Recent research and preliminary results from a number of ongoing research efforts have demonstrated the possibility to eliminate PRRS virus from growing pig and breeding herd operations through protocols that do and do not include the use of MLV PRRS vaccine (1,2,3).

The goal of this study was to evaluate a method that incorporates the strategic use of a modified live vaccine into a protocol designed to eliminate PRRS virus following an outbreak of the disease in a PRRS virus negative breeding and growing pig herd.

History

A 1250 sow farrow to wean farm was repopulated during the fourth quarter of 1998 with PRRS virus negative stock. The genetic source used for repopulation has no history of being positive for the PRRS virus, and remains PRRS naïve. This 1250 sow operation is composed of two sites: Site One is a farrow-to-wean site, and Site Two is a nursery to finish site. The operation utilizes artificial insemination (AI) extensively. The goal of the repopulated operation was to serve as a source of PRRS virus negative gilts.

Following repopulation the farm experienced a clinical outbreak of PRRS. Clinical signs first noted in early January of 1999 included anorexia in sows, abortions, premature farrowings, and increased preweaning mortality with increased weak, listless, nonviable pigs. The virus was transmitted to the nursery-finishing site via the weaned pigs. Once introduced into the finishing facilities, the virus became endemic, with clinical and serologic evidence of continuous viral circulation. Diagnostics confirmed PRRS virus as the agent responsible for the clinical episode via histologic evidence and PRRS virus isolation; seroconversion was documented by the PRRS ELISA. The recovered PRRS isolate was characterized by Restriction Fragment Length Polymorphism (RFLP) to be of field origin ('142').

In response to the clinical episode, four sequential goals for the operation were outlined: [1] return to normal production parameters, [2] initiate a consistent and sustainable production of PRRS negative offspring, [3] eliminate PRRSv from the nursery and finishing sites, and [4] eliminate PRRSv from the breeding herd.

Materials and Methods

The procedure designed to attain stability and produce PRRSv negative offspring started with the following actions: stocking the sow herd with a four-month supply of PRRS field virus-negative gilts, closed the herd to new entries, vaccinated the entire breeding herd as well as the four month supply of replacement gilts twice, 30 days apart with a MLV PRRS vaccine (Ingelvac® PRRS MLV), culled all herd boars, and implemented AI for all future breedings. Ingelvac® PRRS MLV vaccine was administered in January and February of 1999 (vaccination of pregnant swine is not currently an approved label indication in the USA where this study was conducted). No subsequent vaccine has been used on the farm. The next stage of the procedure was depopulation and virus elimination in the growing pigs.

Weaned pigs were evaluated with a nested polymerase chain reaction (nPCR evaluating ORF 5) beginning in April 1999 to assess the stability of the breeding herd and the progress toward producing PRRSv negative pigs. Stability in this case was defined as the absence of detectable vertical or horizontal PRRSv transmission from sow to piglet, indicated by negative nPCR results. Alternating groups of weaned pigs were evaluated. Two pigs per litter from ten litters were evaluated - a total of 20 pigs per group. Samples were pooled by sets of two for testing. The goal was to achieve three consecutive negative PCR evaluations. By testing offspring for the presence of virus three times over a six week period, the resultant consistent production of negative piglets increased the confidence that the breeding herd was now stable and ready to receive PRRSv-naïve gilt entries to proceed towards elimination of the virus from the breeding population.

Subsequent to the three consecutive negative nPCR tests, a PRRS virus elimination procedure involving site depopulation was initiated at the nursery-finishing site. Pigs flowed from the breeding herd site to an alternate site during the depopulation process. Pigs in the diverted flow were monitored via ELISA for response to PRRSv and found to be serologically negative. After the site was completely depopulated, cleaned and disinfected, normal pig flow to Site Two was resumed.

The breeding herd was reopened to replacement gilts originating from a PRRS negative source beginning mid-May 1999, with additional groups of replacements entering in August, October, December of 1999, and February 2000. The replacement gilts were monitored for PRRS virus monthly using the PRRS ELISA. The sampling included a set of the most recent entries as well as previous entries.

In February 2000, a PRRS-seroprevalence screening of the sows present in the herd at the time of the clinical break and PRRS MLV vaccination was initiated in order to determine the readiness of the breeding herd for a planned test and removal procedure.

Results

The breeding herd stabilized and returned to normal production performance. The first three consecutive weaned pig groups evaluated by nPCR were negative. These results supported the observation that the breeding herd had stabilized and was consistently producing PRRSv negative offspring. The repopulated nursery-finishing site continues to be routinely monitored monthly via PRRS ELISA and results are negative to date (March 2000). All gilts tested from May 1999 to February 2000 remain negative for PRRSv on the PRRS ELISA assay.

Results of the February 2000 seroprevalence screening indicated 25/60 (41.7%) were ELISA negative, with a range of S/P ratios from 0.00 to 1.66, (mean = 0.558). At the time of the herd seroprevalence screening, there were 955 previously exposed/vaccinated sows still in the herd and 295 naïve post-closure gilts.

Observations

Active PRRSv transmission has not been detected for a period of 11 months in the site one breeding herd. This breeding herd consistently produces PRRSv negative offspring, as evidenced by the lack of PRRS seroconversion in the nursery and finisher facilities at Site Two. All PRRSv negative gilts that have entered Site One breeding herd since May of 1999 have remained PRRS seronegative. There continues to be a reduction in seroprevalence of PRRS in the portion of the breeding herd present at the time of the clinical outbreak and associated vaccinations. These results suggest that the herd is achieving the goals set forth with the described intervention strategy. However, as long as there remains seropositive sows in the herd, it cannot be classified as a PRRS virus negative breeding herd. The remaining seropositive sows are potentially “high risk” animals with the possibility of being persistently PRRS-infected carrier animals that may shed the virus at some point in time. Therefore, the completion of a test and removal procedure along with a probationary period of continuous monitoring of serology, diagnostics, and clinical herd activity is planned.

The strategy utilized of controlled exposure through herd closure, vaccination and immune management warrants further investigation and application for efficacy and repeatability in other farms. If repeatedly successful, such a procedure may provide another viable option for PRRS virus control, creation of a non-infectious breeding herd production of negative offspring, and elimination of virus.

References
