Porcine Reproductive and Respiratory Syndrome (PRRS)

Author: Dr Mary-Louise Penrith

Adapted from:


Photographs: Courtesy of Dr Gary Buhrmann (Western Cape Provincial Veterinary Services).

Licensed under a Creative Commons Attribution license.

CONTROL / PREVENTION

Prevention of PRRS depends upon the implementation of strict biosecurity measures for which detailed protocols have been worked out in endemically infected countries, in particular the USA. The purpose of the biosecurity measures is to ensure that no PRRSV is able to gain access to the pigs. This entails identifying all the possible ways in which the virus might be introduced to the farm and ensuring that appropriate barriers are in place to prevent an incursion. The most important sources of PRRSV are live infected pigs and infected semen, which are relatively easy to exclude by ensuring pigs and semen come from negative herds and isolating live pigs for at least 30 days, but a number of other possible transmission routes have been identified, some of which are more difficult to prevent than others.

Transmission of PRRSV via fomites that include contaminated clothing and footwear, hands, equipment and needles has been confirmed and biosecurity measures have to include issues of protective clothing and footwear, thorough washing and disinfection of hands and equipment, and using one needle per pig except perhaps in the case of piglets belonging to the same litter. Vehicles that transport pigs have been identified as having a very high risk of transmitting the virus. Effective cleaning, disinfection and drying protocols have been developed for vehicles but it has been pointed out that these are not easily applied to the entire vehicle. In damp and cold conditions, material that clings to the underside of the vehicle, like snow balls and mud balls, and may fall off and be transferred to footwear have been shown to be capable
of containing infective quantities of PRRS virus. Excluding vehicles from the pig area altogether by having loading/unloading facilities at points along the perimeter is ideal.

Mosquitoes and flies are competent mechanical transmitters of PRRSV and should therefore be excluded as far as possible. This is not possible in outdoor or semi-outdoor farming systems but measures should at least be in place to control insects for example by minimising suitable breeding sites. Although other species such as birds and rodents are apparently not susceptible to PRRSV or able to transmit it, their exclusion from pig facilities is an essential part of any biosecurity protocol, as is avoiding the feeding of swill to pigs, although the probability of transmission of PRRSV by swill, as discussed previously, appears to be very low.

Not all of the means of ‘neighbourhood spread’ have been identified with any certainty; pig farms, particularly in pig dense areas, have become infected when it could be demonstrated that none of the usual means of entry had taken place. It must therefore be accepted that, although aerosol transmission over distances has not been reliably proven, it is likely that it may occur under particular circumstances involving cold and humid conditions. For this reason, proximity to roads along which pigs are transported is regarded as a risk factor for becoming infected, as is proximity to other piggeries. Since the location of a pig farm in relation to roads and other farms can usually not be changed, some of the risk factors are not susceptible to mitigation, although it may be possible to locate facilities as far from the perimeter as possible and to protect pigs from the prevailing winds.

Vaccination does not form part of the strategy to protect uninfected herds. Vaccines have been developed and are potentially an important tool in strategies for managing PRRS. However, the heterogeneity of PRRSV presents a challenge. There are two major genotypes, European (EU) and North American (NA). In addition to differing genetically from one another, the strains within the two genotypes are themselves clinically, antigenically and genetically heterogeneous. Both genotypes have become widespread, and in many countries both genotypes occur. Some viruses used in the production of modified-live vaccines have become established as field viruses, and recombination between vaccine viruses and field viruses has occurred. Mixed infections involving both EU and NA genotype viruses have been recorded in the same herd, and cross protection between the two does not occur. The efficacy of vaccination is also reduced by the ability of PRRSV to evade the immune system, resulting in a delayed response to vaccination and reduced ability of the immune system to mount an adequate anamnestic response.

Control of PRRS in infected herds consists of minimising the negative effects on production. One of the main objectives is to produce piglets that are negative for PRRSV at weaning. This is achieved by ensuring that the breeding herd is immune and the sows will therefore not be shedding virus during gestation and farrowing so that transplacental infection does not occur and the piglets do not become infected by their dams. The key to maintaining the immunity of the breeding herd is to ensure that the gilts that are introduced have been exposed to the virus or viruses circulating in the herd and are immune by the time they enter the breeding herd. Ensuring that infection has taken place presents challenges and
vaccination of the gilts with modified-live vaccines and sometimes additionally with inactivated vaccines may form part of the acclimatization protocol. Vaccination with modified-live vaccine may also be used at herd level to increase protective immunity and should be applied to all the pigs within a particular air space at the same time. The problems of cross-protection have been discussed previously. If a recent infection has occurred in the breeding herd, a temporary closure during which no new gilts are introduced for a period of 2 – 4 months may be able to minimise the effects of the virus.

Control of PRRS in weaned and growing pigs focuses on controlling pig flow in order to limit contact between pigs of different infection status. All-in-all-out management, preferably using different sites for different stages of production, greatly facilitates control of PRRS. Where this is not possible, partial depopulation to interrupt the flow can result in considerable improvement. A combination of vaccination with modified-live vaccine and ensuring that the pig flow takes place only in one direction has also been applied successfully. It has also been stressed that controlling concurrent infections by vaccination and, if appropriate, medication is important to minimise the effects of PRRS infection on weaners and growers.

Eradication has proven extremely difficult in countries that have become endemically infected, because the risk of re-infection is very high. Recent introductions of PRRS offer a better chance of eradication but the measures are drastic and require considerable resources, in particular sufficient veterinary officers to carry out the operation swiftly. The eradication of PRRS from Sweden, which had been free until seven infected herds were detected in 2007, has been described. It was achieved by stamping out the infected herds, followed by cleaning and disinfection of the infected premises and an empty period of three weeks before restocking was permitted. As soon as the infection was detected, spread was prevented by mobilisation of veterinarians in the public and private sectors and of the pig industry. Other countries that have achieved eradication of PRRS incursions are Chile and South Africa; in Chile PRRS had become endemic in a limited area before it was detected and the national eradication programme that was developed was in operation for several years.

Disposal of carcasses after culling
Eradication of PRRS within herds in endemically infected countries sometimes requires depopulation/repopulation, which is costly, and if eradication is achieved it is most likely to be sustainable on multi-site farms in areas of low pig density. Individual herds have been successfully cleared and maintained free of infection by using mass vaccination with a modified-live vaccine, depopulating the nursery and managing the rest of the pigs on a strict all-in-all-out basis. Maintaining freedom from infection requires implementation of the strictest biosecurity measures as outlined previously. The level of risk of re-infection and the ability of the producer to implement the necessary biosecurity measures to mitigate any risks identified should be determined before embarking on herd-level eradication.

When eradication of PRRS has been undertaken either at national or at herd level, it should be followed by a programme of intensive monitoring and surveillance with serological screening for both antibodies and circulating virus to confirm that eradication has been achieved and that re-infection has not occurred.