Management and Control of PRRS: Introduction

to Ingelvac PRRS MLV
S. Ernest Sanford, DVM, Dip Path, Diplomate ACVIM
Boehringer Ingelheim (Canada) Ltd.

The Porcine Reproductive & Respiratory Syndrome (PRRS) has been with us now for almost a decade. The first documented outbreaks occurred in North America in 1987 and in western Europe in 1991. The first PRRS virus was isolated at the Central Veterinary Institute (ULe-GLO) in Lelystad, the Netherlands, in the spring of 1991. In the summer of 1994 the first modified live virus vaccine was made available in the USA and Canada.

Control of PRRS

The two methods currently used to control PRRS are Nursing Depopulation and Vaccination, combined with strictations of pig flow patterns, upgraded gilt/pig management, and other management techniques to reduce the opportunity for the virus to spread. None of these individually will control PRRS, but by using various combinations of the above, significant and dramatic turnarounds in the disease can be achieved.

Nursery Depopulation

The first effective control measure (Nursery Depopulation) became available soon after the PRRS virus was isolated and serological tests were developed. This technique has been recommended and used by Dr. Suitem Hanno in Minnesota. The procedure involves the identification and depopulation of the production area where the PRRS virus is continuously circulating in the herd. The area in most continuous-flow, farrow-to-finish (or show-to-breeder) farms is the nursery. Before doing the depopulation, however, two things must be established:

(1) Which is the virus circulating in the herd?
(2) Confirm that this is the only place that the virus is actually circulating in, and not in any other production areas.

If both of these criteria are met, then the entire nursery may proceed. The depopulation criteria are fulfilled by detecting serological tests on a cross-sectional of the herd. This establishes a serological profile of the herd or a suspect group of sows, so to speak. To do this, a statistically determined number of blood samples, usually 50, is tested for each of the following:

(1) The year
(2) Nursery pigs
(3) Gilt pigs

Analysis of test results allows identification of the area where the PRRS virus is circulating. It also determines whether there is only a single area of virus activity. It both of these criteria are met then the depopulation can proceed. The depopulation is followed by a cleaning and then the nursery and its rear is restocked with pigs from other areas of the farm.

PRRS MLV

All-Out Pig Flow with very strict attention to eliminating the very possibility of any mixing back into the holding back stock of pigs to be mixed with a younger (smaller) age group. The whole key to PRRS management is the implementation of PRRS-MLV vaccine technology in North America over the last few years in an elevation of the type of pig flow strategy.

Equine Influenza

Isolation and quarantine of incoming replacement gilts to separate breeding farms for a period, preferably at a different site from the home farm, is the conversion of current gilt pig management techniques. This is combined with programmed administration that may involve vaccination (before 18 weeks old).

Management Tools

Other management techniques include establishing All-Over Pig Flow and creating various measures proposed in the recently announced "McFarlane" program:

(1) No cross-fostering after 1 day
(2) No replacement gilts
(3) No feedback of aborted and stillborn foals

Vaccine

An MLV PRRS vaccine (Ingelvac® PRRS) in Canada and USA; Ingelvac PRRS MLV in Canada, was introduced in late 1995 in the context of the respiratory form of PRRS in the Summer of 1994. It is a single dose (iatrogenic strain to be injected) at 1 to 2 months of age. The MLV vaccine induces PA, SN and FIBA antibodies to PRRS. However, the current knowledge of the back titration by antibodies, the vaccine is most likely providing its protection by stimulating cellular immunity (CD8). Activation of CD8 is a characteristic of MLV vaccines; CD8 antibodies are produced as early as 7 days post vaccination. Moreover, CD8 can support inflammation of the lung tissue. Often, shortening of vaccination has to be taken into account when implementing a PRRS MLV vaccination program. It is in evident that boosted recomendations are not satisfactory since the dynamics of PRRS within each herd are different. Each herd has to be evaluated individually and a suitable program followed to each herd.

Safety and Efficacy of Ingelvac PRRS MLV

In experimental and field studies, Ingelvac PRRS MLV has proven to be safe and effective in preventing the clinical signs, viremia and CpK activity associated with the respiratory form of PRRS in pigs vaccinated in 3-5 weeks of age. Ingelvac PRRS MLV also significantly increased weight gain and reduced the number of treatments following naturally-occurring challenges with wildtype field virus.

Safety

Extensive safety studies, conducted both in experimental and field settings demonstrate the overall safety of Ingelvac PRRS MLV. Safety was demonstrated in pigs given vaccine doses for extending for required for immunity, including:

1. 2 x 2.5x dose in safety and transmissibility studies in conventional pigs.
2. Four field safety studies in pigs in PRRS-positive and PRRS-negative herds.

The vaccine virus did not revert to virulence in backpassage studies through conventional gilts, non-immunodepressed dams

Vaccination consistently and significantly reduced the level and duration of PRRS virus in the pigs' environment. Vaccination resulted in high immunological responses detected by SN antibodies. Vaccination substantially reduced lung involvement and the level of detectable challenge virus from lungs tissue following challenge with wildtype virus. Vaccination significantly improved weight gain, compared with non-vaccinates, with the weight gains of vaccinated being superior to those of non-vaccinated, non-challenged pigs.

Duration of Immunity

Protection following IM vaccination of weaning-age pigs with Ingelvac PRRS MLV lasts up to 6 months (90 weeks), the longest period tested.

Cross-Protection after Vaccination

The Lelystad (European) and North American antigen variants represent the two extremes of genetic differences of the PRRS virus. These are, however, numerous isolates which exhibit smaller variations clustered around these two genetic extremes. The vaccine was tested against the two (North American and European) extremes and pigs were protected against both isolates. Demonstration of protection of the two extremes would indicate that it would protect against variants in-between the two extremes. In controlled experiments PRRS-MLV vaccine resulted significantly fewer days of fever after challenge with Lelystad virus (LV).

The vaccine when used both the amount and duration of virus shedding following challenge with LV. Furthermore, no virus was detected in 40% of the vaccinated control containing the same dose inoculum 28 days post challenge study period. In comparison, 100% of the unvaccinated control control pigs became viremic. Continuing virus spread is significant pigs in contact with viremic infected pigs is essential in controlling the continued spread of PRRS.

Field Studies

Results of on-going field studies shall be presented.

Vaccination Shedding and transmission

Although shedding and transmission of vaccine virus were not observed under controlled laboratory conditions, field use has now demonstrated vaccine virus shedding amongst animals in a herd.

SEV Production

The advent of SEV and multi-site production systems has given us another tool to control PRRS (and other swine diseases). SEV, however, does not guarantee PRRS-free pigs unless all pigs are not free of virus. SEV should for holding back or moving pigs from regions with the virus and moved into an offsite nursery when airborne bacteriology cannot prevent all but the active introduction of PRRS.

Closing Comments

1. PRRS is a new disease that has exploded in the 1990s. But in less than 5 years producers and veterinarians have learned various techniques to manage and control this disease.

2. The tools are now at hand to help us fight PRRS. An effective vaccine is now available. We have dealt with other devastating diseases in the past and will certainly face new ones in the future. PRRS is not that different. We will conquer PRRS.

Selected References