CHAPTER ELEVEN

A Producer’s Guide to Managing PRRS Virus Infection
What Do You Need to Know?

- Developing a Plan of Action to Manage PRRS Virus Infection
- Sampling and Monitoring Protocols
- Semen Supplier Questionnaire
- Biosecurity Protocols
- An Assessment of Other Diseases
- Vaccination
- Gilt/Boar Isolation and Acclimatization Protocols
- Identification of PRRS Virus Strain(s) on the Farm
- PRRS Virus – A Template for Investigation of an Outbreak
- Farm-Specific Plan to Manage PRRS Virus

The techniques for controlling and managing PRRS virus that have been described in the 2003 PRRS Compendium Producer Edition, can be expected to meet with varying levels of success on your specific farm. Many factors including the management and pigflow of a production system, the level of risk associated with local pig density, and the inherent characteristics of the specific strain of PRRS virus found on a farm all contribute to successful program development. The questions presented in Chapter 11 will assist the producer and veterinarian in carefully considering the factors that can contribute to the success or failure of a given PRRS virus control strategy. While this guide is meant to help organize your approach to addressing PRRS virus, much remains to be discovered. This guide will be revised as new research and understanding becomes available.
Developing a Plan of Action to Manage PRRS Virus Infection

1. **Contact your veterinarian and develop a sampling strategy to determine farm status.**
   - **Unknown**
   - **Positive**
   - **Negative**
     - Develop a strategy to stay negative.
     - **Positive**
       - Do you know how the farm initially became infected with the virus?
         - **No**
           - Develop an Eradication strategy to eliminate the disease.
         - **Yes**
           - Are you able to control the factor(s) that resulted in the initial infection?
             - **No**
               - Control
             - **Yes**
               - Do you want to Eradicate PRRS or Control PRRS?
                 - **Eradicate**
                 - **Control**

2. **Discuss and decide on an Eradication or Control strategy.**

3. **Develop a strategy to stay negative.**

4. **Consider other diseases.**

5. **Vaccination.**

6. **Gilt/Boar Isolation and Acclimatization Protocols.**

7. **SEMEN SUPPLIER QUESTIONNAIRE.**

8. **Complete an Assessment of Other Diseases.**

9. **BIOSECURITY PROTOCOLS.**

10. **Sampling and Monitoring Protocols.**

11. **PRRS VIRUS - A TEMPLATE FOR INVESTIGATING AN OUTBREAK.**

12. **Identify PRRS strain(s) on the farm.**
Sampling and Monitoring Protocols

1) What is the purpose of the proposed sampling or monitoring program?
   a) Do you need to know what percentage of animals are positive (prevalence) or simply whether any animals are positive (determine herd status)?
   b) Consider what actions will be taken based on the test results before sampling is initiated.

2) Give careful consideration to the characteristics of the population you plan to sample.
   a) Is it important to incorporate factors such as parity distribution, location within the building, age of the animals, or source of the animals?
   b) Does each pen or group need to be represented in the sample?
   c) Does each room or building need to be represented in the sample?

3) What test(s) should be run on the samples?
   a) Serology will only indicate if the individual has been exposed to the virus, not whether it is truly infected.
      i) Several serologic tests are available (ELISA, SVN, IFA). Consult with your veterinarian and laboratory to determine the best test to meet your needs.
   b) Antigen detecting tests can provide more information about whether the animal is actually harboring the virus.
      i) Several tests are available (PCR, VI, IHC staining); each test has its advantages and disadvantages. Consult with your veterinarian and laboratory to determine the best test to meet your needs.
      ii) A negative result from an antigen detecting test should not be considered to be 100% accurate. An accurate test result is highly dependent of the stage of the disease, sample handling, and sample collection technique.

4) How frequently do you need to sample?

5) What action will be taken in the event a sample is reported to be POSITIVE when you are expecting it to be NEGATIVE?
   a) Remember that what you think is probably a FALSE POSITIVE result may actually be POSITIVE! Respond to any POSITIVE result promptly.
   b) False positive results can frustrate even the best designed sampling or monitoring program.
   c) As a farm nears eradication, managing false positives becomes extremely important.
Semen Supplier Questionnaire

It has been well documented that PRRS virus can be transmitted through boar semen. For this reason, it is important to consider all the risks that are involved when choosing to bring semen onto your farm. National Pork Board recently developed a questionnaire designed to help producers assess these risks through questions that should be asked of your current or potential semen supplier. This booklet, entitled “Biosecurity and Health Assurance at a Boar Stud: An Outline of Questions to Ask Your Semen Supplier” can be ordered from National Pork Board or downloaded from the website at www.porkboard.org.
Biosecurity Protocols

A biosecurity plan should describe all the efforts on a farm that are designed to minimize the risk of introducing new disease pathogens onto a farm. PRRS virus presents many of the same challenges to biosecurity as other common swine pathogens but adds some of its own unique considerations as well. National Pork Board recently developed a publication designed to assist producers in developing biosecurity guidelines for their operation. This publication, entitled “Biosecurity Guide for Pork Producers”, covers a wide range of topics including downtime, use of footbaths, vehicle and transport cleanliness, disinfectant selection, biosecurity practices for outdoor production, foreign animal disease reporting, and others. This biosecurity publication is bundled with an additional booklet entitled “Security Guide for Pork Producers”. It describes objectives for producers to consider about the physical security of their operation and suggestions for properly managing situations and individuals that threaten their farm’s security. Both publications are available for download at the National Pork Board website www.porkboard.org.

Biosecurity considerations for managing PRRS virus are discussed below. The virus’ tendency to cause persistent infections in swine and our lack of complete understanding of viral transmission and epidemiology are the primary reasons biosecurity should be scrutinized when designing a control or eradication program.

1) The most significant source of PRRS introduction onto a farm is the entry of an infected pig.
   a) No diagnostic test is perfect.
   b) Pigs can be negative on several tests and still harbor the virus.
   c) Only under unique circumstances, should PRRS positive animals be permitted onto your farm.
2) The significance of airborne spread of PRRS virus is largely unknown. As with any swine disease, increasing the geographic separation between production sites will decrease the likelihood of disease transmission.
3) PRRS virus does not remain viable outside the pig for extended periods. Routine cleaning and disinfection followed by complete drying of the surface should be adequate to prevent transmission between groups of pigs.
4) Research has shown the potential for PRRS virus to be transmitted on boots, coveralls, and vehicles. Changing outerwear and boots, showering, and minimizing the carriage of equipment between farms or groups of pigs are good habits to develop regardless of a farm’s PRRS virus status.
An Assessment of Other Diseases

A fundamental question when considering the best way to manage PRRS virus on a swine farm is “How significant is PRRS virus relative to other problems that may be occurring on the farm?”. Some PRRS virus positive farms, specifically smaller, closed herds, are relatively free from the clinical effects of the disease. Other diseases may be much more economically important and should be targets for management or eradication before PRRS virus. Following are a list of questions to consider on this topic.

1) What other diseases are present on my farm?
   a) Are these diseases more or less significant than PRRS?
   b) Are other diseases inter-related with the introduction of PRRS virus into the operation? For example, did *Haemophilus parasuis* only become an important disease after PRRS was diagnosed? Can these inter-related diseases be managed by themselves or do they require the control or eradication of PRRS virus in order to be brought under control?

2) Can control or eradication strategies be implemented for PRRS virus that can be modified to eliminate other diseases at the same time?

3) Have medication or vaccination strategies for non-PRRS diseases become less effective since the introduction of PRRS virus?

4) Has a complete evaluation of husbandry practices, biosecurity, cleaning and disinfection, environment, and nutrition been completed to determine their effect on the severity of PRRS?

5) Are historical production records available that can help determine the cost of disease to the farm and the impact of disease intervention strategies?
Vaccination

Vaccination can be an important part of PRRS virus control and eradication strategies. However, there are a number of factors that should be considered before embarking on a vaccination program. Even the best vaccine should be considered less than 100% effective and there are some unique characteristics of PRRS virus that make this fact even more important. PRRS virus has evolved into numerous different strains since the early 1990’s when it was first discovered. Infection with one strain of the virus will not create protective immunity against all other strains of the virus. Likewise, vaccination should not be expected to provide protection against all strains.

1) What do I hope to achieve by initiating a vaccination program?
   a) Will the vaccine provide protection against the resident strain of PRRS virus on the farm?
   b) Is there more than one strain of the virus circulating on the farm? By definition, introduction of modified-live PRRS virus vaccine will result in a new strain being introduced onto the farm.
   c) Is the disease clinically apparent on the farm? If not, vaccination may not be warranted.

2) Will the cost of vaccination be offset by improvements in pig performance? How much improvement in breeding herd performance or growing pig performance is needed to pay for the vaccine?

3) Vaccination will cause POSITIVE results on many of the diagnostic tests for PRRS virus. Will this jeopardize breeding stock or semen sales? Will this jeopardize your PRRS monitoring program?

4) What populations of pigs will be vaccinated?
   a) Vaccination of breeding animals during gestation with modified-live vaccine can result in the vaccine strain of the virus being passed to the pigs in utero.
   b) Vaccination of breeding animals is likely give some protection to newborn piglets depending on the PRRS virus strain circulating on the farm. However, this protection will eventually diminish later in the pig’s life and make it susceptible to infection at a less desirable age.
   c) Will vaccination be a component of gilt development, isolation, or acclimatization?

5) What PRRS virus vaccine will be used?
   a) Killed virus vaccine.
   b) Modified-live virus vaccine.

6) If a vaccination program is initiated, when can it be stopped?
   a) Should you expect to be required to vaccinate forever?
   b) What can you measure to know the vaccination program has been successful?
Gilt/Boar Isolation and Acclimatization Protocols

1) What is the source of your replacement boars and gilts?
   a) You should require them to be PRRS virus negative except under unique circumstances.
   b) Can the supplier of these animals be maintained into the future in order to avoid having to switch suppliers?
   c) What health assurance practices does the supplier have in place specific to PRRS virus? What monitoring program is in place? How and when will you be notified by the supplier if something unusual happens at the source herd?

2) What is the appropriate length of time for isolation and acclimatization?
   a) This will likely be a compromise between the PRRS status of the recipient herd, the amount of isolation space available, and the means of acclimatization.
   b) No single time period can be suggested as the right answer for all farms. Extended periods of isolation will reduce the risk of introducing PRRS virus through replacement animals. Working closely with your veterinarian will help determine the optimum isolation period for your farm.

3) Acclimatization is the exposure of new animals to the resident pathogens known to be on the farm.
   a) How will new animals be exposed to the resident pathogens, including PRRS virus?
   b) Will animals be monitored to evaluate the success of the acclimatization procedures?
   c) What period of recovery should be allowed after exposure to the pathogens?

4) What are the criteria for a group of animals to “fail” the isolation and acclimatization procedures? What will happen to these animals?

5) What are the criteria for a group of animals to “pass” the isolation and acclimatization procedures? Will diagnostic testing be used to “pass” the group? Do all animals need tested or just a sample?

6) What biosecurity precautions have been established for isolation?
   a) Can the isolation area be completely separated from the rest of the farm?
   b) Can the isolation area be located at a separate site from the main farm?
   c) Who will provide care to the animals in isolation? What steps does this person need to take to return to the main farm?
   d) Will the isolation area be cleaned and disinfected between groups? Isolation areas must be managed in an all-in, all-out manner in order to truly act as a biosecurity barrier.
Identification of PRRS Virus Strain(s) on the Farm

PRRS control and eradication strategies become much more complicated when more than one strain of PRRS virus is circulating on the farm. While not an easy task, some effort should be made to isolate and characterize any and all strains that are on the farm. Chapter Eight in this PRRS Compendium 2nd Edition, Producer Version, discusses this topic in great detail and the reader is encouraged to study the information that is provided. Specific considerations to be made within this topic are:

1) Genomic sequencing is currently the most definitive method for comparing two or more strains of PRRS virus. Sequencing generally requires isolation of the virus from a live animal.

2) What sampling technique will be used to assess the possibility of multiple PRRS virus strains circulating on a farm?
   a) At what point during the sampling can one assume that they have found all the strains that are on the farm?
   b) How frequently should the sampling be repeated, over time, in order to evaluate the emergence of a new strain?

3) How “different” must strains be in order to consider them separate, unique viruses?

4) Genomic sequencing is an expensive process. What value must be derived from their use in order to justify doing the test?
PRRS Virus – A Template for Investigation of an Outbreak

When considering the development of strategies to control or eradicate PRRS virus from a farm, it is critical to invest some time into understanding the most likely reason the farm became infected in the first place. If one does not understand the means by which the infection was initially acquired, it becomes a risky venture at best, to devote the time and financial resources that will be necessary to bring the control or eradication process to completion. This template provides a framework for investigating the potential mechanism by which a PRRS virus infection occurred. While there will be occasions when the source of an outbreak can not be confirmed, a thorough investigation of all possibilities will nearly always result in a list of the most likely sources. Control and eradication plans can then be developed in cooperation with your veterinarian that control for these likely sources of infection and subsequently reduce the risk of reintroducing PRRS virus at a later date.

Animal Introductions: Contact with infected pigs provides the highest risk of transmitting PRRS virus to uninfected swine. Swine producers should fully investigate all of the potential pig-to-pig contacts that may have occurred prior to an outbreak.

- Boars
- Growing Pigs
- Replacement Females
Semen: PRRS virus is known to be readily transmitted through infected semen. Producers considering the use of artificial insemination should utilize the “Biosecurity and Health Assurance at a Boar Stud: An Outline of Questions to Ask Your Semen Supplier” created by the National Pork Board to familiarize themselves with the associated risks of using semen and put in place assurances to minimize the risks.

- Semen testing procedures
- Delivery Method
- Biosecurity and Health Assurance at a Boar Stud: An Outline of Questions to Ask Your Semen Supplier
- Number of semen suppliers
**Transportation:** Transportation and transport vehicles can be an important means of transmitting many swine diseases, including PRRS virus. All vehicles, both owned and contracted, for swine or people transport, should be assessed for their risk of harboring and transmitting swine diseases.

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<tr>
<td>● Market transportation</td>
<td>● Vehicle cleaning and disinfection</td>
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<td>● Transportation to or from exhibitions</td>
<td>● Delivery of boars, females, or growing pigs</td>
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<td>● PRRS virus status of other farms visited by contract transporters</td>
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**PRRS Virus Transmission by Other Vectors:** A disease vector can be considered as anything that can transmit disease pathogens from an infected to a non-infected pig. Producers need to consider vectors that are present not only on their own farm, but those that might be shared between farms or between different areas of the same farm.

- Shared equipment, vehicles, and tools
- Rodents, wildlife, and insects
- Contaminated wash water or flush water
- Direct infection through contact with a contaminated environment
- Visitors, veterinarians, and suppliers
- Shared labor
- Dead animal disposal
Feed: It is unlikely that PRRS virus can be transmitted through contaminated feed. However, feed suppliers do present a risk acting as a vector between infected farms.

- Cleanliness of delivery people and vehicles
- Delivery routes, sequencing of farms
**Area or “Airborne” Spread:** PRRS virus can not be reliably transmitted over long distances in a laboratory setting. Reports from veterinarians and producers in swine dense regions, however, lead some to believe that airborne spread does occur with some frequency. Until this question can be definitively answered, producers should consider the PRRS virus status of neighboring farms when investigating the source of their own outbreak.

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<th>Proximity to nearby swine operations</th>
<th>Prevailing winds (direction, spread)</th>
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<td>Weather (temperature, humidity, sunlight)</td>
<td>PRRS virus status of nearby farms</td>
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<td>PRRS virus genomic sequence of nearby isolates</td>
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<td>Recent activity on nearby swine farms (new pig introductions, mortality, known PRRS virus outbreak)</td>
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# Farm-Specific Plan to Manage PRRS Virus

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### Control of Other Diseases:

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### Vaccination:

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### Pig Flow, Facility Utilization, Depopulation:

| ![Pig Flow, Facility Utilization, Depopulation](image) |

### PRRS Virus Herd Stabilization Protocol:

| ![PRRS Virus Herd Stabilization Protocol](image) |