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# Post-weaning multi-systemic wasting syndrome (PMWS): Clinical signs and control measures experienced in China

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## Introduction

Porcine circovirus type-2 (PCV2) has been associated with several disease syndromes in pigs. The virus was first identified in tissues of piglets suffering from post-weaning multi-systemic wasting syndrome (PMWS) (Ellis et al., 1998). Although PMWS has now been reproduced using PCV2 alone (Kennedy et al., 2000), co-infection with another pathogen and/or activation of the immune system appear necessary to reproduce severe clinical disease (Krakowka et al., 2001). PCV2 has also been detected in cases of porcine dermatitis and nephropathy syndrome (PDNS) (Gresham et al., 2001; Rosell et al., 2000), porcine respiratory disease complex (Harms et al., 2002), and reproductive failure (O'Connor et al. 2001). The objective of this article is to report observations on clinical signs and control measures for the problems associated with PMWS in China.

## Health management associated with PMWS in southern China

Since Guangdong and Guangxi provinces are near a major pork market in Hong Kong, large production systems of 1,000–3,000 sow farms have been built and are operating with modern facilities in recent years. Most farms are doing continuous farrow to finish without an all-in—all-out production system. PRRS-related reproductive/respiratory problems appeared to be endemic on most farms. Many different domestic and imported vaccines are routinely used in swine farms, and most farms are heavily dependant on vaccination and antibiotic use for different diseases.

We visited three different breeding farms with clinical signs of PMWS/PDNS in November 2002 and March 2003. The clinical signs in Farm A were considered acute PMWS/PDNS, whereas farms B and C were in the recovery phase.

### Farm A

The company owns 7,500 GP and GGP sows in three different sites, with one of the sites having 2,250 sows with a farrow-to-finish operation. The farm has experienced a severe problem with PMWS/PDNS since November 2001. At the time of our visit in November 2002, only

66% of live-born pigs were marketed, while they were able to market up to 89% before the problem. The farm had a history of PRRS-related reproductive problems in October 2001. Many different vaccines have been used in the nursery, including hog cholera three times, PRV twice, mycoplasma twice, AR, APP, and others autogenous products.

In the nurseries, weaned pigs showed PRRS-like clinical signs within a few days of arrival. There were few emaciated pigs, but a major finding was that most of the pigs showed some degrees of skin lesions similar to those of PDNS. Mortality of the pigs began mid-nursery and reached up to 20%. At necropsy, pigs showed enlarged and hemorrhagic lymph nodes, and wet and heavy lungs. Since there was no capability for doing any laboratory work, PMWS was tentatively diagnosed. Although PRRS or other diseases could be suspected, PDNS skin lesions, unresponsiveness to antibiotics, and wasting pigs in the grower phase strongly suggested that the farm was suffering from a PMWS/PDNS complex.

Since the etiology of PMWS/PDNS is not fully understood, management improvements were recommended. Management guidelines suggested were

- perform strict all-in—all-out with sufficient downtime and complete cleaning and disinfecting of the nursery rooms, and
- remove unnecessary vaccines for nursery/grower pigs because activation of the immune system has been associated with development of PMWS.

In addition, initial trials of immune serum and tissue autogenous vaccine were recommended for prevention of PMWS/PDNS. During the second visit in March 2003, nursery performance was much improved. PMWS along with minor PDNS were seen in only a few nursery and grower pigs.

### Farms B and C

Farm B is only 1.5 years old in a new site with 1,200 GGP sows. The pigs were serologically positive for PRRS virus but no major clinical problems were present. For several months prior to our visit, the farm had a clinical history of severe PMWS/PDNS in nursery/grower pigs as described for farm A. There was no major problem

with mortality but PMWS and/or PDNS signs were noticed in some nursery/grower pigs. Farm C is located in a well isolated area, and PMWS and/or PDNS signs were noticed in some nursery/grower pigs. This farm also had a previous clinical history of severe PMWS/PDNS in nursery/grower pigs.

On these three farms, gradual recovery was obvious based on the numbers of sick or dead pigs after acute losses. This may be due to improvements in management or development of herd immunity, although the latter is more likely. The recovery may have been facilitated by the fact that none of the farms brought susceptible pigs in from other sources.

## Immune serum injection trials at farm A

### Experimental design

Blood was collected from cull sows or finishing pigs recovered from PMWS/PDNS signs, and serum was separated and pooled into different batches for sow or finisher serum. The serum was heated to 56°C for 1 hour, and gentamycin was added. The serum was divided into 100ml bottles and stored in a freezer.

In two different trials, treatment groups were divided at weaning by parity. Attempts were made to have piglets of similar parity in 3 groups in each trial. At weaning, pigs in each litter were inoculated once with immune serum (3ml) intraperitoneally. Pigs in the control litter remained without inoculation. Clinical signs and mortality for each pig were examined until the end of the nursery period.

### Results and Discussion

Table 1 shows the results of two trials following immune serum inoculation in piglets at weaning. In trial 1, no

obvious differences in the pigs with clinical signs of PMWS and mortality were observed between treated and untreated control groups. However, the farm manager reported that pigs in untreated group had more underweight pigs with typical PMWS/PDNS. In trial 2, a major difference was observed in pig mortality between treated and untreated control groups. The manager described obvious benefits in the performance in the treated groups. The manager also commented that the use of sow serum helped more than that of the finisher pig serum.

An obvious benefit was observed in trial 2 with immune serum inoculation, but it is not known if antibodies to a specific agent played a role in mortality levels at this time. The immune serum is not expected to contain the etiologic agents in the serum preparations because blood from the sows and finishers were collected long after the disappearance clinical signs, and the sera were heat inactivated. However, it is important to note that the farm manager claimed significant improvements in production during an acute outbreak of PMWS/PDNS by the use of serum inoculation.

## References

- Ellis JA, Hassard L, Clark E, et al. Isolation of circovirus from lesions of pigs with postweaning multisystemic wasting syndrome. *Can Vet J* 1998;39:44-51.
- Kennedy S, Moffett D, McNeilly F, et al. Reproduction of lesions of postweaning multisystemic wasting syndrome by infection of conventional pigs with porcine circovirus type 2 alone or in combination with porcine parvovirus. *J Comp Pathol* 2000;122:9-24.
- Krakowka S, Ellis JA, McNeilly F, et al. Activation of the immune system is the pivotal event in the production of wasting disease in pigs infected with porcine circovirus-2 (PCV-2). *Vet Pathol* 2001;38:31-42.

Table 1. Mortality during nursery period for pigs with or without serum inoculation at weaning

		Trial #1		Trial #2		
group	# of pigs (litter)	pigs with PMWS	# of deaths (%)	group	# of pigs (litter)	# of deaths (%)
A	85 (11)	4	1 (1.2)	D	124 (14)	8 (6.5)
B	78 (10)	3	0 (0)	E	89 (10)	6 (6.8)
C	73 (6)	6	4 (5.5)	F	153 (16)	26 (17.0)
<i>total</i>	<i>236 (29)</i>	<i>13</i>	<i>5 (2.1)</i>		<i>366 (40)</i>	<i>40 (10.9)</i>

A: sow serum batch 1

B: finisher serum batch 1

C: none

D: sow serum batch 2

E: sow serum batch 3

F: none

Trials 1 and 2 were performed on December 9 and 19, 2002, respectively

Gresham A, Thomson J. PMWS and PDNS in Great Britain. *Vet Rec* 2001;148:387.

Rosell C, Segales J, Ramos-Vara JA, et al. Identification of porcine circovirus in tissues of pigs with porcine dermatitis and nephropathy syndrome. *Vet Rec* 2000;146:40-43.

Harms PA, Halbur PG, Sorden SD. Three cases of porcine respiratory disease complex associates with porcine circovirus type 2 infection. *J Amer Assoc Sw Vet* 2002;10:27-30.

O'Connor B, Gauvreau H, West K, et al. Multiple porcine circovirus 2-associated abortions and reproductive failure in a multisite swine production unit. *Can Vet J* 2001;42:551-553.

