. Immediate virus sequencing was done. Samples from the three production areas of the farm yielded the same PRRS virus. Production values for weeks 4 to 8 in 2009 showed no improvement (Table 1).

The entire population was boostered with a third dose of the same killed PRRS vaccine on week 8 of 2009. The six weeks (13 through 18 in 2009) after the additional sow booster of the killed PRRS vaccine wean pigs were still PRRSV positive. During weeks 13-18 in 2009, production was struggling with 9.4 live born, 6.8% stillborn rate and 17.2% mummy rate (Table 1). The killed vaccine appeared to stop late stage abortions, but did not have an effect on stillborn or mummy rates. That vaccine also had no affect on limiting PCR status for PRRS virus in pigs at weaning. Considering that it had been 6 weeks since the booster of this killed vaccine, we concluded that it was time to look at our next option.

Production during and after MJPRRS vaccination

The decision was made to try MJ Biologics' MJPRRS vaccine. The PRRS virus sequences were submitted for evaluation and characterization of viruses based on MJPRRS grouping technology. Vaccine containing the

Table 1: Production summary by time frame

Production	Third quarter, 2008	Weeks 4-8, 2009 (after 2 doses of killed vaccine)	Weeks 13-18, 2009 (after 3rd dose of killed vaccine)	Weeks 25-30, 2009 (after 2 doses of MJPRRS)	First 3-quarters of 2010
Live born (pigs)	10.9	9.4	9.4	11.3	11.7
Stillborn (%)	7.4	9.5	6.8	4.7	6.4
Mummy (%)	n/a	11.4	17.2	3.5	1.9
Pre-wean mortality (%)	22.1	24.5	34.7	15.8	11.0
Pigs weaned per sow (pigs)	8.5	7.3	6.7	9.5	10.5
Farrowing rate (%)	77.1	75.6	68.6	82.9	86.0
Average weaned per week (pigs)	2448	1487	1570	2891	2939

appropriate virus group was used from week 18, 2009. The MJPRRS vaccine was given twice, four weeks apart, to the entire sow herd and all the way through gilt isolation (~10,000 doses). The booster (2nd vaccination) of the MJPRRS was given to all sows in the herd on week 22 of 2009. Once again all groups being weaned had samples taken from the poorest pigs in the group to do PCR analysis for PRRS virus beginning with week 18 and continuing through week 25.

By the 4th week after the first dose of MJPRRS vaccine, mummy rates had dropped from 17% down to 3.5% and continued to inch its way down to the present level of 1.9%. The stillborn rate also decreased from 6.8% down to 4.7% (Table 1). Pigs remained PCR positive for PRRS until the 6th week (week 24 of 2009) after the initial vaccination or 2 weeks after the booster. The farm has continued the vaccination program by giving a whole herd booster of the MJPRRS vaccine every 13 weeks. Pigs coming out of the farrowing house remain PCR negative for PRRS from week 24 of 2009 to the present time.

Research support

The original goal was to produce 2700 full-value wean pigs every week regardless of PRRSV status of the sow farm. Using MJPRRS vaccine has helped achieve that goal. Research has been presented that supports the use of MJPRRS vaccine to aid in PRRSV control and increasing the number of full-value weaned pigs. Reicks et al. describes the use of a commercial attenuated virus vaccine (ATP) in a study comparing Positive control gilts to those given ATP-only and those given ATP-MJPRRS.[1] There was a significant ($P = 0.0467$) increase in full-value pigs at weaning (94%) in the ATP-MJPRRS as compared to the Positive control group (66%). On the other hand, the ATP-only group (78%) was not different than the Positive control group ($P = 0.8518$). These results emphasize the importance of priming the animals with live virus prior to using the MJPRRS vaccine. This point was also presented during the 2010 *Roy Schultz Lecture* by H.J. Nauwynck.[2] The author noted that the next breakthrough in PRRSV control would be with inactivated (killed) vaccine technology. And that these vaccines would be inactivated during the growth phase to conserve viral binding ligands. New cell lines for growing the virus to produce high virus titers and developing a differential vaccine are also high on the list of desirable breakthroughs.

Conclusion

At this point, the MJPRRS approach has resulted in a significant increase in pigs produced each week (2750-3000) as well as a major improvement in pig quality. The previous year the quality of wean pigs averaged; 70% good, 20% questionable but start-able and 10% of no value. Today wean pigs are rated; 95% excellent-pigs, 3% good-pigs and 2% off-pigs. Performance of the pigs in nurseries and finishers has been exceptional. Research has shown that there is merit in using the MJPRRS vaccine. Due to these results on this farm as well as others where MJPRRS has been used, we plan to continue to use this technology as our first option to control PRRSV. An update of vaccination procedures, management programs and production will be shared at the meeting.

References

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