THE INTRODUCTION OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS (PRRSV) SERONEGATIVE REPLACEMENTS INTO PRRSV-SEROPOSITIVE HERDS

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Abstract

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The Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) status of a herd dictates how PRRSV-negative replacements are introduced into a herd. In a herd free of PRRSV, the PRRSV-negative replacement can be readily introduced after a 21-day isolation period followed by 21-days of acclimatization, which is to ensure the PRRSV status of the replacement pigs and to expose them to other organisms that might exist in the herd. In a seropositive herd with or without PRRSV circulating, the PRRSV-negative replacement cannot be readily introduced. The PRRSV-negative replacement must be acclimatized by exposing them to the herd-specific strains of PRRSV in order to develop immunity. The introduction of PRRSV-negative pigs without acclimatization may lead to an outbreak of PRRS due to transmission from chronically infected sows. Prior to their introduction into the breeding herd, they should have recovered from the infection and ceased virus shedding. If a herd, positive for PRRSV, has the virus circulating, it is suggested restocking ceases for 4-6 months, to achieve endemic levels of PRRSV (herd stabilization). Once the herd starts weaning negative piglets, then restocking can resume. In a seropositive herd with no virus circulating, it is not recommended to readily introduce PRRSV-negative replacements. The herd must be evaluated for virus transmission by using sentinel pigs. If sentinel pigs remain negative, the negative replacement can be introduced. In contrast, if the sentinel pigs seroconvert, those pigs should be removed and the process started over again.

Keywords : PRRS, Gilts, Serum profile, Replacement

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Introduction

Since its first emergence in the late 1980s, Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) has caused a significant economic impact on the swine industry worldwide. It has become increasingly established that it is economically advantageous to maintain herds free of PRRSV. Therefore, several management protocols have been used to control PRRSV with varying degrees of success. Those protocols include total depopulation followed by repopulation with PRRSV-free replacement pigs (Andreasen et al., 1998), partial herd depopulation such as the depopulation of entire nursery units (Hassing et al., 2000), the testing and removal of infected pigs (Dee et al., 2001) and total herd vaccination with a modified-live PRRSV vaccine (MLV) (Philips et al., 2000). Temporary herd closure has been used to control PRRSV as well (Torremorell and Baker, 2000; Torremorell et al., 2000). This protocol involves closing the breeding herd to any new replacements for an extended period of time to permit the cessation or a significant reduction of virus shedding, followed by restocking the breeding herd with PRRSV-negative replacement pigs.

PRRSV-negative replacement breeding stock with the proper acclimatization prior to the introduction into a herd is the key to control of PRRSV from infected herds. The introduction of PRRSV-negative pigs without acclimatization may lead to an outbreak due to virus transmission.
from chronically infected sows. The introduction of PRRSV-positive replacement gilts into a herd is not recommended. Precaution is advised because these pigs might be viremic upon arrival and serve as a possible source of PRRSV to other pigs. Moreover, they could potentially introduce other strains of PRRSV that are antigenically different from existing strains. Intramolecular recombination between two distinct strains of wild-type PRRSV is possible (Yuan et al., 1999). Such recombination could potentially result in the emergence of a strain of increased virulence. In such cases, cross protection between strains may not exist and new PRRSV outbreaks may occur in farms that have been previously exposed to the virus.

The PRRSV status of a herd dictates how PRRSV-negative replacement breeding stock should be acclimatized properly prior to their introduction. PRRSV-negative replacements can be readily introduced into PRRSV-negative herd after they have been in isolation unit for 21 days followed by 21 days of acclimatization to ensure the PRRSV status of incoming gilts and to expose them to other organisms existing in the herd (Harris, 1999). If a herd is PRRSV-seropositive with or without the evidence of actively circulating virus, then PRRSV-negative replacements should be properly acclimatized. In addition, the utilization of PRRSV negative semen and a strict biosecurity program should be in place. The introduction of PRRSV-negative replacement pigs into PRRSV-seropositive herd can be accomplished by using the steps described below.

**Assuring the health status of PRRSV-negative replacement breeding stock**

Replacement breeding stock should be obtained from herds free of PRRSV. Upon arrival, pigs should be housed in an isolation unit for at least 21-28 days prior to starting the acclimatization procedures. The pigs should be tested serologically for PRRSV antibodies. This isolation period allows time to monitor the source of the replacements for any evidence of PRRSV and is necessary to avoid receiving pigs incubating the virus. In addition, it prevents the introduction of other organisms that might exist in the source herd or contaminate pigs during transport. Ideally, the isolation facility should be located on a site away from the breeding herd (Dee, 1997).

**Acclimatization of PRRSV-negative replacement breeding stock prior to their introduction**

Acclimatization is the process of exposing replacement pigs to farm-specific strains of PRRSV and allowing time for pigs to recover from infection. The recovered pigs would expectedly develop strong protective immunity against PRRSV and stop shedding virus. Immune pigs are protected from being re-infected with the same strain of PRRSV (Lager, 1997).

The acclimatization stage is located on the same site as the herd and its goal to expose replacement pigs to the herd-specific strains of PRRSV as well as other bacterial and viral agents (Dee, 1997; Harris, 1999). The acclimatization process is initiated by the feeding of tissues infected with farm-specific PRRSV and/ or exposure to infected pigs from the nursery or finisher areas. The use of cull sows with recent clinical manifestation of disease could be a poor choice since they might not be shedding the virus (Dee, 1997). The duration of the acclimatization process is flexible and can range from 60-90 days (Harris, 1999).
Introduction of PRRSV negative pigs into a seropositive herd with circulating virus present

If a herd seropositive for PRRSV also has a high level of PRRSV circulation and/or PRRSV-positive weaned pigs, then one can anticipate continued virus circulation in the herd if PRRSV-negative replacement pigs are introduced directly into the herd without appropriate acclimatization. These PRRSV-negative pigs will perpetuate recurrent problems related to PRRS. Therefore, the flow of breeding stock replacements may need to be stopped for approximately 4 to 6 months to achieve enzootic levels of the PRRSV (note: this is generally referred to as stable herd). The introduction of these replacement is similar to the method used to introduce transmissible gastroenteritis virus (TGEV) negative replacements into a TGEV-positive herd (Harris et al., 1987; Harris and Wiseman, 1989).

In a PRRSV-positive herd with circulating virus present, PRRSV-negative breeding stock of a wide variation in age will need to be introduced into the breeding herd to provide replacements for the next 4-6 months of production. The entire herd is immunized by natural exposure to the virus. The herd is then closed to any replacements for the next 6 months. An off-site breeding project is utilized to avoid production losses. Piglets are weaned off-site. Serological tests and polymerase chain reaction are used to monitor the PRRSV status of weaned pigs from the sows. Once the system produces negative weaned pigs, then the next restocking will follow the steps described in the next topic. On a one-site farm, grower pigs may have to be removed from the production system for several weeks to eliminate circulating virus because they are a potential source of PRRSV.

In addition to natural exposure, Phillips et al. (2000) has proposed using MLV in a mass vaccination scheme, including PRRSV negative stock after their introduction, to immunize an entire herd. The herd is then closed to replacements for 6 months. As the herd became immune, it started to produce PRRSV-negative pigs. If MLV is used as suggested, it should not be used again.

Introduction of PRRSV-negative pigs into a seropositive herd with no circulating virus

In a closed population, a herd seropositive for PRRSV would eventually become negative for the virus and start producing PRRSV-negative weaned pigs. This scenario is often referred to as a PRRSV stable herd. In these situations, it is based on maintaining sufficient herd immunity to avoid clinical disease in the sow herd. The following steps should be followed: (1) growing pigs are removed from contact with the sow herd; (2) no pigs recently infected with PRRSV are used as replacements for 4 months (production loss can be avoided by breeding PRRSV negative replacements off site); and (3) modified live vaccines should not be used in the breeding herd or in the system. Once the PRRSV-seropositive herd becomes negative for virus and produces PRRSV-negative piglets, the question then is when to start restocking with new replacements for the breeding herd. In this situation, PRRSV-negative replacements cannot be introduced into the herd even though there is no evidence of virus circulating. The recipient herd must be evaluated for evidence of virus transmission. A straightforward method to determine if a herd is free of PRRSV is to introduce a limited number of PRRSV free replacements as sentinel pigs. Pigs are allowed interaction to occur for at least a month and then sentinels are tested serologically. If they remain seronegative for PRRSV, PRRSV-negative
replacements can be introduced into a stable herd after they have been in the isolation unit for 21 days followed by at least 21 days of acclimatization to expose them to other organisms existing in the herd. A clear area of separation between existing pigs and the new incoming replacements should be established. Personnel movement between both areas should be prohibited. Seropositive sows can be removed through normal culling practices (Henry et al., 2000).

If the replacements seroconvert, remove them from the herd and extend the herd closure for another 30-day period. Following removal, new sentinels must be reintroduced again to start the process over.

**Exposure of PRRSV-negative isowean pigs as a source of replacement breeding stock for herds seropositive for PRRSV**

Many producers have been using MLV to expose isowean pigs to PRRSV while in isolation in order to introduce replacements with a degree of immunity to PRRSV. Isowean pigs (approximately 21 days of age) are obtained and held in isolation to assure negative status for PRRSV. At 8 weeks of age, MLV is administered. The pigs are held in isolation until breeding age. In this situation, the sow herd may or may not have circulating PRRSV. This methodology has worked very well in many systems. However, more research is needed to verify and substantiate this method as a reliable approach for the introduction of PRRSV negative replacements in seropositive herds.

A recent paper from Torremorell et al. (2002) suggested that it is possible to introduce PRRSV-positive replacements into a PRRSV-positive herd. PRRSV-negative weaned pigs were produced from those systems as well. In the study, two groups of PRRSV-positive replacements were housed together in the acclimatization area for 70-100 days, bred in an off-site finisher and farrowed in a separated facility. Piglets were weaned at 5-7 days of age to off-site nurseries. Of the 31 batches of weaned pigs, three batches 2, 4, and 6 weeks after birth were positive. In the acclimatization area, there was no feedback or commingling with infected pigs. The authors believe that it is crucial to hold these gilts in the acclimatization area for a long period, to allow pigs to develop solid immunity and stop shedding the virus. More investigation is needed to verify the virus status in this system before it can be accepted as another strategy for restocking the herd.

**Conclusions**

PRRSV-negative replacement breeding stock are becoming more readily available even though the majority of herds in the U.S. are seropositive for the virus. The introduction of replacement PRRSV positive animals into a herd is not recommend. In most situations, it is preferable to utilize PRRSV-negative pigs as replacements in seropositive herds. In a herd negative for PRRSV, PRRSV-negative replacements can readily be introduced. In contrast if a herd is positive for PRRSV with or without the virus circulation, then negative replacements should be properly acclimatized, to become immune against the herd specific strain of PRRSV, prior to their introduction.

**References**


