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based on the original design by Dr. Robert Dunlop

# Meta-analysis of globally published results on the efficacy of Ingelvac CircoFLEX® vaccination

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## Introduction and Objectives

Porcine Circovirus Associated Diseases (PCVAD) are related to PCV2 infection, but many other factors on the farm can affect the severity of the disease and might also affect vaccination results.

Several studies on the efficacy of Ingelvac CircoFLEX® (Boehringer Ingelheim Vetmedica, Inc., St Joseph, MO) have been published since 2007.

The aim of this study was to evaluate the effect of vaccination with Ingelvac CircoFLEX® on mortality in many different studies around the world taking into account some variables related to pig production and to PCVAD.

## Materials and Methods

This meta-analysis includes 38 trial groups vaccinated with Ingelvac CircoFLEX® (n=41,260) and 38 non-vaccinated groups of pigs (n=38,686) from the same trials. All data evaluated have been published until April 2010.

The effect of vaccination on wean-to-finish mortality has been analysed for the overall and within the following effects: production system (one-site, multisite); infection age (early, medium or late); PRRS status (positive, negative) and trial design, i.e. vaccinated and non-vaccinated pigs commingled in the same pens (yes, no).

The method used for meta-analysis is based on a bivariate approach[1] and it was implemented using the Mixed SAS procedure. Briefly, the analysis includes the information of log-odds for mortality from each trial weighted using estimation error and sample size, and obtaining estimates of log-odds ratio within effects.

## Results

Odds ratio mean and confidence interval of treatment is higher than 1 in all groups of the meta-analysis. This indicates a significant positive effect of vaccination in mortality in all trial groups (table 1). In the overall analysis, non vaccinated animals had a 2.75 times higher chance to die than vaccinated ones.

Comparing odds ratio between levels of each effect, two significant effects (i.e. confidence intervals non-overlapped) have been found: the effect of vaccine is clearer (higher odds ratio) in trials with i) pigs in separated pens compared with mixed (comingled), and ii) an early infection age compared with medium infection age (but not compared to late infection age).

Table 1: Difference in mortality and odds ratio between non-vaccinated controls and vaccinated animals.

| | Level of effects | Diffe-rence | Odds ratio | Confidence interval Odds ratio |
|---|---|---|---|---|
| Overall | | +5.5 | 2.75 | 2.34 - 3.23 |
| Within effects | | | | |
| Production System | One site | +2.0 | 2.00 | 1.61 - 2.48 |
| | Multisite | +5.8 | 2.65 | 2.33 - 3.01 |
| | Unknown | +8.9 | 3.94 | 2.59 - 6.00 |
| Infection age | Early | +7.7 | 3.36 | 2.66 - 4.24 |
| | Medium | +4.4 | 1.87 | 1.52 - 2.31 |
| | Late | +3.4 | 2.17 | 1.69 - 2.77 |
| | Unknown | +6.8 | 4.21 | 3.36 - 5.28 |
| PRRS | + | +9.6 | 2.99 | 2.43 - 3.69 |
| | - | +3.8 | 3.27 | 2.55 - 4.2 |
| | Unknown | +3.2 | 2.13 | 1.68-2.70 |
| Pigs comingled | No | +8.2 | 3.71 | 3.16- 4.35 |
| | Yes | +2.9 | 2.04 | 1.59 - 2.62 |

## Discussion and Conclusions

The meta-analysis yielded a significant reduction of mortality in Ingelvac CircoFLEX® vaccinated compared to non-vaccinated animals for all different levels of effects, demonstrating the consistent efficacy of vaccination. Vaccinated animals overall had 5 points of percentage of mortality less than non-vaccinated, a reduction of 50%. Further evaluation of this data is needed in order to analyse factors influencing the differences within the effects.

## References

1. Houwelingen et al. (2002)