Porcine Cirovirus Type 2 Elimination Study

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Porcine circovirus type 2 (PCV2) vaccination improves post-weaning growth rate, decreases mortality rate, and reduces viral load as measured by quantitative polymerase chain reaction (PCR) in vaccinated pigs compared to non-vaccinated, control pigs. While previous reports have demonstrated impacts at the group level, there has been little information demonstrating the impact of vaccination on viral circulation at the herd level. Over time, due to reduced viremia in vaccinated pigs, we hypothesize that vaccination will minimize viral shedding, reduce environmental contamination, and possibly lead to PCV2-free herds. Therefore, the objective of this study was to monitor PCV2 viral circulation after implementing PCV2 vaccination in the growing pig population in two farrow-to-finish farms.

The study farms were the Michigan State University (MSU) and Kansas State University (KSU) swine teaching research farms. Management of both herds is such that they represent a model of commercial, multi-site swine production. Batch farrowing is practiced in both herds, with approximately 300 pigs weaned every five weeks, to allow growing pig groups to be managed on a strict All/In-All/Out basis. Histopathologic lesions, characteristic of PCV2 infection had been documented at necropsy at both farms and clinical disease had been noted at the MSU farm. Both herds were free of most other major swine pathogens and had few potential routes for PCV2 reintroduction.

Prior to implementation of PCV2 vaccination, baseline indirect fluorescent antibody (IFA) and PCR analysis was performed on a cross-sectional sample of age groups at the MSU and KSU farms. Approximately 100 pigs were bled across the growing pig populations (6-10, 11-15, 16-20, 21-25, and 26-30 weeks of age) at the MSU farm, while 140 pigs were surveyed among the populations (4, 9, 14, 19, and 24 weeks of age) at the KSU farm. Within age groups, 5 to 7 serum samples were pooled for PCR, for a total of 21 MSU and 27 KSU pools. There was PCV2 DNA detected in 76.2% of MSU pools (1/2, 5/7, 7/9, 2/2, and 1/1 for the 5 age groups in increasing order) while 40.7% of KSU pools (0/5, 0/5, 0/5, 5/6, and 5/6 for the 5 age groups in increasing order) had detectable DNA.

IFA analysis of individual baseline serum samples demonstrated maternal-derived antibody decline by 15 and 19 weeks in the MSU and KSU herds, respectively and subsequent seroconversion following this decline. These baseline results provided some evidence of viral circulation and seroconversion in the finisher phase of production.

PCV2 vaccination with a commercial, 2-dose PCV2 vaccine (Intervet; Circumvent PCV) was initiated in spring 2007. For 9 and 10 consecutive pig groups at MSU and KSU farms, respectively, 12 barrows from unique litters were randomly selected, ear-tagged, and serially-bled at weaning, end of nursery, mid-finisher, and prior to marketing. PCR analysis was performed on individual samples for pigs with complete serum sets. PCR analysis on sera from 111 KSU pigs after initiation of vaccination program indicated that groups 1, 2, 4, 7, 8, 9, and 10 were negative for PCV2 virus at the collection points. Serum with detectable viral DNA was found in group 3 (10%, 1/10 from mid-finisher), group 5 (25%, 3/12 from weaning; 25%, 3/12 from nursery; 8.3%, 1/12 from mid-finisher; and 8.3%, 1/12 from just prior to marketing), and group 6 (8.3%, 1/12 from nursery). In only 10% (1/10) of the groups did pigs remain PCV2 PCR positive for longer than 1 testing interval. For serum samples with detectable DNA, viral template quantity ranged from 5 to 379 viral copies/reaction. No PCV2 viral DNA was detected in samples from the remaining 7 groups (70%). In contrast, after initiation of the vaccination program, PCR analysis of the 9 groups (88 pigs) from the MSU swine farm found no detectable PCV2 DNA.

We believe these results demonstrate that PCV2 vaccination is affecting viral circulation on each farm, either by preventing infection or shortening the duration of viremia.

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