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PRRS PCR: Field applications

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Introduction

The PRRS PCR is widely used in US diagnostic laboratories and provides swine practitioners with a very powerful tool to detect PRRS genetic material in a variety of scenarios. This technique is routinely used to detect PRRS infection, monitor farms, analyze PRRS isolates (sequencing), and as a tool to stock PRRS-negative farms.

This report describes the application of the PRRS PCR in a variety of field situations.

Field applications of PRRS PCR

PCR as a tool to stock PRRS-negative farms

PCR has been used as a tool to stock PRRS-negative farms in animals derived from positive sources. The use of PCR is particularly helpful in detecting positive groups in the early stages of infection, allowing for the early identification of these groups and the subsequent removal from the stocking program. When used for negative farm stocking, PCR is part of a more complex strategy. A batching system is needed at the nursery level to allow retesting of the animals. A sentinel program with negative pigs also improves the sensitivity of the technique, since sentinels become viremic within hours of infection. In addition, animals born from positive dams may have been infected in utero. In this case, PCR is the only antigen detection tool that can detect these viremic animals at birth and provide results within 24 hours of sample submission.

However, when the prevalence of infected animals is very low, the use of PCR to detect infection can be compared to the search of a needle in a haystack. When possible, serology should be added to the protocol and used to test animals after maternal immunity has dropped off.

PCR as a back-up for ELISA false positives

While monitoring both negative farms and farms undergoing PRRS elimination projects, the appearance of false positive results by the IDEXX ELISA test has become more noticeable. Although the best confirmatory test for a serologic false positive result is to perform another serological test, the PCR has also been used by diagnostic laboratories for clarification of these false positives. This is correct if the assumption is made that the ELISA positive results are in fact positive, in which case the aim of the PCR is to look for early signs of infection.

When this strategy is used, the sera samples should be split and one tube kept in the clinic's lab. In cases where a sample is suspect, the resubmission of the sample is advisable. Under routine monitoring conditions, diagnostic laboratories evaluate the samples first using serology and then, if needed, with PCR from the same sample. However, the process of storing and handling the samples in the serology lab may favor the degradation and/or contamination of the genetic material which may confound the results with the risk of returning a false negative result.

In my opinion, a better strategy to clarify false positives is the retest of the ELISA-positive sample with another serological test (such as IFA), and then proceed to the retest of the animal and in-contact animals two weeks after the original sampling.

PCR as a tool to monitor the stability of sow farms

PCR has been used as a tool to monitor farms in order to assess the sow farm's stability and timing subsequent nursery depopulations. Samples from baby piglets are taken between 5 to 15 days of age. Due to cost, only a proportion of the population is tested, usually 30 piglets from 30 different litters. The PCRs are pooled in groups of three to five.

This strategy has proven useful when the amount of viral shedding in the sow farm is noticeable (usually following the appearance of clinical signs). However, the technique becomes less sensitive as the sow farm reaches stability. Including samples from weak-born piglets and sick piglets may also add sensitivity to the strategy.

If a nursery depopulation is planned, it is suggested that extra time be added after the last positive result is detected as well as to review gilt replacement introduction and the risk for lateral infection.

PCR as a tool to monitor boar studs

The PCR has also been used to monitor boar studs and to determine whether a serological PRRS-positive boar may be shedding virus in the semen.

It is important to remember that PRRS is shed intermittently in semen. This makes the interpretation of the PCR results more difficult in serological positive boars since a negative result does not guarantee that virus in the semen will not be found later.

When monitoring PRRS-negative boar studs, the PCR should be enforced in poor quality semen samples since PRRS usually induces changes in semen quality and an increase in the number of trashed doses. In addition, boar production parameters should be recorded since clinical signs of PRRS infection in boars are commonly unnoticed.

As a word of caution, the use of PCR for routine monitoring may create a "false sense of security" since a negative result does not ensure lack of infection in the farm.

PCR as a diagnostic tool and sequencing

PCR is routinely used as a tool for the diagnosis of clinical cases. Usually tissues of stillbirths, weak born piglets, sick pigs, and aborted sows are submitted for PRRS diagnosis. Commonly pooled tissues for PRRS PCR testing as well as virus isolation include the following: sera, lung, lymph node, heart, and tonsils. The technique has proven to be very sensitive for this purpose and, in some cases, even more sensitive than virus isolation.

When submitting tissues for PRRS detection and characterization, PCR also allows for the direct sequencing of the virus genetic material without it being necessary to isolate and propagate the virus in cell culture. It is not uncommon to have diagnostic reports with negative virus isolation and positive PCR products, in which case the sequencing of the virus would still be possible.

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