Sponsors

University of Minnesota
College of Veterinary Medicine

College of Agricultural, Food and Environmental Sciences

Extension Service

Swine Center

Keeping the PRRSV genie in its bottle

Luis Fernandez, DVM

Premium Standard Farms, Princeton, MO

Since 1992 when PRRSV first broke at Premium Standard Farms, attempts to control the impact of PRRSV have met with varying degrees of success. As the company grew, the genie was passed from one master to the next. The PRRSV genie did not come out of its bottle and manifest itself throughout the production system until late 1995. Since then, we have tried to stuff the mischievous genie back into its bottle, with a combination of vaccination, acclimation, science, and more than a few shots from the old shotgun.

Vaccination

Sows

The initial vaccination program was begun in week 39, 1995 in the 87,000 Princeton-based sows. Our program was based on the need to get quick, widespread coverage of all breeding stock and replacements. Though extralabel to use in sows and boars at that time, we vaccinated the herd with BI-NOBL's RespPRRS®. As Loula describes in his 1996 Leman proceedings, we vaccinated all open, lactating, recently bred, and pregnant animals up until 9 weeks of gestation (the "60" in 6/60). Sows that were 10–16 weeks of gestation, were vaccinated 1 week post farrowing (the "6" in 6/60). Sows and boars received 1cc IM. From this point forward, all reproductive and tissue feedback was discontinued, in an effort to stop non-vaccine viral exposure. The maintenance program consisted of a 1cc IM shot at 60–70 days of gestation. This program remained in effect until fall 1996. Since that time, we have been vaccinating all sows at weaning with 1cc IM.

Pigs

At the same time that we started sow vaccination, all piglets were vaccinated. Piglets received 1cc intranasally during the 1st week of life. Piglet vaccination continued into 1996, being discontinued in late summer. Dramatic changes in nursery and G/F performance resulted each time we changed our piglet vaccinations. Piglet vaccination was restarted in 1997. All pigs receive 1cc IM of RespPRRS® by 1 week of age. This will be the first fall/winter that we will have PRRS-vaccinated pigs entering G/F. The impact of piglet vaccination on herd performance will be discussed during the presentation.

Internal replacements

All internally produced gilts received 2 doses of vaccine in the finisher at 7 and 12 weeks on feed. Gilts exited the finisher after 16 weeks on feed. This program was in effect until 1997. Beginning in 1997, gilts receive 1cc IM at 1 week of life, followed by 2cc IM at selection. Gilts are individually run through a scale during selection at 11 weeks in G/F and vaccinated. At 16 weeks, gilts are delivered to a heat check site where they are mixed and penned according to heat status. Gilts are delivered weekly to the 74 sow units.

External replacements

External GGP boars and gilts enter through an isolation facility. Gilts are housed in a separate, but connected, facility from the AI boars. External replacements are supplied by more than one source of differing PRRS status. Initially, we attempted to keep these sources separated due to concerns with HPS in the Genetic Improvement Facility (GIF). Unfortunately, problems were transferred to the GIF. Currently, sources are mixed in isolation under vaccination and medication. All animals receive 2 doses of PRRS vaccine 30 days apart. Cull animals from the GIF are added to isolation in the fifth week and remain until the building is emptied. Animals are tested for PRRS ELISA within 3 days of arrival and again at 45 days post arrival. A consistent pattern of titers is used to determine if the animals can be released at 60 days post-arrival, held longer, or culled.

Science

Isolation vaccination trial

During isolation, we try to vaccinate incoming animals against several antigens, using—among other vaccines—RespPRRS®. By the time these animals leave isolation, they feel like pin cushions. We wanted to be sure that we were allowing animals adequate time to build an immune response before we gave them another set of antigens. We designed a trial to look at the difference between using all vaccinations at once with RespPRRS® or vacci-

nating them at different times throughout the isolation period.

There were no statistical differences in antibody responses between treatment groups. Isolation employees and the boars like giving all vaccinations at one time. All boars were from PRRS negative(naive) herds.

Using Statistical Process Control (SPC)

Now that we have committed resources to vaccinations, how do we measure whether or not we have been prudent in our choice of products and vaccination regimes? Are the vaccines giving us a false sense of security? Successful vaccination programs necessitate that vaccinations are administered as scheduled. Over time—as we attempted to interpret piglet titers to determine whether or not piglets were vaccinated—we discussed the use of titer patterns to assign a relative risk of releasing animals from isolation, and have looked at sow titers to try and determine whether we felt vaccine was getting into animal flesh or simply finding its way through the slats. In July 1997, we started a project with BI-NOBL to find out if we could correlate serology with performance information. Could we use serologic information to make commingling decisions? Could we predict performance of a group of pigs based on serologic information and thus allocate medication or vaccination dollars to that group? Could we test piglets and get a good reflection of the sow herd status without having to blood test sows? Over the course of nine months, we collected sera from weaned pigs, incoming gilts, and sows. Samples were collected weekly, with parity and stage of production considered to adequately mirror the herd makeup. Gilt serology was collected to test for vaccination and procedural compliance. We chose a multiplier herd and a group of four commercial sow units that commingled pig flow for our sample. We used statistical process control (SPC) to categorize the weekly data. Sow herd data was shown to be in control. Gilt serology lost statistical control after a process change in week 40, 1997. The loss of control in gilt serology does not appear to have resulted in a concomitant loss of control in sow herd or nursery performance. Since limits were readjusted, gilt serology has been in control. Compliance to gilt vaccination has been a nice benefit of tracking serology results in SPC. Groups that do not appear to be vaccinated coming into the finisher can be re-vaccinated. Gilts leaving the finisher can be vaccinated before they arrive at the sow farm. Once personnel are 'caught', they usually confess to any other groups that they let slide.

PCR, predicted cutting pattern, and genetic analysis

Today there are several new tools available to the swine practitioner, including several brands of vaccine (Bayer, BI-NOBL, Schering-Plough, Immtech autogenous, Grand autogenous, and others), PCR tests, RFLP, and genetic analysis. The question of whether or not we can exploit these tools is another matter. In the past, one isolated virus from a whole blood buffy coat sample, a tissue sample, or rarely, from a serum sample. Upon successful virus isolation, a RFLP test could tell you the cut pattern and thus the group of virus with which you are likely dealing. For example, a 2–5–2 would be BI-NOBL vaccine virus, while a 1–4–2 would indicate wild virus. Virus isolation tended to be hit or miss, depending on meticulous sampling or cell lines used. Lab-to-lab variation seemed to be great. Conversely, PCR allows you to routinely detect viral RNA in samples. The PCR result can then be amplified to show the genetic makeup of the virus at a given ORF(s). From this information, viruses can be compared directly or put into a group based on a predicted cut pattern.

A case example of how we blend vaccination, science, and a healthy dose of shotgun will be discussed during the presentation. During a PRRS outbreak in a replacement source, we used statistical sampling to assess where gilts were serologically in comparison to known titer responses from controlled challenge studies. Gilt barns were selected or discarded based not only on the average titer, but also the titer distribution within a group. Once the group looked satisfactory, they were placed into isolation for 60 days. Unfortunately, the PRRS came through anyway. Abortions and respiratory disease in growing pigs moved herd to herd as the gilts flowed in to the sow units. Virus isolation from affected animals revealed similar cut patterns to the home strain. However, genetic analysis and clinical signs were inconsistent with historical impact of the home strain. Since that time a new acclimation and vaccination program has been initiated.

Even though there is a great deal of science involved in this process, I am afraid that we probably don't know enough about what the result means to differentiate this from the shotgun method many of us prefer.