Evaluation of PCV2 vaccination in a commercial pig farm in Malaysia

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Introduction

In Malaysia, laboratory evidence for the presence of porcine circovirus type 2 (PCV2) was first reported by the Veterinary Research Institute in 2004 (Hassuzana *et al*., 2004). A study in 2007 based on clinical features, histopathology findings and PCR screening showed that five out six farms studied fulfilled the diagnostic criteria for porcine circovirus disease (PCVD) (Ooi *et al.*, 2007). Latest phylogenetic study found these samples shared 98.3-99.2% similarities with sequences of isolates from the Netherlands, suggesting that there may be a link between movements of animals with importation of breeders into the country being the route of entry of the virus (Jaganathan *et al.*, 2011).

PCV2 cause multi-factorial diseases, which are collectively known as PCVD. The most well recognized PCVD in Malaysia's pig farms is post-weaning multi-systemic wasting syndrome (PMWS), which has a peak clinical prevalence in pigs between 6 and 15 weeks of age. The severity of the clinical manifestations varies from farm to farm, with wasting and lesions of prominent enlargement of inguinal and mesenteric lymph nodes as the most consistent findings. It causes great economic losses to Malaysia swine industry which is currently estimated to be worth over 2.2 billion ringgit.

In the past, before first introduction of PCV2 vaccine, Circovac, in Malaysia in year 2007, pig producers only can control the effects of PCVD through improved husbandry practice and biosecurity measures, which at best achieved suboptimal clinical protection against the disease in many of the farms.

PCVD in The Study Farm

This is a 2500-sow farrow-to-finish breeding and production farm, divided into 3 units with Landrace hybrids sows mated to purebred Duroc boars.

Vaccination programs: The sows are vaccinated against Aujeszky's disease (Geskypur), classical swine fever (Pestiffa), parvovirus (Parvoject) and atrophic rhinitis (Rhiniffa T) while the production herd is vaccinated against Aujeszky's disease (Akipor), classical swine fever (Pestiffa) and enzootic pneumonia (Sprintvac).

Farm history with PCVD: The farm has a history considered typical of the syndrome of PCVD. Early infection of PCV2 caused PMWS as early at 6 weeks old with the mortality rate reaching as high as 20%. Higher mortality was found in grower stage, at 3 months old, in which coughing index is high and respiratory diseases, including *Haemophilus parasuis* and *Actinobacillus pleuropneumoniae* have been diagnosed. Outbreaks of both PMWS and complicated respiratory disease occurred intermittently throughout the years. The severity of the episodes appeared to be more severe whenever the farm is subjected to increased stress factors. On the other hand, late infection of PCV2 was regarded as less prominent in this farm apart from PDNS which was often seen in a small percentage of porkers at about four months of age.

In the porker units, there was traditionally a relatively high reliance of the use of a variety of antimicrobial medications to control the mortality. However, most of the time, animals had poor response to the antibiotic treatment

Post mortem examinations routinely showed the presence of interstitial pleuropneumonia, with enlargement of multiple lymph nodes, especially inguinal, mesenteric and mediastinal lymph nodes.

PCVD was diagnosed based on characteristic clinical and postmortem lesions, and later confirmed by PCR isolation for both PCV type I and II. Meanwhile, PRRS EU strain was also isolated from the field samples.

Circovac Vaccination

i. Sow vaccination: porker performance evaluation

The study farm is among the pioneer users of Circovac in its first introduction at the middle of the year 2007. Mass vaccination of sows was carried out twice, 3 weeks apart, in July/August 2007, followed by routine boosters at 3-4 weeks prior to farrowing. Following vaccination, the prevalence of PMWS in weaner pigs greatly reduced, with reduction of 66.6% of weaner mortality at 6 months post-sow vaccination. Such efficacies were also consistently demonstrated in other farms in the country (Lim *et al.*, 2009). Grower-Finisher mortality showed reduction of 37.7% six months later (Table 1). From field observations, there was an increase of growth uniformity in porkers, and a reduction in the incidence of PDNS in grower-finisher stage.

Table 1: Weaner & grower-finisher mortality in 6 monthly periods before and after blanket sow vaccination

Time Period	*Weaner mortality, %*	*Grower-Finisher mortality, %*
2007Feb-2007Jul	11.29	3.1
2007Aug-2008Jan	3.77	4.26
2008Feb-2008Jul	3.81	1.93

ii. Sow vaccination: sow performance evaluation

The earliest report of improvements in reproduction parameters of sows vaccinated with Circovac had been documented in 2009 (Tang *et al.*, 2009). Evaluation of reproductive performance of the study farm was done 3 years after implementation of sow vaccination based on the data extracted from the farm records using the software program PigCHAMP (Table 2, Tee *et al.*, 2011). The improvement is significant, with especially an increase of 0.9 total piglets per litter, and an additional 1.5 pigs weaned per mated sow per year.

Table 2: Comparison of reproductive parameters before and after Circovac – sow vaccination

Parameter	*Before (Jan 2006-Dec 2007)*	*After (Jan 2008-Dec 2009)*
% repeat services	10.3	9.9
Weaning-1st service interval, day	6.8	6.9
% sows bred by 7 days	83.6	82.8
Average total pigs per litter	9.7	10.6**
Average pigs born alive per litter	9.2	9.7**
Average stillborn/litter	0.5	0.8**
Average mummies/litter	0	0.1
Farrowing rate	76.3	78
Litters/female/year	2.2	2.2
Pigs weaned /litter	9.3	9.9**
Preweaning mortality	5.2	5.6
Pigs weaned /mated female/year	18.9	20.4*

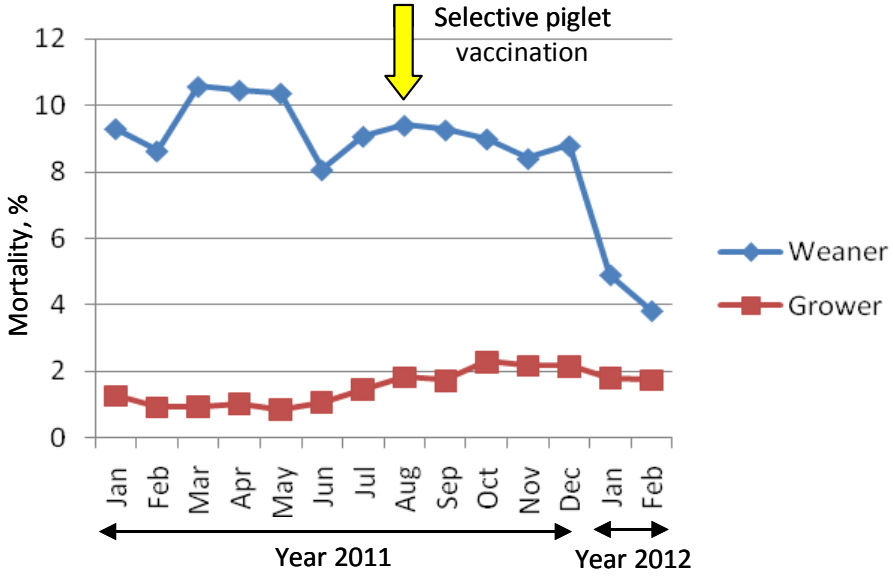
** Statistically significant values ($p<0.01$) * Statistically significant values ($p<0.05$)

iii. Herd vaccination

In early 2011, there was an increase in weaner mortality which was suspected to be due to suboptimal colostrum intake in piglets due to a sudden change of feed and increase of the Mastitis-Metritis-Agalactia (MMA) syndrome in the farrowing sows. This was followed by increase in grower-finisher mortality after the middle of the year. The farm decided to selectively vaccinate piglets with Circovac, in conjunction with sow vaccination. Selected piglets are those weak, small

size or belonging to litters from dams with suboptimal colostrum production to lactational problems attributed to MMA. The number of piglets selectively vaccinated with Circovac comprised about 10-20% from the total born. Circovac is given to piglets aged 3 to five days at a dose of 0.5ml, IM. Supportive vaccination in selected piglet was started from Aug 2011 (Fig. 1) and reduced the weaner mortality by 59% at 6 months after implementation.

Figure 1 : Monthly Pig Mortality from 2011-2012



Discussion

Herd immunity plays a key role in the control of PCVD and imparts significant economic impacts to affected commercial piggeries. Circovac vaccination in sows in the study farm has proven itself in improving performance for both sow reproductive performance and porker production. The response to vaccination is consistent with those of earlier studies in other similar farms (Lim et al., 2009). However, in a field situation, changes in the epidemiology of the disease may subject the animals to a variety of risk factors (Tang *et al.*, 2009) which may necessitate additional selective supportive vaccination in piglets that will augment sow vaccination in the control of PCVD. The adjustment of vaccination timing and stage accordingly to the changes of a farm situation is vital to meet the viral challenge in the field, and to ensure lowest economic impact to the herd. In our experience, the success of sow vaccination in the control of PCVD is related to the management efficiency and the presence of other disease co-factors. In Malaysia, different farms have adopted different vaccination strategies. Some farms have been vaccinating sows since PCV2 vaccination was first introduced in 2007. Some farms are vaccinating only piglets. In still other farms, both sow and piglet vaccination programs are in-force. In the farm in question, the sow vaccination program was effective in controlling PCVD from 2007 until 2011. The example shown in this study demonstrates that modification of vaccination strategies can help overcome problems caused by changes in the epidemiology of the disease.

References

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