

# Effects of porcine circovirus type 2 (PCV2) vaccination on mortality and average daily gain

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## Introduction

Porcine circovirus associated disease (PCVAD) is caused by porcine circovirus type 2 (PCV2) and is responsible for severe losses on swine farms worldwide.<sup>1,2,3</sup> Common manifestations of PCVAD include systemic disease, as part of the respiratory disease complex, porcine dermatitis and nephropathy syndrome, enteric disease, and reproductive disease.<sup>4,5</sup>

Recently, PCV2 vaccines targeting control of PCVAD have become available. The purpose of this study was to evaluate the effectiveness in a PCVAD-affected pig flow of a commercially available single-dose PCV2 vaccine (Ingelvac CircoFLEX<sup>®</sup>, Boehringer Ingelheim Vetmedica, Inc., St Joseph, MO) administered to pigs at either three or six weeks of age.

## Materials and methods

The study was conducted in central Missouri at a PRRSv and *Mycoplasma hyopneumoniae* negative 1250 sow herd. The herd uses conventional genetics and has off-site nursery and finishing units. The system has been experiencing PCVAD losses exclusively in the finishers, with mortality as high as 15%. Disease onset occurs at 10-11 weeks of age and peak mortality occurs at 14 weeks of age.

Experimental animals were housed in commercial swine facilities appropriate for breed and age with similar climate, ventilation, temperature, humidity, and light. The pens measured 18 × 10 feet and had totally slatted flooring with ventilated shallow pits. Each pen had a five-hole dry feeder and two nipple drinkers with water coming from on-farm wells.

Prior to weaning each pen was randomly assigned to one of three treatment groups. Pigs were weaned over a two week period according to normal farm practices and placed into nursery pens. The only criterion for sorting in the finisher was to place 25 pigs in each pen, allowing each pig approximately 7.2 ft<sup>2</sup>.

All pigs were ear tagged and weighed at weaning, with the individual pig considered the experimental unit.

Group A pigs were vaccinated with Ingelvac CircoFLEX<sup>®</sup> at three weeks of age, and Group B pigs were vaccinated with Ingelvac CircoFLEX<sup>®</sup> at six weeks of age. Group C control pigs received no vaccine.

Three pigs in each nursery pen were randomly selected as serum collection animals and were serially bled at 3, 6, 10, 14, 18, and 22 weeks of age. The blood was tested for PRRS ELISA, PRRS PCR, *M. hyo* ELISA, *Lawsonia* ELISA, and PCV2 quantitative PCR (qPCR). The PCV2 qPCR reported logs of genomic copies per ml of serum.

Pigs were weighed individually at 3, 10, and 22 weeks of age.

Mortalities and treatments were tracked and recorded throughout the nursery and finishing periods. Each pig that died was necropsied and a standard set of tissues was submitted to the ISU-VDL.

Average daily gain (ADG) was analyzed using the fit model, analysis of variance, function of JMP v.5.1 (Cary, N.C., USA) having treatment and room as main effects and starting weight as a covariate. Differences among means were tested using Tukey HSD. Nursery and finishing mortalities, finishing culls, and percentage of prime marketings were analyzed using the fit model, chi-square, function of JMP v.5.1 (Cary, N.C., USA) comparing the number of mortalities, culls, and prime marketings by treatment group. Prime marketings were defined by pigs weighing greater than or equal to 220 lbs at finishing closeout

## Results

Both vaccinated groups of pigs had significantly higher day 133 weights and ADG (d0-50, d50-133, d0-133) than the nonvaccinated control group (Table 1,  $P < 0.0001$ ). Nursery mortality didn't vary between the three groups (Table 2,  $P = 0.84$ ). Finishing mortality and cull rates were significantly reduced in the vaccinated groups compared with the non-vaccinated group (Table 3,  $P < 0.0001$ ). The number of prime market

pigs was significantly higher in the vaccinated groups compared to the nonvaccinated controls (Table 3,  $P < 0.0001$ ).

## Discussion

Pigs vaccinated with Ingelvac CircoFLEX<sup>®</sup> had a significantly lower finisher mortality rate than the control group. There was no significant difference in mortality rate between the three-week-of-age vaccinates and the six-week-of-age vaccinates. Average daily weight gain was significantly higher for the pigs vaccinated with

Ingelvac CircoFLEX<sup>®</sup> compared to the control group. Vaccinates had a significantly lower cull rate and a significantly higher prime market rate than the controls. The decreased mortality, increased ADG, lowered cull rate, and increased prime market weight results in a positive economic impact on the farm.

**Table 1:** LS means and SE for pig performance measures.

Item	Group A CircoFlex 3 wk vaccinates	Group B CircoFlex 6 wks vaccinates	Group C control	SE
d0-50 ADG, lbs/day	1.13 <sup>a</sup>	1.13 <sup>a</sup>	1.07 <sup>b</sup>	0.01
d50-133 ADG, lbs/day	2.29 <sup>a</sup>	2.31 <sup>a</sup>	2.16 <sup>b</sup>	0.01
d0-133 ADG, lbs/day	1.85 <sup>a</sup>	1.85 <sup>a</sup>	1.74 <sup>b</sup>	0.01
Final weight, lbs	252.96 <sup>a</sup>	253.45 <sup>a</sup>	239.84 <sup>b</sup>	1.4

<sup>ab</sup> Means with different superscripts in the same row are significantly different ( $P < 0.0001$ ).

**Table 2:** Summary of nursery mortalities by treatment group.

Item	Group A CircoFlex 3 wk vaccinates	Group B CircoFlex 6 wks vaccinates	Group C control	P-value
Number of pigs placed in the nursery	373	365	368	-
Number of pig mortalities in the nursery	9	9	7	-
Nursery mortality rate, %	2.41	2.47	1.90	0.84

**Table 3:** Summary of finishing culls, mortalities and prime marketings by treatment.

Item	Group A CircoFlex 3 wk vaccinates	Group B CircoFlex 6 wks vaccinates	Group C control	P-value
Number of pigs place in finishing	364	356	361	-
Number of culls in finishing <sup>a</sup>	6	3	21	-
Finishing cull rate, % <sup>a</sup>	1.68	0.86	6.31	<0.0001
Finishing mortalities	7	8	28	-
Finishing mortality rate, %	1.92	2.25	7.76	<0.0001
Prime marketings, % <sup>b</sup>	84.59	90.80	78.68	<0.0001

<sup>a</sup> Culling rate based on animals less than 180lbs at finishing closeout.

<sup>b</sup> Prime marketing rate based on pigs weighing greater than or equal to 220 lbs at finishing closeout.

## References

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