



South Dakota

Animal Industry Board



South Dakota

Voluntary Porcine Reproductive and
Respiratory Disease (PRRS)


Certification Program





The South Dakota Pork Producer Council's Swine Health Committee proposed offering for producers a method to verify PRRS Negative Status.

This Committee working with Dr. Bill Epperson, Extension Veterinarian, Dr. Dave Zeman, and his staff of the Veterinary Science Department, SDSU, and the Animal Industry Board developed the program enclosed.



What is Porcine Reproductive and Respiratory Disease (PRRS)

- once called “Mystery Swine Disease”
- capable of producing catastrophic losses either upon introduction into uninfected herds or as rebreaks in endemically infected herds
- occurs in swine of all ages
- recognized in the US, North Carolina, in the late 1980s
- some avian species, mallard ducks in particular, are susceptible to PRRS

What are the signs of PRRS in swine?

- Clinical signs in adult animals
 - lethargy
 - depression
 - failure to eat
 - feverish
 - sows may abort, commonly in late gestation, > 10%
 - boars, loss of libido, poor semen quality
- Farrowing house
 - stillborn levels may increase to 50% - 70%
 - mummified fetuses may increase to 20% - 30%
 - suckling pigs demonstrate
 - “thumping” or a distinct pattern of rapid, open-mouthed, abdominal breathing which results from respiratory disease
 - sows milk poorly leading to colostrum deprivation which results in increased cases of colibacillosis or starvation
- Nursery clinical signs are
 - respiratory disease
 - meningitis
 - post weaning diarrhea
 - reduced average daily gain of 50% - 75%
 - increased mortality of 10% - 25%



Where does PRRS come from?

- primary transmission from herd-to-herd is the introduction of infected animals
- this virus is highly infectious
- as few as 10 virus particles can cause infection by intramuscular or intranasal routes
- virus is shed in saliva, nasal secretions, urine, semen, mammary secretions and feces
- virus persists in lymphoid tissue such as the tonsil
- virus can cross the placenta and infect fetal pigs

How does PRRS develop?

- virus enters the pig through the nasal mucosa and/or epithelium of the upper respiratory tract
- virus multiplies in the mucosa, lymphoid tissue and blood cells in the respiratory system
- virus spreads via the blood to secondary multiplication sites
- virus can be found in lungs, heart, lymph nodes, tonsils, thymus, spleen, intestine, kidneys, liver, adrenal glands, brain, and testes

How long is the incubation period for PRRS?

- with the virus crossing the placenta, piglets can be born with PRRS disease
- introduced infections can cause respiratory signs in as little as 3 days
- typically, pneumonia is most severe at 10 days after infection
- virulence of different strains of PRRS virus is variable
- swine of all ages are susceptible to PRRS
- speaking broadly, younger pigs are more susceptible than older pigs to PRRS

What breeds or types of animals does PRRS effect?

- investigators indicate breed genetics may influence the severity of the infection
- different breeds may have variable severity of infection shown in different tissues (i.e., pneumonia, meningitis, myocarditis, or serum antibody response)



Is PRRS a new disease?

- PRRS virus entered the domestic swine population relatively recently and spread rapidly thereafter
- earliest evidence of PRRS was from Canada in 1979 where 2 of 51 herds had antibodies to PRRS virus detected
- essentially found today in all hemispheres of the world
- the North American and European strains are distinctly different
- some countries are claiming to be free of the PRRS virus

How do I know if have PRRS in my herd?


- clinical signs of reproductive problems in breeding stock and respiratory disease in pigs of any age
- many similarities with other swine diseases lends importance to diagnostic testing
- a definitive diagnosis of PRRS virus infection requires the isolation of virus, detection of viral antigen or genomic material, and/or detection of antibody
- involve your veterinarian in the evaluation of clinical signs, tissue sampling and collection, and diagnostic test interpretation

Is there a good vaccine for PRRS?

- several vaccines are available in the U.S. today
- vaccination does not stop infection
- the purpose of vaccination is to produce an immune response which will alter the course of infection and protect against clinical signs
- both modified live and killed virus vaccines are available
- development of new vaccine products is currently an area of active research
- management changes are required in conjunction with prudent vaccine use
- vaccinated animals will test positive to serologic tests

How do I get a diagnosis?

- contact your herd veterinarian
- not possible on the basis of grossly visible lesions
- submission of tissue samples for microscopic analysis

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- submission of serum samples to detect antibodies (serology)
 - frozen tissues for laboratory immunohistochemistry
 - tissue samples for virus isolation
 - tissue submission for viral genomic material detection
 - consult with your veterinarian about lab result interpretation and diagnosis

What are the laboratory tests?

- indirect fluorescent antibody (IFA)
- enzyme-linked immunosorbent assay (ELISA)
- serum virus neutralization (SVN)
- virus isolation
- fluorescent antibody test (FA)
- immunohistochemistry test (IHC)
- polymerase chain reaction test (PCR)
- monoclonal antibody analysis can be used to differentiate a commercial MLV vaccine from field isolates
- research continues on developing new laboratory tests

How long does the PRRS virus survive in the environment?


- PRRS virus is a fragile virus which is quickly inactivated in the environment
- at 75 degrees virus does not persist on fomites beyond a day
- standard cleaning and disinfection procedures should be effective for inactivation of PRRS virus in facilities and on equipment
- drying quickly inactivates PRRS virus

How is PRRS virus transmitted in and between herds?

- once a herd is infected, PRRS virus tends to circulate within a herd indefinitely
- PRRS virus persists in clinically normal carrier animals and the continual introduction of susceptible animals either through birth or purchase
- primary herd-to-herd transmission is the introduction of infected animals
- aerosol transmission rarely occurs over a distance of 1 meter
- transmission occurs by close contact between animals
- semen from infected boars can infect susceptible females

TESTS FOR PRRS

<u>TEST</u>	<u>ADVANTAGE</u>	<u>DISADVANTAGE</u>
Virus Isolation	Serum or Fresh Tissue	Requires Proper Handling
Virus Antigen a. Fluorescent Antibody (FA)	Frozen Tissue, Inexpensive & Rapid	Less Sensitive
b. Immunohistochemistry (IHC)	Formalin-fixed tissue	More expensive More time required
Virus Genomic Material a. Polymerase Chain Reaction (Pcr)	Detects Viral RNA, Highly Sensitive Highly Specific	High Cost
b. In Situ Hybridization (ISH)	Very Sensitive Uses Fixed Tissues	
Virus Antibody a. Indirect Fluorescent Antibody (IFA)	Highly Specific, Magnitude of Antibody Titer	Unknown Sensitivity In Individuals
b. Immunoperoxidase Monolayer Assay (IPMA)	Highly Specific, Highly Sensitive	Antigenic Variability *Used In Europe*
c. ELISA	Detects North American & European Strains, Laboratory Automation, Sensitive And Specific, Low Cost	



*Current Serologic Assays Cannot Routinely Differentiate Vaccine-Derived Antibodies From Field Isolate-Derived Antibodies.

What are the costs of PRRS Disease in my herd?

- loss of animals due to death or early culling
- decreased milk production in affected sows and gilts
- decreased average daily gain
- 2 -3-fold increase in number of disadvantaged pigs
- reduction in total profits due to performance losses
- veterinary costs for diagnosis

Are there Laws regulating PRRS Disease?

No - not other than as with any other disease - clinically affected animals are not eligible to be sold other than for slaughter

How do I control or eliminate PRRS Disease?

- With your veterinarian
 - evaluate the extent of infection
 - set up plan to identify infected animals
 - determine best program for your herd
 - continue testing on a quarterly basis to monitor progress of efforts (record keeping)
 - participate in the Voluntary PRRS Certification Program in South Dakota

What role will the South Dakota Animal Industry Board play?

While this is a disease the industry will voluntarily control, the Animal Industry Board will provide help in record keeping and certifying herds. This will facilitate authenticity to Herd Plans and therefore assist the industry in controlling and eliminating PRRS. Certification of voluntary achievement of herd status will no doubt become important in the marketing of animals in the future.



South Dakota PRRS Certification Program

1. Premise definition:

- A. A specific geographical area under common management. The premise is defined by the owner and veterinarian, and may include all or a portion of pork production under their control. A premise describes a physical space which is dedicated for use by the producer when entering the PRRS certification program.
- B. For an entire production system to be certified, all phases of production must be sampled and participate in the program.
- C. Producers can select the production group they wish to certify. All phases of production up to and including the “selected” group must participate in the program.
- D. If multiple locations input swine into the proposed PRRS certification production premise, all sites must be sampled separately to validate the final herd PRRS certification defined premise.

2. Initial Procedure Applicable to All Premises

Each producer will be required to define the premise(s) for which PRRS certification is desired. Based on this, a PRRS certification plan and sampling scheme will be constructed in consultation with the herd veterinarian. In addition, each herd owner or manager will be required to sign a Herd Owner PRRS Certification Statement.

3. Certification levels: An overview

(see section for specific premise(s) certification details)

- a. Initial certification:
 - depending upon the defined production premise, i.e., farrow - finish, farrow - feeder pig, farrow - wean
 - blood sample the required number of pigs (Table A)
 - sample at 90 day intervals
 - sample for one year (4 bleedings)
 - sample all levels of production as established in Herd Owner PRRS Certification Statement
 - permanent official ID on all breeding swine tested
 - negative test results on all incoming swine (see rules)



Subsequent monitoring for maintenance of certification

- blood sample the required number of pigs (Table B)
- sample at 90 day intervals
- negative test results on all incoming swine (see rules)
- lack of clinical signs consistent with PRRS
- permanent official ID on all breeding swine tested

Terms:

- PRRS Negative -- No serologic evidence (antibody) by PRRS ELISA test or clinically confirmed case of disease due to PRRS
- serologic test of choice PRRS ELISA
- confidence level of 95% PRRS detection with > 10% prevalence in Table A and > 20% in Table B

Table A -- Quarterly Sample Size for Initial Certification --
All production systems as well as monitoring phase for farrow - wean sites.

Breeding females or maximum G-F capacity	Breeding herd females	G-F Swine
10	9	9
20	15	15
30	18	18
40	20	20
50	22	22
100	25	25
200	27	27
300	28	28
500	28	28
750	28	28
1000	28	28
2000	29	29
3000	29	29

Table B -- Sample Size Table for the Monitoring Phase for Farrow - Finish and Farrow - Feeder pig

Population Size:

Breeding females or maximum G-F capacity	Breeding herd females	G-F Swine
10	7	7
20	10	10
30	11	11
40	12	12
50	12	12
100	13	13
200	13	13
300	14	14
500	14	14
750	14	14
1000	14	14
2000	14	14
3000	14	14

4. Animal identification:

- a. All breeding swine tested must have permanent identification other than a plastic eartag.
- b. Acceptable means of permanent identification are: individual specific ear tattoo, USDA uniform series eartag (metal tags), and electronic ID.

5. Collection of samples:

All blood and tissue samples are to be collected by, or under the supervision of, a licensed accredited veterinarian.



6. Veterinary certification:

The veterinarian performing or supervising the collection of test samples is to certify that the samples were from the animals identified on the test documents.

7. Herd Owner PRRS Certification Statement:

A signed document that verifies that the producer or manager; 1. understands the clinical signs of PRRS, 2. identifies a herd veterinarian, 3. agrees to work with that veterinarian in the event clinical signs of PRRS develop, 4. identifies the premise and animal production groups that will be certified, and 5. outlines the testing procedure employed to verify PRRS testing qualifications.

Definition of a positive animal:

An animal is defined to be positive, i.e., antibody detected for PRRS virus, when PRRS ELISA test conducted at an accredited veterinary diagnostic laboratory indicates a positive value on a serum sample.

Protocol to be followed if an animal is positive by the serum antibody PRRS ELISA test:

Suspected False Positives -

- Samples that are suspected to be false positive may be reassayed, OR the animal(s) may be rebled later and retested to determine PRRS status.

Reporting procedure:

All PRRS results from the herd must be reported and be available to the South Dakota Animal Industry Board.



How do I maintain PRRS negative herd status?

- maintenance of PRRS negative status relies on sampling quarterly and testing all incoming swine with results indicating no antibody to PRRS virus.
- also, maintenance of PRRS negative status is contingent on the lack of clinical signs consistent with PRRS, as determined by the herd veterinarian and producer.

TESTING PROCEDURE FOR CERTIFICATION

A. Farrow - Finish & Seedstock Producer Premises

1. Initial Certification:

- a. Blood sample the required number of pigs (Table A) in the grow - finish environment at 90 day intervals for a period of 12 months (4 bleedings total).
- b. Blood sample the required number of breeding stock (Table A) at 90 day intervals for a period of 12 months (4 bleedings total). No sow will be sampled twice with 101 sows or more in the breeding herd. Individual official ID is required.
- c. Incoming swine (both internal and external sourced) will be tested in accordance with the incoming swine guidelines.

2. Monitoring Certification:

- a. Blood sample pigs (Table B) in grow - finish environment at 90 day intervals. Pigs must weigh at least 90 pounds.
- b. Blood sample breeding stock (Table B) at 90 day intervals. Sows must be of all parities and from each production phase (gestation, post-weaning, lactation, and off premise gestation). Individual official ID is required.
- c. All incoming swine must be tested according to the guidelines for incoming swine. (see incoming swine).



B. Farrow - Feeder Pig Premises

1. Initial Certification:

- a. Blood sample the required number of feeder pigs (Table A) at 90 day intervals for a period of 12 months (4 bleedings total). The sample should represent the oldest pig in the nursery. Pigs should be present in the nursery at least 2 weeks to be eligible for sampling. No ID is required. Multiple pens and litters should be sampled.
- b. Blood sample the required number of breeding stock (Table A) at 90 day intervals for a period of 12 months (4 bleedings total). No sow will be sampled twice with 101 or more sows in the breeding herd. Individual official ID is required.
- c. Incoming swine (both internal and external sourced) will be tested in accordance with the incoming swine guidelines. (see incoming swine)

2. Monitoring Certification:

- a. Blood sample the required number of feeder pigs (Table B) at 90 day intervals. The sample should represent the oldest pigs in the nursery. Pigs should be present in the nursery for at least 2 weeks to be eligible for sampling. No ID is required. Multiple pens and litters should be sampled.
- b. Blood sample the required number of breeding stock (Table B) at 90 day intervals. Sows must be from all parities of each production phase (gestation, post-weaning, lactation, and off premise gestation). Individual official ID is required.
- c. All incoming swine must be tested according to the guidelines for incoming swine.



C. Farrow - Wean Premises

1. Initial Certification:

- a. No piglet sampling is required.
- b. Blood sample the required number of breeding stock (Table A) at 90 day intervals for a period of 12 months (4 bleedings total). No sow will be sampled twice with 101 or more sows in the breeding herd. Individual official ID is required.
- c. Incoming swine (both internal and external sourced) will be tested in accordance with the incoming swine guidelines (see incoming swine).

2. Monitoring Certification:

- a. No piglet sampling is required.
- b. Blood sample the required number of breeding stock (Table B) at 90 day intervals. Sows must be from all parities from each production phase (gestation, post-weaning, lactation, and off premise gestation). Individual official ID is required.
- c. All incoming swine must be tested according to the guidelines for incoming swine.

D. Boar Stud Premises

ONLY SERONEGATIVE BOARS CAN RESIDE IN THE BOAR STUD.

1. Initial Certification:

- a. All boars must be tested each 6 months for a period of 12 months (2 bleedings total). Individual official ID is required.
- b. All incoming boars must be tested on arrival (preferably prior to arrival) and again 40 - 60 days after arrival. Boars must be from a farm of origin where there has been no evidence of active PRRS for at least one year. The herd of origin must not use PRRS vaccine.

2. Monitoring Certification:

- a. Blood sample the required number of boars (Table B) every 90 days.
- b. Incoming boars - test according to item D.1.b.

Incoming swine testing requirements

1. All incoming swine will be held in isolation until all PRRS test results are available. All incoming swine must be tested on arrival (preferably prior to arrival) and again 40 - 60 days after arrival. Only after the retest result is PRRS ELISA Negative can the animal be released from isolation. Individual official ID is required. IF A POSITIVE TEST ANIMAL IS DETECTED - All in-contact animals must be retested 4 weeks later to assess individual status and a herd monitoring plan initiated in consultation with the herd veterinarian. Any PRRS test positive animal must be promptly removed from the defined certification premise(s).
2. Internal Herd Replacements - All internal replacements (gilts, boars, teaser boars) must be PRRS test negative prior to entry to the breeding herd.

Semen

- infected semen has been identified as a source of PRRS virus into a swine herd.
- assure that semen is not contaminated with the PRRS virus by written PRRS Negative Certification from the dispensing boar stud enterprise.

Biosecurity

- PRRS virus transmission is primarily from animal to animal
- personnel cleanliness and equipment use needs careful control to minimize transmission of PRRS virus
- rodent control, bird control and feral animal population control are required
- evaluate ventilation air flow patterns so the virus is not spread to naive swine populations
- control commodity vendors and distributor access to the swine
- maintain cleanliness and numbers of visitors to the premise(s)
- strictly control animal additions and movements, follow testing schedules, review certification requirements and maintain record keeping procedures
- discuss biosecurity needs with your herd veterinarian

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