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Standard herd classification system for describing the PRRS virus status of herds

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Introduction

This paper describes a herd classification system for describing the porcine reproductive and respiratory (PRRS) virus status of herds, based upon a set of definitions that reflect the biology and ecology of PRRS virus as its understood today.[1]

The herd classification system was developed by a definitions committee formed jointly by the American Association of Swine Veterinarians (AASV) and the United States Department of Agriculture (USDA) PRRS-CAP. The committee was chaired by Dr. Bob Morrison and composed of veterinarians from private practice, industry and researchers as well as representatives from AASV and the National Pork Board (NPB).

The herd classification system described in this paper was approved by the AASV Board of Directors on March 9, 2010.

Classification system for breeding herds

For breeding herds, with or without growing pigs on the same premises there are four categories: Positive Unstable (Category I), Positive Stable (Category II), Provisional Negative (Category III), and Negative (Category IV). Category II is further divided into two sub-categories; Positive Stable (Category II-A) and Positive Stable undergoing elimination (Category II-B) (Table 1).

The classification system is based on determining both shedding and exposure status of the herd.

PRRS shedding status is classified as negative, uncertain or positive. A negative shedding status means that the available evidence supports the absence of viral shedding in the herd. A positive shedding status is supported by diagnostic and clinical evidence of viral shedding and transmission in the herd. A positive shedding status is also assumed for all herds and situations when information on the actual herd status is lacking. On the other hand, an uncertain shedding status is used when diagnostic data in tested herds is available to suggest a negative shedding status but without sufficient confidence to support a negative shedding status, usually because of lack of power in the sampling and testing strategy. An uncertain shedding status is considered transitory in the progress towards eliminating PRRS virus from an infected herd.

The exposure status is classified as negative or positive. A negative exposure status means there is evidence to support the absence of prior exposure to the PRRS virus in the population assessed by the absence of antibodies to the virus in the samples tested.

The criteria and supporting evidence required for each category are presented in Table 2.

Classification system for growing pig herds

Growing pig herds are categorized simply as Positive or Negative (Table 3). The criteria and supporting evidence required for each category are presented in Table 4.

Table 1: Breeding herd classification for PRRS virus according to shedding and exposure status.

Herd category	Shedding status	Exposure status
Positive unstable (I)	Positive	Positive
Positive stable (II-A)	Uncertain	Positive
Positive stable (undergoing elimination)(II-B)	Uncertain – undergoing elimination	Positive
Provisional negative (III)	Negative	Positive
Negative (IV)	Negative	Negative

Table 2: Criteria and summary of supporting evidence required for breeding herd classification.

Herd category	Criteria	Supporting evidence required
Positive unstable (I)	Any virus detected on the site along with clinical signs consistent with PRRS. Herds that do not meet the criteria for any of the other categories (II through IV) are category I by default.	None required. Non-tested herds are category I by default. Detection of virus in any tissue and presence of clinical signs would confirm status.
Positive stable (II-A)	Category II starts after a 90 day period of sustained lack of viremia in weaning age pigs and no clinical signs of PRRS in the breeding herd. Herd has not initiated an elimination program.	Test serum from weaning age pigs by PCR[1]. No positive results over a 90 day period (4 consecutive negative herd tests sampling every 30 days or more frequently) and no clinical signs consistent with PRRS observed in breeding herd.
Positive stable, undergoing elimination (II-B)	Category II starts after a 90 day period of sustained lack of viremia in weaning age pigs and no clinical signs of PRRS in the breeding herd. Herd has initiated an elimination program and intends to become Negative.	Test serum from weaning age pigs by PCR[1]. No positive results over a 90 day period (4 consecutive negative herd tests sampling every 30 days or more frequently) and no clinical signs consistent with PRRS observed in breeding herd.
Provisional negative (III)	Category III starts 60 days after negative breeding replacements are first introduced during a herd rollover with diagnostic evidence that they remain uninfected.	Test serum from negative breeding replacements by ELISA[2]. No positive results, after ruling out false positives, at least 60 days after the initial introduction of negative breeding replacements.
	If growing pigs are present at the same premises, a confirmation of negative exposure status in that sub-population is also required.	Test serum from growing pigs by ELISA[2]. No positive results, after ruling out false positives
Negative (IV)	For herd rollovers category IV starts when all previously infected animals have been removed from the herd.	Test serum from adult breeding animals by ELISA[2]. No positive results, after ruling out false positives, subsequent to completion of rollover. Confirmed by breeding animal inventory lists from production records.
	Alternatively, category IV starts one year after the herd was classified as category III if all animals in the herd are seronegative by ELISA.	Test serum from adult breeding animals by ELISA[2]. No positive results, after ruling out false positives, at least 30 days after population of premises with negative breeding replacements.
	For herds established Negative as a new startup or by complete depopulation and repopulation	
	If growing pigs are present at the same premises, confirmation of a negative exposure status in that sub-population is also required	Test serum from growing pigs by ELISA[2]. No positive results, after ruling out false positives.

[1] Other virus or antigen detection tests may be used
[2] Other antibody detection tests may be used

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Table 3: Growing pig herd classification for PRRS virus when only growing pigs are at the premises (wean-to-feeder, wean-to-finish, and feeder-to-finish herds).

Herd category	Shedding status	Exposure status
Positive	Positive	Positive
Negative	Negative	Negative

Supporting material to define shedding and exposure status

The criteria for defining negative or uncertain shedding status; or negative exposure status, are based upon observable, objective and quantifiable measures. The objective evidence includes diagnostic results and information from production records, both of which should be routinely collected. Absence of clinical signs consistent with PRRS can also be used to support the herd status classification but clinical signs alone are not sufficient.

Testing methods to determine shedding include direct detection of the virus by PCR or virus isolation. PCR is the preferred testing method. Exposure is determined by antibody testing (ELISA, IFA, IPMA). ELISA is the preferred testing method. Classification is determined by monitoring the PRRS virus status of specific subpopulations in a herd. For the purpose of classifying herds, the relevant subpopulations are adult breeding animals, weaning age pigs, breeding replacement animals and growing pigs (post-weaning). Testing is based upon a representative sampling of the population.

Discussion

An accepted set of terms and herd classifications is required to facilitate regional and national efforts to eliminate PRRS virus. Furthermore, the availability of standardized nomenclature should facilitate communications among researchers, veterinarians, producers, genetic companies and other industry participants. Standardized nomenclature will facilitate better contractual and business arrangements, especially between genetic and commercial production companies, and those between producers including agreements that offer premiums for weaned pigs from breeding herd sources with a specific PRRS virus status. Researchers writing proposals, papers and making presentations may save time otherwise spent defining terms related to PRRS and standardized definitions will facilitate comparison of field-based research results by making clearer the conditions under which research trials are conducted.

Acknowledgements

References

1. Holtkamp D.J., Polson D.D, Torremorell M. 2010. Terminology for classifying swine herds by PRRS virus status. J. Swine Health Prod. (submitted)

Table 4: Criteria and summary of supporting evidence required for growing pig herd classification.

Herd category	Criteria	Supporting evidence required
Positive	Any virus detected on the site along with clinical signs consistent with PRRS. Herds that do not meet the criteria for Negative are Positive by default.	None required. Non-tested herds are category I by default. Detection of virus in any tissue and presence of clinical signs would confirm status.
Negative	None positive after ruling out false positives for ELISA	Test serum from growing pigs by ELISA. No positive results, after ruling out false positives and no clinical signs consistent with PRRS observed in growing pigs.