What have we learned using load close expose to produce PRRSv-negative pigs from positive breeding herds?

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Herd closure is a strategy widely used in the US swine industry to control and eliminate PRRSv from infected breeding herds. As part of the herd closure program some veterinarians expose the breeding herd with PRRSv in an effort to increase herd immunity (Desrosiers and Boutin, 2002; Voglmayr et al., 2006). In conjunction with deliberate exposure, the program often includes filling the facility with extra replacement pigs and then temporarily closing the breeding herd to any replacement pig introduction. Hence, the herd closure program for PRRSv is commonly thought of as having “load, close and expose” components. There are different immunogens that can be used for whole-herd exposure including the resident live virus and attenuated virus vaccine. Recently, our group conducted a series of studies to compare effectiveness of LCE using live virus inoculation (LVI) to that of using modified-live virus vaccine (MLV). Full details of the studies are available in the Ph.D thesis of Daniel Linhares at the University of Minnesota’s College of Veterinary Medicine.

One study compared the LCE programs using LVI or MLV in regards to the time it takes to reach PRRSv stability (TTS) from infected breeding herds. Results showed that despite the great variability of TTS between enrolled herds, there were some variables associated with shorter TTS. Specifically, herds that used LVI as the method of whole-herd exposure reached TTS earlier than herds that used MLV vaccines. Moreover, herds with history of PRRSv infection in the 3 years prior to our study reached TTS sooner than herds without history of PRRSv in those same 3 years. Furthermore, herds assisted by a specific veterinary clinic reached TTS sooner than all other herds suggesting that there might be management practices associated with shorter TTS. Our results also showed that PRRSv-monitoring must be done repeated over time to increase confidence of PRRSv-negative status of weaned piglets. Altogether, those findings represent prove of concept that herds can reach PRRSv stability as soon as 84 days from establishment of LCE.

Another study evaluated the effect of attenuated PRRSv vaccine inoculation compared to the use of live-virulent virus inoculation on production performance in breeding herds. It was shown that herds that used MLV vaccine as part of load-close-expose herd closure programs recovered production levels and had a less severe production impact than herds that used LVI. Also, herds that reported previous PRRSv infection reached time to baseline production (TTBP) sooner than herds with no history of PRRSv infection in the previous 3 years. Interestingly, herds assisted by a specific veterinary clinic recovered production faster than other herds, raising the hypothesis that specific management practices could be associated with herd closure effectiveness.

Because results of TTS and TTBP studies pointed to different directions in regards to advantage of MLV compared to that of LVI, we built economic models to assist veterinarians to make informed decisions between LVI and MLV as part of LCE program to eliminate PRRSv. Taking in consideration the future prices for market hogs and pig feed from January to December 2012, and $13.52 loss per pig that is PRRSv-positive, the results suggested that MLV would be a better economical choice.

Furthermore, the final study investigated herd-closure practices associated with successful PRRSv-elimination from breeding herds. It showed that the success rate of LCE programs was 76% and 92% for LVI and MLV herds, when failures associated with unrelated PRRSv were excluded from the analysis although these differences were not statistically significant. Moreover, one out of six herds that achieved 90 days of failure to detect PRRSv in due to wean piglets failed to achieve AASV category III, which indicates that more strict monitoring programs should be adopted in herds undergoing PRRSv elimination. Interestingly, herds assisted by different veterinary clinics had different set of recommendations of management practices to be followed during LCE, indicating that there was no agreement between veterinarians on what is the relative importance of each management practice evaluated. The variables associated with failure to reach AASV category III were a) being infected with a PRRSv of RFLP pattern 1-4-4 and b) holding back pigs at weaning for quality.

Results from these studies provided science based information on LCE with live PRRSv as a method to produce PRRSv-negative pigs from infected breeding herds. Further studies are needed to compare herd closure without the “exposure” component on the c) effectiveness of
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reaching TTS, b) total loss followed by the infection and intervention, and c) chance of program success. Also, further studies are needed to better understand specific factors associated with reaching short TTS and minimized total loss, such as farm layout, pig flow and actual implementation of specific management practices during the period of herd closure.

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