

## SWINE HEALTH

**Title:** Comparison of porcine circovirus type 2 (PCV2) vaccine efficacy in a PCV2 positive production environment with concurrent porcine reproductive and respiratory syndrome virus (PRRSV) circulation – NPB #09-164

**Investigator:** Darryl Ragland

**Institution:** Purdue University School of Veterinary Medicine

**Date submitted:** March 9, 2011

### Scientific Abstract:

**Objectives.** The first objective of the study was to evaluate the efficacy of approved porcine circovirus type 2 (PCV2) vaccines based on growth performance, antibody response to vaccination and prevalence of circovirus viremia. The second objective was to investigate the impact of vaccination against PCV2 on porcine reproductive and respiratory syndrome (PRRS) virus circulation in a commercial finishing facility that has satisfied the case definition for porcine circovirus associated disease (PCVAD) and has a documented history of PRRS virus infection.

**Introduction.** In 1996, swine veterinarians in Western Canada reported a disease syndrome where nursery pigs exhibited generalized lymphadenopathy, poor body condition and/or wasting, interstitial pneumonia, diarrhea, and jaundice. The agent responsible was eventually identified as porcine circovirus type 2 (PCV2). After documented spread around the world, PCV2 resurfaced in Canada affecting late nursery and grower/finisher pigs and clinical signs included generalized lymphadenopathy, poor body condition and/or wasting, interstitial pneumonia, diarrhea, jaundice and skin lesions. To recognize the many clinical expressions that can result from infection with PCV2, the name porcine circovirus associated disease or PCVAD was adopted and diagnostic criteria for case definition established in 2006. Vaccines were developed by Boehringer Ingelheim Vetmedica, Fort Dodge Animal Health and Intervet/Schering Plough Animal Health and controlled studies utilizing infectious disease challenge models have demonstrated that the vaccines effectively stimulate satisfactory antibody responses, reduce viremia of infected pigs and reduce gross and histologic lesions. Evaluation of these vaccines in the commercial production environment is warranted to determine their ability to promote health and satisfactory performance of vaccinated pigs. The purpose of the research project was to evaluate the three commercially available vaccines utilizing average daily gain, serum antibody titers and viremia to PCV2 and PRRS virus.

**Materials/Methods.** The study was completed in a 26-pen, slotted-floor, wean-to-finish facility with 1023 pigs enrolled in the study. The pigs were split-sex fed with food and water provided *ad libitum*. Twenty four pens were used for the trial with a stocking density of 41 pigs per pen at the beginning of the study. Pigs were assigned to four treatment groups (3 vaccinated: 1 non-vaccinated) designated by ear tag color and based on a randomized complete block experimental design with 6 replicates. Pigs were placed at weaning (3 weeks old) with bodyweight data being collected from all animals at 21, 63, 103 and 144 days of age. Blood samples were

---

These research results were submitted in fulfillment of checkoff-funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer-reviewed.

---

For more information contact:

National Pork Board • PO Box 9114 • Des Moines, IA 50306 USA • 800-456-7675 • Fax: 515-223-2646 • [pork.org](http://pork.org)

---

collected from 10 pigs per pen at 21, 42, 63 and 144 days of age to obtain serum for serologic testing and polymerase chain reaction (PCR) to assess viremia for PCV2 and PRRSV. Data was analyzed using STATA Data Analysis and Statistical Software. Growth data was subjected to ANOVA and the Bonferroni test was used as the mean separation procedure. The PCV2 serology data was subjected to log transformation, analyzed by ANOVA and the Bonferroni test was used as the mean separation procedure. Chi square analysis was used to compare the percentage of PCV2 positive pigs in each treatment on successive sampling days. For all tests,  $p < 0.05$  was considered to be statistically significant.

Results. Bodyweight data over the course of the study revealed only one significant difference ( $P < 0.05$ ) in bodyweight. Pigs assigned the Circumvent<sup>TM</sup>PCV treatment had lower bodyweights than the Control and Ingelvac Circoflex<sup>®</sup> treatments at 63 days of age. Indirect fluorescent antibody testing demonstrated that the vaccinated pigs experienced a significant increase ( $P < 0.05$ ) in titer at 42 days of age. Antibody titers decreased over the next two test dates for the pigs assigned the one-dose vaccines. The Circumvent<sup>TM</sup>PCV treatment group, which received two doses of vaccine maintained constant titer levels from 42 days of age to 63 days of age, after which titers were significantly reduced at 144 days of age. The Circumvent<sup>TM</sup>PCV treatment group had the highest ( $P < 0.05$ ) percentage of PCV2 positive pigs at 21 days of age. At 42 days of age the Control group had the highest ( $P < 0.05$ ) percentage of positive pigs compared to the Suvaxyn<sup>®</sup> PCV2 treatment group. Differences ( $P > 0.05$ ) in viremia were not detected when the pigs were tested at 63 and 144 days of age. Seroconversion to PRRS was detected at all sampling points and by day 144 of the study, all pigs exhibited antibodies to PRRS by IDEXX ELISA. Although we were able to confirm exposure to PRRS virus via serology, the amount of viremia from PRRS virus was low at all sampling points to the extent that virus amplification was deemed to be unsuccessful and the PCR assays were of minimal value to the overall scope of project.

Discussion. Based on the results obtained during the study, vaccination against PCV2 did not have a stimulatory effect on pigs achieving heavier bodyweights than non-vaccinated pigs. The growth of the non-vaccinated Control pigs remained similar to the vaccinated pigs throughout the study. Vaccination of pigs with the two-dose PCV2 preparation promoted persistently higher titers compared to the one-dose vaccines. Vaccination did not completely eliminate PCV2 viremia but a steady reduction in the number of viremic pigs was observed and may have coincided with the increase in immune status.