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PMWS treatment & control: Asian approach

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Porcine circovirus type-2 (PCV-2) was first identified in the tissues of piglets suffering from post-weaning multi-systemic wasting syndrome (PMWS) (1). Although PMWS has now been reproduced using PCV-2 alone (2), co-infection with another pathogen and/or activation of the immune system appears to be necessary to reproduce severe clinical disease (3). PCV-2 has also been detected in cases of porcine dermatitis and nephropathy syndrome (PDNS), porcine respiratory disease complex (PRDC), and reproductive failure. The present article describes clinical signs, prevention and control measures for PMWS problems in some Asian countries.

Clinical observation

In China, severe clinical losses due to PMWS were observed in Guangdong province where swine production is intensive and large pig companies are located. Breeding farms first experienced PMWS, and the syndrome spread to the multipliers and commercial farms. Clinical signs on affected farms were usually observed in grow-finish barns in the initial stage and extended to the nurseries with high mortality. Nursery pigs as young as 3 weeks old pigs were affected during the peak period. The clinical signs were then limited to older grower pigs during the recovery stage.

A 2,000-sow GGP farm in southern China had a severe problem with PMWS/PDNS from November 2001. During November 2002, only 66% of live-born pigs could be marketed, while they were able to market up to 89% before the problem. The farm was endemically infected with PRRS virus, and the nursery pigs were vaccinated with various vaccines including hog cholera virus (HCV), pseudorabies, mycoplasma, atrophic rhinitis, APP and other autogenous vaccines. In the nurseries, weaned pigs showed PMWS-like clinical signs after a few days of their arrivals, and mortalities began to see in pigs of mid-nursery age and reached up to 30%. Numbers and frequency of vaccination were reduced to minimize the stress. Immune serum therapy and autogenous tissue vaccine were used on this farm. The production became normal after about 4 years from the initial break.

In South Korea, PMWS or PCV-2 associated diseases have been a major problem throughout the country from about 2001. Nursery pig mortality ranging from 10-30% was common. At necropsy, pigs showed enlarged and hemorrhagic lymph nodes as well as wet and heavy lungs. However, necropsy lesions similar to those infected with *H. parasuis* were common. Some farms were experiencing high mortality without wasting syndrome, and the clinical signs have been confused with PRDC. It is interesting to note that vaccination with a highly attenuated HCV vaccine caused increased mortality with hog cholera-like lesions in some PMWS farms. Meanwhile, no evidence of infection with a virulent HCV was found in extensive diagnostic efforts including molecular sequencing of the isolates. In order to reduce vaccination stress, many farmers have modified their vaccination schedule.

In Thailand, problems with PMWS related diseases appear to be similar to those in S. Korea. High nursery mortality with HCV-like lesions was also reported. PMWS cases appear to not be a major problem in the Philippines, and it has been reported that health levels in their breeding farms are relatively high.

Prevention and control measures

Transmission of the causative agent appears to occur mainly via introduction of replacement gilts from the infected breeding farms. Therefore, health status of the source farms must be obtained and reviewed. Careful consideration should be given with semen since excretion of PCV-2 via semen has been reported. Contaminated feeds can also be a significant source of infection. Of ingredients in the feed, porcine plasma should be considered a risk, and PCV-2 may not be killed during the spray-dry process of the plasma because of its heat resistance. Elimination of the virus from contaminated environment would also be difficult.

Management practice

It would be necessary to stop introducing replacement gilts if the source farm is affected with PMWS. Internal multiplication and the use of home grown gilts have been practiced with benefits of fast recovery and reducing mortality in PMWS farms. In the nurseries, transmission occurs commonly from older pigs to incoming newly weaned pigs, and high mortality for each nursery group has been observed repeatedly at a certain age (e.g. approximately 6 weeks of age). Therefore, strict all-in/all-out

of the nursery flow and extensive cleaning and disinfection of the nurseries are highly recommended. It is also recommended to use two different disinfectants for the nursery cleaning, although certain disinfectants were found to be more effective for PCV-2. Successful reduction of mortality has been achieved with the use of off-site or container nursery. Then, subsequent nursery depopulation has been practiced. Following nursery depopulation along with herd closure, elimination of PMWS as well as PRRS virus infection was possible in some farms.

Nutritional supplements

Decreased feed intake, diarrhea, fever etc are common clinical signs in pigs with PMWS. In South Korea, several products with different nutritional supplements are available on the markets targeting PMWS farms. Such products contain high energy/protein, electrolytes, anti-diarrhea drug, and substance for better digestibility, lowering fever or improving immune system. Cooked rice powder has been used as the major energy supplement, and egg yolk antibody to PCV-2 has been produced and added in some products. Data for evaluating these products under controlled experiments are not available at this time but good comments have been made by leading veterinarians and producers for some of the products.

Control of co-infection with different pathogens

Co-infection with PRRS virus, porcine parvovirus, *Mycoplasma hyopneumoniae* and other bacterial pathogens has been found to increase the severity of the clinical signs and mortality in PMWS farms. In order to reduce the mortality, *M. hyopneumoniae* and/or PRRS vaccine has been strategically used for pigs before weaning. In addition, excessive amount of different antibiotics has been administered to the pigs because many dead or sick pigs on PMWS farms showed the necropsy lesions of different bacterial infection. Lesions similar to those infected with *H. parasuis* appear to be the most common in such farms.

Modification of vaccination program

It has been reported that activation of the immune system in pigs with a certain adjuvant has been associated with development or increased severity of PMWS. That is why some of the producers have modified their vaccination schedule. For an example, mycoplasma vaccination has been practiced before weaning rather than post-weaning age to reduce any side effect in pigs in PMWS farms. Similarly, vaccination with different modified live virus (MLV) vaccines have been carried out at pre-weaning age or even stopped being used on some farms. Increased mortality with an attenuated HCV vaccine has been experienced on PMWS farms. Some veterinarians have suggested removing unnecessary vaccines or avoiding vaccination of the pigs during early nursery period.

Use of immune serum

Immune serum of cull sows or finishing pigs recovered from PMWS have been used to prevent clinical losses due to PMWS. The serum was separated and pooled to make a batch, and heated at 56 C for 1 hour, gentamycin was added and stored in a freezer before the use. In two different trials, pigs were inoculated once with immune serum (3 ml) intraperitoneally at weaning, and control pigs remained without inoculation. Clinical signs and mortality were observed for each pig until the end of the nursery period, and the results are summarized in **Table 1**. In trial 1, there were no obvious differences in the pigs with PMWS clinical signs and mortality between treated and untreated groups. However, the farm manager reported that pigs in the untreated group showed more signs of being underweight than with typical PMWS. In trial 2, a marked difference was observed in pig mortality between treated and untreated control groups. The manager expressed obvious benefits in the performance in the treated groups. The manger also commented that the use of sow serum helped more than that of the finisher pig serum.

Tissue extract vaccine

Prevention of PMWS was attempted using an autogenous tissue extract vaccine. Pigs with early clinical signs were sacrificed and affected tissues (lung, spleen and lymph nodes) were collected. The tissues were grounded, centri-

Table 1: Mortality during nursery period for pigs inoculated with or without inoculation of convalescent serum at weaning

Group	Inoculation	No. of pig (litter)	Pigs with PMWS	No. of death (%)
Trial 1				
A	Sow serum #1	85 (11)	4	1 (1.2)
B	Finisher serum #1	78 (10)	3	0 (0)
C	None	73 (6)	6	4 (5.5)
Trial 2				
D	Sow serum #2	124 (14)	8 (6.5)	
E	Sow serum #3	89 (10)	6 (6.8)	
F	None	153 (16)	26 (17.0)	

fuged, and supernatants of the tissue homogenates were used as an antigen. The vaccine was prepared by mixing the inactivated antigen and an adjuvant, and used only for the farm where the tissues were supplied. This was inoculated twice in sows at pre-farrowing for the farms where clinical signs were present during early stage of nursery period. A program of vaccinating at 3 and 5 weeks of age was suggested for the farms with clinical signs during late nursery and grower phases. Although experimental data using the tissue vaccine are not available, an obvious benefit has been observed on PMWS farms, and the veterinarian reported the continuous use of tissue vaccine during the last 3 years.

Reference

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