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Porcine Reproductive and Respiratory Syndrome (PRRS)

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Summary and Implications

The porcine reproductive and respiratory syndrome (PRRS) virus has adverse affects on the breeding herd and growing pigs. Through field experiences and research, the clinical signs, spread, and diagnosis of PRRS are better understood. Vaccination and improved pig flow are tools available to control PRRS but, the ultimate foundation for controlling, eliminating, and avoiding the virus is better management.

Introduction

PRRS was first observed in the United States in 1987 and in Europe in 1990. It has now spread worldwide due to increasing international trade. Trends that may have influenced the spread of PRRS are the move toward high density of pig populations and the increasing size of herds. This article summarizes the current knowledge base and introduces some of the most recent diagnostic, management, and vaccination protocols.

Clinical Signs

The disease is characterized by its effect on the respiratory and reproductive systems. It affects pigs of all ages. Any combination of signs can affect a herd. Some herds test positive serologically but have no clinical disease. Frequently, in a new outbreak the breeding herd is initially affected. Once the disease has gone through the breeding herd, clinical signs are restricted to the nursery and grower/finisher pigs. In other herds the reproductive condition becomes chronic. The clinical signs seen in an acute outbreak of a breeding herd are: abortion, premature farrowing, stillbirths, mummification, conception failure, and lack of appetite. In many herds, the reproductive problems last only three to four months. Affects on suckling piglets are: listlessness, spraddle-leg, and increased preweaning mortality rates.

The most serious effect is usually respiratory disease in young growing pigs after the initial reproductive outbreak. Most pigs recover from PRRS but some die or become chronic poor-doers from secondary infections. PRRS virus tends to persist in infected populations and can give rise to continuing problems in both growing pigs and breeding stock if pig flow or management changes are not instigated. It is hypothesized that inconsistent exposure to PRRS virus following initial infection my not occur among all members of a population. This may lead to pockets of naive animals and subsequently, continuous cycling of the virus in the herd.

Secondary infections due to *Streptococcus suis, Hemophilus parasuis, Salmonella choleraesuis, Bordetella bronchiseptica, Pasteurella multocida type A, hemolytic E. coli, Mycoplasma hyopneumoniae,* and *Actinobacillus pleuropneumonia* become a major problem in nursery and grower/finisher herds. Viruses also isolated have included Swine Influenza virus and Coronavirus. The secondary infections are controlled through management changes, vaccinations and/or antimicrobial therapy. Antibiotic therapy will usually reduce the severity but not eliminate the clinical signs of secondary infections. The changes needed to control the secondary infections are usually farm specific and best recognized through cooperative efforts between the producer and a swine specialist (i.e., veterinarian, extension specialist, or consultant).

Table 1. Risk factors increasing probability of infection by PRRS virus

◆ Large herd size
◆ Housing in one building
◆ Introduction of new animals of unknown health status
◆ Lack of disinfection procedures
◆ Young average parity of herd
◆ Continuous flow of pig movement
◆ High pig density

Epidemiology

PRRS appears to be spread mainly from one herd to another by transfer of infected animals. Airborne spread has been suggested but not confirmed. Spread via semen and artificial insemination has been documented. Semen from recently infected boars may contain virus for up to six weeks. Research results indicate that boars shed virus in semen intermittently. The PRRS virus is inactivated in the environment in the absence of moisture. Its activity is significantly reduced within 6 days if held at 68 °F. The virus **does** persist over time under moist conditions such as deep pits and lagoons. Risk factors analyzed in European outbreaks are summarized in Table 1.

There are no reports of this disease affecting humans or any other animal species, but PRRS virus can infect some bird species. This may only contribute to further infection of swine herds through bird fecal contamination.

Diagnosis of PRRS

The diagnosis of PRRS relies on compiling information from the herd's clinical history, serology (blood testing), pathology (post mortem examinations) and isolation of the PRRS virus from at least one age group of pigs on the farm. There are numerous diagnostic tests now available for PRRS.

Each test has advantages and disadvantages in reference to its ability to diagnose the virus strain and stage of infection.

Serologic profiling is becoming a common practice for detecting exposure to the PRRS virus. Indirect fluorescent antibody (IFA) test has been the primary mean of testing for a herd profile. This test measures the IgG level and it can be used for detection of antibody from seven to 10 days to three to four months post infection. Serum neutralization detects antibodies at nine to 28 days following infection and may persist for up to 365 days. Most recently, an IgM IFA test has been developed. The IgM test detects titers as early as five days post infection but IgM will only be detectable in herds with an acute infection (14 to 28 days post infection). ELISA test has the same sensitivity and specificity as IgG IFA but, it has the ability to identify both the European and American strains of the PRRS virus. These four profiling tests are tools for identifying exposure and potential disease spread within a herd. They are considered a vital step in preparing a herd plan for control and/or eliminations of the PRRS virus. Contact your diagnostic lab to determine what tests are available.

Vaccination Programs

There is currently a modified-live vaccine produced for use against the PRRS virus. This vaccine is not a cure and should only be viewed as a tool in control/elimination plans. The vaccine is labeled for use in nursery pigs (2cc dose IM at weaning). Some individuals are currently advocating the program of a 1cc dose given intra-nasally (IN) to pigs between 2 and 5 days of age and a second 1cc dose given IM at weaning (14 to 28 days of age). This is usually done in conjunction with the vaccinations given to the sow herd. A PRRS vaccination program for sows must be developed and administered through the advice of a veterinarian. All of the legal aspects of this program need to be discussed. Vaccination of adult animals should not be viewed as risk-free due to reports of vaccine-induced abortions.

There have been mixed responses to PRRS vaccination throughout the United States (personal communications). The overall objective of vaccination usage in breeding and growing swine is to reduce the shedding of virus, reduce the secondary infections in growing pigs, and protect naive herds from severe outbreak of PRRS. The most promising use appears to be in stabilizing the breeding herd so that the piglets are not exposed to viral shedding from the sow.

Management Procedures

Management protocols have been established and tested by individuals world wide. The procedures most widely advocated are depopulation/repopulation, partial depopulation, segregated early weaning (SEW), medicated early weaning (MEW), multi-site production, strict all-in/all-out flow, and most recently, North Carolina's McREBEL™ system.

The most provocative aspect of the McREBEL™ system is its practicality. Producers of any size can easily incorporate the protocol into their units' management. The intent of this system is to stop PRRS-associated death losses due to secondary bacterial infections. It is not meant to eliminate the virus but may be a valuable tool in stopping viral circulation.

McREBEL™ PRRS

- ➔ **M**anagement
- ➔ **C**hanges to
- ➔ **R**educe
- ➔ **E**xposure to
- ➔ **B**acteria to
- ➔ **E**liminate
- ➔ **L**osses from PRRS

McREBEL PROCEDURES

- Stop cross fostering of piglets between litters for resizing or saving sick pigs, fall-behinds, and runts.
- Cross-foster piglets to equalize number of piglets per litter only within the first 24 hours of age.
- Only move pigs within farrowing rooms at birth. Do not move sows or piglets between rooms.
- Stop use of nurse sows for weak-born PRRS infected pigs, fall-behinds, and runts.
- Minimize handling of piglets, especially routine antibiotic or extra iron injections.
- Evaluate the effect on clinical disease levels of each nonessential processing or treatment procedure for suckling and nursery pigs.
- Immediately destroy piglets that become very sick and are unlikely to recover completely.
- Hold NO pigs back!! DO NOT move fall-behind or light-weight pigs backward to younger rooms or to nurse sows.
- IMMEDIATELY STOP ALL FEEDBACK of weak born or aborted/stillborn fetuses.
- Nursery pigs should be moved STRICTLY ALL IN-ALL OUT. Leave 2 to 3 days clean-up and disinfectant time between groups.
- Nurseries may be loaded ALL IN by early weaning a few of the oldest, best performing litters from another farrowing room.

These changes must be followed completely to achieve a sudden reversal of PRRS-associated secondary bacterial disease and mortality of suckling and nursery pigs.

Additional Comments

There are many aspects of the PRRS virus that are not completely understood. We are progressing toward control and elimination of the virus but until the development of immunity against PRRS is understood, management improvements are the most beneficial tool to employ. The vaccine seems to be beneficial in specific herd situations but a veterinary/client/patient relationship must be established for off-label protocols. Much more research will evolve before control of the PRRS virus is achievable.

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