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Producing PRRS-negative pigs from PRRS-positive sows

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PRRS elimination in a multiple-source, multiple-site Isowean system

Isowean[13-15,7] and multiple site Isowean production[11-12] are modifications of the medicated early weaning [MEW][2] procedure that are useful for producing weaned pigs free of infectious agents. A variety of infectious agents have been eliminated from pigs entering the nursery and finishing stages of production by employing these methods.[16] Both MEW and Isowean have been utilized to produce PRRS-negative weaned pigs.[10,6]

The PIC multi-site system in Oklahoma has been attempting to eliminate PRRS through a long-term gilt isolation and acclimatization procedure. Isolation of new breeding stock has been associated with decreased risk of having endemic reproductive losses due to PRRS.[3] Acclimatization of new breeding stock has been recommended before breeding gilts destined for PRRS-positive farms.[5] Prior to initiating long-term isolation and acclimatization of gilt replacements[8], modified-live vaccine use was discontinued in the sow farms and nurseries and no gilt replacements occurred for four months following the last episode of clinical PRRS.[17] The objective is to decrease PRRS virus circulation in the sow farms and to have piglets that are born without PRRS virus.

Methods

On a weekly basis, all sow farms in the Oklahoma multiple-site Isowean system normally wean pigs at 18–23 days of age into a clean and disinfected nursery. The nursery is run all-in—all-out and, after 50 days, the pigs move into a finisher that is also all-in—all-out.

Determination of PRRS status of batches

Beginning in April 1998, we began taking small batches (150–300 head) of Isowean pigs out of a single PRRS-positive sow farm into separate, isolated nurseries. We weaned piglets at 6–12 days of age for four experiments. Two known PRRS-negative sentinels were added per pen while in the nurseries. These sentinel pigs are tested at 10 days post-placement for PRRS by PCR to determine if any PRRS virus is present in the batch. A second test for PRRS by ELISA is done at 35 days post-placement on all sentinels and a sample of principals. After these two tests are conducted—and all results are negative—the batch is considered uninfected by PRRS and released.

Determination of PRRS status for multiple-site nurseries

Since June 1998, we have tested the regular nurseries in the Oklahoma multi-site system for PRRS by ELISA at the end of the nursery. These nurseries receive pigs from all four sow farms. Forty pigs are tested (95% confidence in detecting a 7.5% prevalence) randomly from the eight nursery rooms. This one-time population test is used to determine whether a nursery is infected or uninfected with PRRS.

Results

Isowean batch results

To date, all sentinel and principal tests have been negative for PRRS by both PCR and ELISA (**Table 1**).

Nursery testing results in multiple-site Isowean systems

Results of nursery PRRS ELISA testing to date are shown in **Figure 1**. The nursery testing done in nursery groups A, B, C, and D was completed before the initiation of long-term gilt isolation and acclimatization. The remainder of the testing revealed two nurseries that were negative for PRRS by ELISA. This subsequent testing was done after three groups of isolated and acclimatized gilts were introduced to the sow farms.

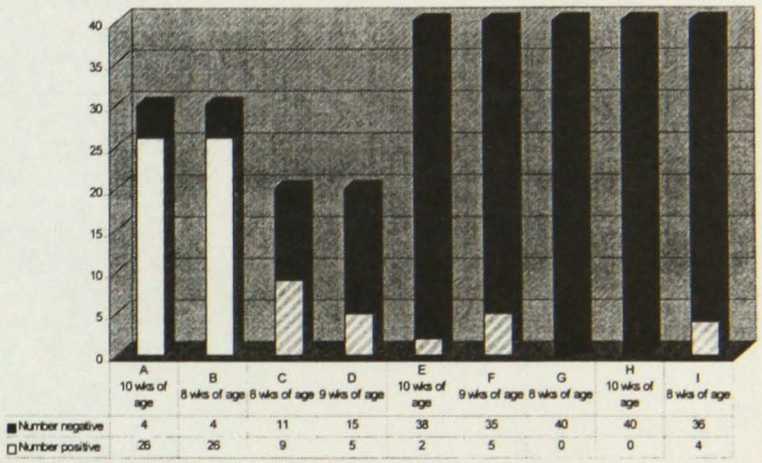
Discussion

When the decision has been made to eliminate a disease from a swine population, the herds under the elimination plan are referred to as either infected or uninfected. They can also be referred to as positive or negative, exposed or unexposed, respectively. This clear and unmistakable classification is essential in order to lessen confusion during all phases of elimination.

Table 1. Test results from batches of Isowean pigs weaned from PRRS positive sows and sentinel pigs from a PRRS negative herd

Project No.	Date	PRRS Test	Isowean	Sentinel
19981B	4/28/98	PCR	Not done	0/20*
	5/22/98	ELISA	Not done	0/20
19982J	5/15/98	PCR	Not done	0/18
	6/22/98	ELISA	0/6	0/16
19983M	5/22/98	PCR	Not done	0/24
	6/23/98	ELISA	0/6	0/24

Figure 1. Test results from pigs placed in nurseries in a PRRS-positive multiple-site Isowean system



Immune response and testing

Many of the tests used to determine PRRS infection detect the presence of antibodies to the antigen.[18] An uninfected, unexposed, or negative pig that has never acquired antibodies or been exposed to the antigen should not have measurable antibodies.

Antibodies, however, are acquired in two ways—passively or actively. An infected dam will form antibodies that she will pass to her offspring during suckling. At this point the offspring will have antibodies that may be detected. If the offspring is not infected or exposed later in life, the antibodies will wane and will no longer be detectable. This pig is also considered negative, unexposed, or uninfected. This is determined by testing for antibodies after the maternal antibodies have degraded. This can be confirmed by exposing these pigs to known uninfected sentinels and testing the sentinel for either the presence of the agent or antibodies.

An infected pig will have antibodies forming after the maternal antibodies have degraded due to being exposed to the antigen at some point in its life. Testing done in order to follow antibody levels is an acceptable method of determining disease status but it is difficult to interpret based on a herd test like the PRRS ELISA. The PRRS ELISA, while sensitive and specific[1], when performed on the commercial test kit, reports a sample/positive ratio (s/p). Sample/positive ratios are not antibody titers. This makes it difficult to determine if antibody levels are rising or falling when using the commercial PRRS ELISA kit. However, determining whether or not the pig is capable of spreading the infection is very important. This is accomplished by testing for the agent itself and by mixing the pig with known uninfected sentinels and testing the sentinels for the presence of agent or antibody.

Producing negative pigs from positive sows

When dealing with PRRS, these basic principles are the foundation of a large-scale eradication plan. The goal is to have pigs that are negative. Negative pigs can be produced from negative sows or from positive sows. As long as the pigs are never exposed to virus, they are uninfected and negative.

PRRS is now considered endemic in many swine populations.[9] The availability of large numbers of PRRS-negative replacement gilts makes large-scale depopulation difficult, expensive, and lengthy. Our efforts have focused on producing PRRS-negative pig flow out of existing PRRS-positive sow herds. What is required is the ability

to hold and test specific groups or batches of pigs away from sources of PRRS virus all the way to market.[4] It is expected that not all batches or groups of Isowean or MEW pigs will be negative for all infectious agents. Therefore, the ability to test rapidly for the infection is paramount to a successful elimination program. One way to do this is through all-in—all-out isolated buildings with proper cleaning and disinfecting of barns between batches. Biosecurity measures should also be in place to be sure that infectious agents are not introduced horizontally.

Conclusions

PRRS elimination can take many forms depending on the system and farm type. On a large scale, PRRS-negative pigs can be produced from PRRS-positive sow farms. Testing of batches of pigs can determine PRRS infection status for the group when done after maternal antibodies diminish or before introduction to the breeding herd. It is important to determine the presence of infection by detection of PRRS antigen (via PCR or virus isolation) or by testing known negative sentinel pigs for PRRS after exposure to the pigs in question.

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