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## SDEC Partners Research Update

### Project Update: The effect of 6 years of PCV2 vaccination in United States swine herds

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#### Background

- Vaccines against PCV2 for the control PCVAD were introduced in 2006
- PCV2 vaccination controls and prevents PCVAD, but does not eliminate the virus from the animals
- With USDA APHIS NAHMS, we performed a PCV2 prevalence survey in 2006, before the widespread use of PCV2 vaccine, and again in 2012 after 6 years of PCV2 vaccination
- PCV2 viremia (qPCR) and immunity (anti-PCV2 antibodies) were examined in pigs and by production site in both 2006 and in 2012

#### Objective

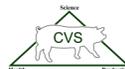
To assess the impact of 6 years of PCV2 vaccination on viral prevalence and immunity in finishing pigs and on production sites across the United States

#### Results

- PCV2 viremia was observed in 17% of finishers in 2012, greatly reduced from 83% of finishers in 2006.
- The number of finishing sites in which at least one animal was PCR-positive for viremia was reduced from 99% of sites in 2006 to 48% of sites in 2012. The frequency of viremic pigs per positive site was reduced in 2012 as well (Figure 1).
- Levels of viremia were greatly reduced from 2006 to 2012 (Figure 2). A 22-fold decrease in the median viral levels in finishers from 2006 to 2012 was observed. Maximal viral levels also were decreased substantially, by 50-fold from 2006 to 2012.
- The frequency of naturally infected finishers, as determined in 2012 by the presence of anti-rep antibodies, which are only present in virally infected pigs, and in 2006 by anti-capsid antibodies, when vaccines had not yet been introduced, was greatly reduced from 79% in 2006 to 19% in 2012.
- High PCV2 seroprevalence was observed in sites in both 2006 (99% of finisher sites were PCV2 seropositive) and in 2012 (95% of finisher sites and 99% of sow sites).



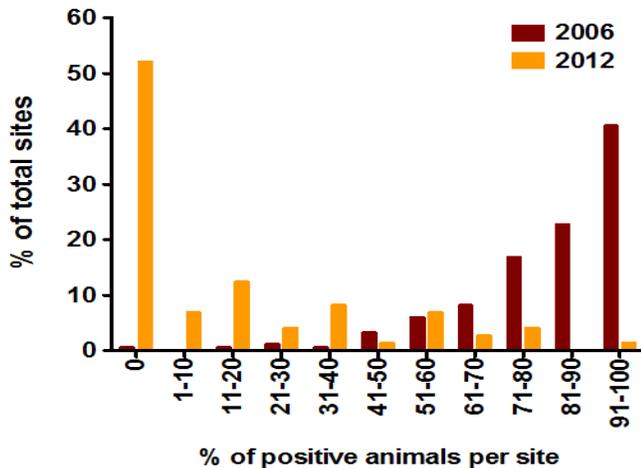
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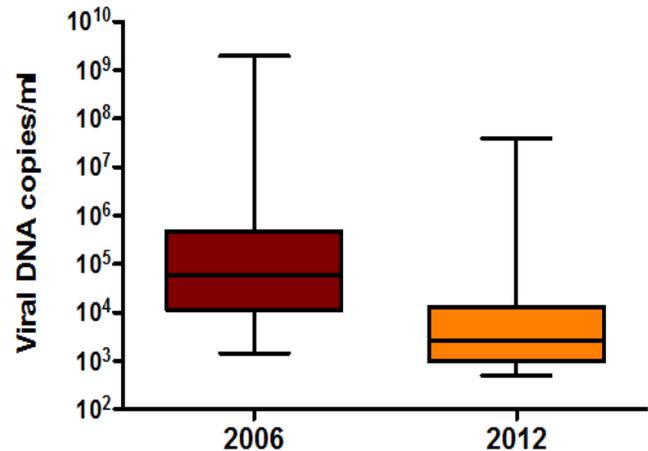
## Conclusions

The major impacts of 6 years of PCV2 vaccination include:

- ⇒ A dramatic reduction in viremia levels and the frequency of viremic finishers and sows.
- ⇒ Absence of detectable viremia in more than 50% of finisher and sow sites. A dramatic change from 2006, when <1% of sites were PCR-negative.
- ⇒ A dramatic decrease in the number of naturally infected pigs
- ⇒ A high prevalence of anti-capsid antibodies in 2012, which may be due to infection or vaccination or both.



**Figure 1. Frequency distribution of PCV2 viremic animals per site in 2006 and 2012.** PCV2 was isolated from pig serum and tested by qPCR. Animals with >500 viral copies/ml (the limit of detection) were recorded as positive. Data were recorded as percent of positive animals per site on the x-axis and proportion of sites in each bin as a percent of total sites on the y-axis.



**Figure 2. PCV2 viral levels before and after widespread vaccination.** PCV2 was isolated from pig serum and viral copy number was determined by qPCR using a standard curve. Viral copy number distributions by year in PCV2 positive finishing pigs are shown using box and whisker plots with the whiskers representing the minimum and maximum values. The cut-off for PCV2 positive samples was 500 viral copies/ml of serum.

## Final summary

The profound decrease in detectable PCV2 viremia along with the low prevalence of antibodies due to natural infection supports the conclusion that PCV2 elimination is in progress in the U.S. swine herd. PCV2 continues to circulate through swine sites, but at low levels, thus reducing the likelihood of transmission both vertically and horizontally. Cessation of vaccination programs at this time is not warranted since residual virus present in most herds may quickly reach pre-vaccination levels. While the mechanism by which vaccination controls infection has not been resolved, continued vaccination appears to be driving a dramatic reduction in PCV2 prevalence in swine.