



## Control and Elimination of Porcine Reproductive and Respiratory Syndrome Virus

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## History

Porcine reproductive and respiratory syndrome emerged as a new syndrome in the US swine population more than two decades ago (Keffaber, 1989). After its initial description, the disease was identified rather quickly in many countries throughout the world. In 1992 the virus was isolated in the US and also in 1992 the consensus decision at the International Symposium on Swine Infertility and Respiratory Syndrome (SIRS) held in St. Paul, MN was made to refer to the syndrome as Porcine Reproductive and Respiratory Syndrome (PRRS) and the virus as PRRS virus (PRRSv). PRRSv has been documented to mutate constantly by changing its genetic appearance (Murtaugh et al. 1995) which presents an important challenge for herd-level and regional control.

Today, PRRSv is wide spread throughout the US. In 2000, it was estimated that the virus was present in 21.4%, 17.5% and 16.6% of the sow, nursery and finishing herds respectively according to the National Animal Health and Surveillance study. In 2006, a similar survey was conducted and it was estimated that 27.3%, 26.6% and 30.2% of the sow, nursery and finishing herds respectively, were thought to have experienced health problems related to PRRS in the previous 12 months (USDA, 2007). It is believed that the prevalence of this disease in the US may be higher than what these studies have reported.

## Clinical Signs and Economic Impact

PRRSv causes significant production losses due to reproductive failure including abortions, stillbirth, and premature farrowings. In growing pigs, it can cause increased mortality and decreased growth performance. Additionally, pigs may exhibit anorexia, dyspnea, pyrexia, and labored breathing (Zimmerman et al., 2006) which all contribute to an increase in the number of cull pigs. The economic impact of an acute PRRSv outbreak in the breeding herd was estimated at USD \$255 per sow and at USD \$6.25 to 15.25 per growing pig (Holck and Polson, 2003). In addition, Neumann et al. (2005) estimated the annual cost for the US swine industry to be \$560 million dollars. Losses in the breeding and farrowing phase resulted in reduced number of weaned pigs and farrowing rates and accounted for 11.9% of the total annual economic loss whereas in the nursery and grower-finisher phase, losses were due to increased mortality, decreased feed efficiency and decreased average daily gain accounted for 35.9% and 52.2% respectively. Therefore PRRS continues to be the most important disease affecting swine in the US and possibly worldwide.

## Transmission

Epidemiological data have helped elucidate transmission and the widespread nature of PRRSv in the swine population. PRRSv has been detected in oral fluids, mammary gland secretions, nasal secretions and semen. These routes of excretion highlight why pig movement and commingling of pigs of different PRRSv status has become one of the most important direct routes of PRRSv dissemination.

Besides the above mentioned direct routes of PRRSv transmission, indirect routes are also a concern. Indirect routes comprise contaminated boots and coveralls, needles, mosquitoes, houseflies, transport vehicles and aerosol transmission (Otake et al., 2002). Dee et al. (2009) and Otake et al. (2010) recently reported the detection and isolation of PRRSv in aerosols at 4.7 and 9.2 km respectively, indicating the importance of airborne transmission in regional control programs. Furthermore, PRRS virus has been detected in water and swine lagoon effluent for 11 and 7 days, respectively which pose a risk for further transmission.

Producers are aware of the risk of introducing PRRSv and are trying to minimize such risk by maintaining strict biosecurity levels and constant monitoring in their sow herds.

It has been documented that animal movement represents one of the most important risk factors for disease spread in food producing animals (Velthuis et al., 2007). Besides animals being the source of infection, trucks have also been identified to be a potential risk highlighting the importance of truck washing and disinfection.

## Control

Although significant progress has been made in understanding PRRSv control and elimination strategies, transmission routes and which biosecurity measures are the most effective in preventing PRRSv infection in swine herds, there is a need to further expand a more integral approach at the herd and regional level. In addition, the epidemiological features of PRRSv highlight the need for regional, geographically defined or national collaborative control and elimination programs.

Due to the economic impact of PRRSv on swine production and the many routes that the virus can spread between and within herds, regional elimination programs may be the best method for effectively controlling and eliminating the virus from an area. Diagnostic tools, epidemiologic knowledge, biosecurity practices and effective virus elimination strategies have been developed and successfully implemented at the herd level. This knowledge, together with producers' and veterinarians' commitment, will increase the likelihood of success of a regional program.

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