Canadian Experiences with Porcine Circovirus Associated Disease

George Charbonneau DVM
Iowa Pork Congress
Des Moines, Iowa
January 24, 2007

Carmen, McEwen, Delay, Cai, Fairles
Why are we seeing the increased incidence?

- A new PCV2 strain spreading through the population
- “Agent X” moving through the population
  - “Agent X” as new primary pathogen?
  - “Agent X” as a new cofactor or trigger for PCVD
- Worst Management Practices with many herds graduating into such poor management that the disease can finally express

PCV2 Isolate Virulence

- PCV2 Isolates that are genetically highly homologous (98.9 % homology on genetic nucleotide sequence) may differ in virulence
- These differences may in part explain differences in clinical manifestation of PCV2 associated diseases in the field

Dr. T Opreissnig - Iowa State

PCVAD

Deal with the problem at the level that you understand it and right now it seems clear that PCV2 is integral to expression of the disease

- “Agent X” may well be out there and its’ pursuit is encouraged but in the meantime we will manage PCV2

PCVAD

Prevalence of PCVD Reported by Veterinarians

Survey by Ms. Christa Arsenault and Dr. Robert Friendship
- Percent of herds affected by PMWS 22.4 %
- Average morbidity 16.5 % (8 to 40 %)
- Average mortality 8.0 % (4 to 41 %)
- veterinary respondents reporting that they believed that this disease was spreading like a new infectious disease 80 %

Source: Ontario Veterinary College / Arsenault, Friendship

PCVAD

Assumptions For Cost Estimates of PCVD in Ontario

- No. marketed / year in Ontario 5.2 million pigs
- % of herds affected (Arsenault, Friendship) 22 %
- No. of pigs at risk / year in Ontario 1.1 million
- Average mortality (Arsenault, Friendship) 8 %
- No. of pigs dead / year in Ontario 88 thousand
- Average weight at death 40 kg
- Average cost at death $ 100
- Mortality associated with PCVD $ 8.8 million / year
- Mortality + Culls + Treatment $ 17.6 million / year
PCVAD Case Definition

A diagnosis of PCVD requires all of the following:
1. Clinical signs consistent with PCVD
2. Microscopic lesions consistent with PCVD
3. Demonstration of Porcine Circovirus 2 in the affected tissues.

Postweaning Multisystemic Wasting Syndrome (PMWS)

Classic clinical signs are consistent with past reports now usually 10 to 15 weeks old
• loss of body condition
• difficult breathing
• palpable lymphadenopathy
• paleness
• jaundice (infrequent)
• emaciation
• death

Gastric Ulcer

Primary or secondary?

Humpy Back or Camel Back

Vertebral column arteritis - Ted Clark DVM
**Postweaning Multisystemic Wasting Syndrome (PMWS)**

Enteritis early sign with or without blood.
Gross post mortem looks just like Ileitis.

**Porcine Dermatitis And Nephropathy Syndrome (PDNS)**

- predominantly affects older growing pigs.
- round or irregular shaped, raised red to purple skin lesions that coalesce to larger patches and plaques.
- most notable in the hindquarters, limbs and abdomen, but may progress to involve the thorax, flank or ears.

- mildly affected animals may remain bright, alert and may spontaneously recover.
- more commonly the severely affected animals proceed to show signs of difficult breathing, fever, inappetance and weight loss.
- recovery rate for PDNS pigs is very low.
PCVAD and Swine Respiratory Disease (SRD)
• fever
• difficult breathing
• cough
• unthriftiness
• enlarged lymph nodes
• death

PCVAD and Swine Respiratory Disease (SRD)
• A minor component of SRD in Ontario prior to fall 2004 but very common at Iowa State
• associated with Proliferative and Necrotizing Pneumonia (PNP)
• mixed respiratory infection along with
  • PRRS
  • Mycoplasma hyopneumoniae
  • Swine Influenza Virus

PCVAD Abortion and Reproductive Failure
PCVAD Abortion and Reproductive Failure

- Associated with reproductive failure including increased abortions, stillbirths and mummified pigs as well as increased preweaning mortality.
- Start up farms with single point in time outbreak
- PCV2 antigen demonstrated in both fetal and suckling pig tissues in the cardiac lesions of myocarditis.

Theory is that startup gilts had not been infected with PCV2 during the gilt grow out period and the reproductive failure caused by exposure to PCV2 well into the breeding project.

This is a rare event with last documented case in Ontario in 2002

PCV2 Vertical Transmission

- PCV2 infection implicated in suspected PMWS outbreaks of caesarean derived / colostrum deprived (CD/CD) piglets (Jolie et al., 2000; Harms et al., 1999b).

PCV2 PCR positive piglets at birth do not show clinical signs and are presumably protected from clinical disease by maternal antibodies.

Theory is that these piglets may act as “seeder” pigs in the growing pig population.
PCVAD Diagnosis

- History
- Clinical Signs
- Gross Post Mortems
- Histology, Immunohistochemistry
- PCR, RFLP, Gene sequence
- Serology

PCV2 Infection of lymphoid tissues

- Lymphoid depletion + histiocytic replacement
- Low viremia
- Seroconversion
- Infection cleared
- Subclinical

- High viremia + leukopenia
- +/- Seroconversion
- Systemic spread

- Clinical

Differences between PCV2 isolates
Coinfections
Immune stimulation
Host susceptibility

5–10–20%
70–80% Mortality

PROTECTION AGAINST PCV2 EXPERIMENTAL CHALLENGE IN 3 WEEK-OLD PIGLETS

Piglets with high maternal antibodies were protected against challenge with reduced clinical signs and shedding while piglets with low maternal antibodies developed PCVAD

C. Charreyre, S. Beseme, L. Boeuf-Tedeschi, M. Bublot, and G. Reynaud
International Pig Veterinary Society Congress (2002)

PCVAD Interventions

Minimize “Cofactors” or “Triggers”

What Does It Take To Push Your Herd PCVAD Button?
PCVAD and Triggering Diseases

- Upregulation - infectious agents may trigger the disease through up-regulation of the immune system
- Coinfection - infectious agents may act as secondary or synergistic coinfections once the immune system is compromised

Triggering diseases are quite happy to get PCVAD started and are then just as pleased to help as a secondary to finish the pig off!

% Mortality Associated with PRRS and / or PMWS

<table>
<thead>
<tr>
<th></th>
<th>-/- PRRS</th>
<th>PRRS+</th>
<th>PMWS+</th>
<th>+/- PMWS</th>
<th>????</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-F</td>
<td>3.80</td>
<td>5.06</td>
<td>5.40</td>
<td>10.45</td>
<td>6.58</td>
</tr>
<tr>
<td>Fin</td>
<td>2.81</td>
<td>7.05</td>
<td>5.94</td>
<td>9.47</td>
<td>6.20</td>
</tr>
<tr>
<td>Total</td>
<td>3.66</td>
<td>5.42</td>
<td>5.68</td>
<td>10.07</td>
<td>6.50</td>
</tr>
<tr>
<td>SD</td>
<td>2.46</td>
<td>3.83</td>
<td>2.85</td>
<td>6.41</td>
<td>4.25</td>
</tr>
<tr>
<td>% Herds</td>
<td>17.60</td>
<td>4.5</td>
<td>12.7</td>
<td>43.40</td>
<td>21.70</td>
</tr>
</tbody>
</table>

C Moore, S Dallaire, G Cote: FPPC, AVIA2005
Quebec Fall 2005
Mycoplasma hyopneumoniae

A major contributor to Porcine Respiratory Disease Complex (PRDC)

- Shown to potentiate PRRS
  - Thacker et al 1999
- Shown to potentiate PCV2
  - Opreissnig et al 2004
Swine Services Group

Piglet Mycoplasmata Vaccinations

- Timed to avoid maternal interference
- Mycoplasma vaccines (especially some of the oil based vaccines) have been shifted to during suckling or around weaning
- Avoid vaccination at time of Circovirus circulation*
- Serology is available for clarification

* Dr. Steve Krakowka,
  Dr. Eileen Thacker, Dr. Pat Halbur

Swine Services Group

Average Daily Gain
Post Mycoplasma hyo and PCV2 Challenge

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Day –2 to 76</th>
<th>Day –2 to 100</th>
<th>Day –2 to 131</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placebo</td>
<td>1.55 +/- 0.02 a</td>
<td>1.67 +/- 0.02 a</td>
<td>1.71 +/- 0.02 a</td>
</tr>
<tr>
<td>Respisure</td>
<td>1.63 +/- 0.02 b</td>
<td>1.77 +/- 0.02 b</td>
<td>1.81 +/- 0.02 b</td>
</tr>
<tr>
<td>M+Pac</td>
<td>1.59 +/- 0.02 ab</td>
<td>1.75 +/- 0.02 ab</td>
<td>1.78 +/- 0.02 ab</td>
</tr>
<tr>
<td>Respifend</td>
<td>1.62 +/- 0.02 b</td>
<td>1.76 +/- 0.02 b</td>
<td>1.80 +/- 0.02 b</td>
</tr>
</tbody>
</table>

Mycoplasma challenge at Day 35, PCV2 challenge on Day 49
Numbers with different superscripts are significant at P #0.05

Dr. Eileen Thacker, Dr. Pat Halbur

Swine Services Group

Mycoplasma Vaccination And PCVAD

- M. hyo vaccine was given at 7 and 5 weeks prior to exposure to PCV2 challenge
- This is typical of timing of M. hyo vaccine in NA production
- The use and appropriate timing of M. hyo vaccination is an effective tool in reducing the production losses associated with PCV2 and M. hyo induced respiratory disease complex.

Dr. Eileen Thacker, Dr. Pat Halbur

Swine Services Group

Swine Influenza H1N1 & H3N2

Introduction of new SIV H3N2 triple reassortant in May 2005 in Ontario could not have come at a worse time with respect to PCVAD.
**Streptococcus suis**

**Haemophilus parasuis**

**Brachyspira pilisicoli**

**Porcine Parvovirus**

Effect of Porcine Parvovirus Vaccination on the development of PMWS in segregated early wean pigs coinfect with type 2 porcine circovirus and porcine parvovirus

Opreissnig, Fenaux, Yu, Evans, Cavanah, Gallup, Thacker
vet microbiology 98:209 - 220
PCVAD Interventions

Best Management Practices
- Reduce Stress
- Reduce Infective Pressure

Back To The Basics!

PCVAD Madec’s 20 Point Plan

20 Technical Recommendations
- Issued by Dr Francois Madec
- French units applying at least 16 out of the following 20 management practices reduced mortality from around 20% to single figures

PCVAD Madec’s 20 Point Plan

Farrowing
1. All-in / all-out strictly applied IP
2. Wash sows & treat for parasites before farrowing Im
3. Cross-fostering IP
   Limited to only that which in necessary
   Within 24 hours of farrowing only

Post Weaning
4. Small pens (<13), solid partitions IP
5. Empty pit, clean & disinfect, strict AI / AO IP
6. Lower stocking density (3 pigs / m2) Stress
7. Increased space at the feeder + 7 cm / pig Stress
8. Improved air quality (NH3 < 10ppm, CO2 < 0.15%) IP Im
9. Improved temperature control Stress
10. No mixing of batches IP
**PCVAD Madec’s 20 Point Plan**

**Grower / Finishing**

11. Small pens, solid partitions IP
12. Empty pit, clean & disinfect, strict AI/AO IP
13. No mixing of pigs from post-weaning pens IP
14. No re-mixing between finishing pens IP
15. Lower stocking density: + 0.75m² / pig Stress
16. Improved air quality & temperature Im

**Others**

17. Appropriate vaccination program Im
18. Sensible flow within buildings (air, animals) IP
19. Strict hygiene (tail & teeth clipping, injections, castrations…) IP
20. Early removal of sick pigs hospital room or euthanize IP sick pens located out from the nursery or growing unit

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**Best Practices for Control of PCV2-Associated Diseases**

A great paper that summarizes Iowa State and other research and then suggests from the research which interventions should be considered

P. Halbur, DVM, PhD; T. Opriessnig, Mag med vet, Dr med vet; and P. Thomas, BS ISU Swine Disease Conference for Swine Practitioners (2005)

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**Feed Management**

- Nutrition
- Feeder Management
- Feed Budget
- Feed Manufacturing
- Feed Additives
Feed Management

- Energy
- Protein
- Minerals - Selenium 0.5 ppm
- Vitamins - Vitamin E 100,000 IU
- Fiber - Beet Pulp @ 5%

Feed interventions (feed industry)

<table>
<thead>
<tr>
<th>Change to mash texture</th>
<th>Frequency</th>
<th>Effect</th>
<th>Cost/T</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>sometimes</td>
<td>questionable to none</td>
<td>$3-5</td>
</tr>
<tr>
<td>Increased particle size</td>
<td>sometimes</td>
<td>questionable</td>
<td>$1-4</td>
</tr>
<tr>
<td>Addition of Soluble fiber</td>
<td>often</td>
<td>significant</td>
<td>$2-8</td>
</tr>
<tr>
<td>Addition of Appetizers</td>
<td>occasionally</td>
<td>mixed opinion</td>
<td>$4-10</td>
</tr>
<tr>
<td>Addition of Plasma</td>
<td>occasionally</td>
<td>poor</td>
<td>$40-60</td>
</tr>
<tr>
<td>Increased Vit. E + Selenium</td>
<td>sometimes</td>
<td>mixed opinion</td>
<td>$0.5-5</td>
</tr>
</tbody>
</table>

Jane A. Carpenter, DVM Dipl ABVP-SHM

Water Quantity

- Well capacity, flow rates, pressure, drinker type, number and placement
- Flow meters to monitor consumption
- 1.0 litres per minute @ 20 psi
- Watch for “stray voltage”

Water Quality

- pH is often 7.3 to 8.3
- pH is often adjusted to 4.5 to 5.5 in the early post weaning period
- pH is often adjusted to 6.5 in grow finish
Sources or delivery systems may become contaminated with disease (e.g., E. coli).

Total coliform/bacteria assessed yearly.

Sanitize with chlorine or hydrogen peroxide when added to the drinking water.

Chlorine - measure free chlorine at nipple.

Hydrogen peroxide.

Improper cleaning contaminates subsequent groups of newly weaned pigs.

Use hot water, high pressure and detergents and biofilm removal products in rotation.

Product selection based on problem identification.

Calibrate to ensure proper concentrations.

Water drinkers and bowls need special care.

Foamer nozzles for better “hang time”.

(Voyer et al., 2000). Very Effective In Vitro.

Virkon S @ 1:100 to 1:200 (Antec).

Sodium hydroxide.

Roccal D plus (Winthrop Labs).

Clorox bleach.

1-Stroke Environ (ConvaTec Labs).
Disinfection
- Virocid (Merial) has a claim for PCV2 at a 1:200 dilution. (Quaternary Ammonium / Glutaraldehyde)
- Synergize (Pro-Ag) has a claim for PCV2 at a 1:256 dilution. (Quaternary Ammonium / Glutaraldehyde)
- Ensure that the disinfectant selected is appropriate for the potential triggering diseases as well as PCV2 itself.

Dr. Pat Halbur points out that at Iowa State they can successfully disinfect their research facilities after an experiment with PCV2.

Drying
- Maximize clean, dry downtime to reduce the population of pathogens
- Leaving a room to completely dry

Ventilation Rate
- Control the removal of contaminants
- Increased ventilation=increased air speed
- Monitor effective temperatures
- Increased relative humidity=bacterial survival
- Maintain 65 % RH fall,winter, spring
- Summer - dilute the pathogen load in the air

Temperature control
- Control fluctuations to reduce the stress on pigs and prevalence of disease
- Chilling from drafts, damp floors, wet pigs, or insufficiently insulated floors, walls, ceilings
- Controllers to be monitored and set to minimize daily variability and fluctuation
- Establish targets, monitor and adjust as needed
Gases

- Ammonia depresses feed intake
- Ammonia reduces the effectiveness of the muco-ciliary apparatus of the respiratory tract

Stocking Density

- You should never worry about excessive stocking density and App pneumonia.
  - The pigs will always “Die Down” to the correct stocking density!

Dr. Roy Schultz - Avoca Iowa

Environmental Testing Equipment

- Temperature data loggers
- RH data loggers
- Water pH
- Air speed
- Gas testers

These allow for objective measurements of environmental conditions

Hospital Pen

“The sick are the greatest challenge to the healthy”
Hospital Pen

- Pull out sick pigs early to reduce the challenge to “At Risk” healthy pigs
- Feed or water medication can be targeted specifically to the hospital pen

Hospital Pen / Recovery Pen

- Recovered pigs usually stay together with small group housing
- Get the sick pigs out of the building if possible

Injectable Medication

- Selection of antimicrobials based on the antibiogram of the bacterial isolates
- Anti-inflammatories

Use of Nuflor and Banamine for individual treatment of PMWS and PCV2 associated pneumonia

- Injection with Nuflor significantly increased percentage of pigs reaching target market weight of 110 kg (P < 0.05)
- Injection of Nuflor and Banamine significantly increased the survivability of pigs affected by PCVAD (P < 0.05)

Francois Cardinal, DVM, MSc
American Association of Swine Veterinarians (2006)
Selection of antimicrobials based on the antibiogram of the bacterial isolates

Useful for protecting the at risk pig and control of PCVAD Triggers

Consider targeted pulsing of feed medication to control Triggers
eg Salinomycin for control of Brachyspira pilisicoli
Merial Circovac®

- Inactivated vaccine available in France, parts of Germany and Canada on conditional release
- Initially vaccinate sows and gilts at 7 and 4 weeks pre-farrow then 4 week pre-farrow booster
- European reports of 60% decrease in growing pig mortality

PCVAD Vaccination Results

Merial Circovac®

- Single source, 3 site, high health
  - 2.5%
  - Usually: 5.5%
- Farrow to finish (post weaning mortality)
  - 20-25% to 7 to 9%
  - 15% to 6.5%
- Nursery
  - 6.5% to 3%

Dr. Camille Moore - Big Bug Day III
**PCVAD Vaccination**

**Merial Circovac®**
- Initial results in Canada show similar results for PCVAD occurring in nursery
- Control of PCVAD in finishers has not been as consistent
- May require some exposure in nursery while under umbrella of passive protection

**Boehringer Ingelheim Circoflex®**
- Single dose vaccine
- Initial trials show effectiveness when given at 19 to 56 days of age
- Very few side effects reported
- Initial results look promising

**Intervet Porcine Circovirus Vaccine**
- Available for safety studies and limited initial supply
- 2 doses given 3 weeks apart
- 7/1000 piglets show systemic reaction but fully recover
- Local reaction at injection site is common but fully resolve within a couple weeks
### PCVAD Vaccination Results

**Intervet Circovirus Vaccine**

<table>
<thead>
<tr>
<th>System 1:</th>
<th>5000 pigs vaccinated</th>
<th>3000 pigs vaccinated</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 1.8% - 1.6% - 2.8% - 0.6% - 2%</td>
<td>Usually: <strong>6 to 8 %</strong></td>
<td>Usually: <strong>6 to 8 %</strong></td>
</tr>
<tr>
<td>- 0.6% - 2%</td>
<td>Dr. Camille Moore - Big Bug Day III</td>
<td></td>
</tr>
<tr>
<td>- Usually: 6% mortality and 6% BBQ</td>
<td>Marie-Claude Germain, Isoporco</td>
<td>Marie-Claude Germain, Isoporco</td>
</tr>
</tbody>
</table>

#### Intervet Circovirus Vaccine

<table>
<thead>
<tr>
<th># IN</th>
<th># DEADS</th>
<th>% MORTALITY</th>
<th>ADG</th>
<th>FE (GAIN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1630</td>
<td>28</td>
<td>1.7</td>
<td>881</td>
</tr>
<tr>
<td>B</td>
<td>1517</td>
<td>26</td>
<td>1.7</td>
<td>863</td>
</tr>
<tr>
<td>C</td>
<td>1942</td>
<td>52</td>
<td>2.7</td>
<td>888</td>
</tr>
</tbody>
</table>

- Usually: **6% mortality and 6% BBQ**

Marie-Claude Germain, Isoporco

#### Intervet Circovirus Vaccine

<table>
<thead>
<tr>
<th># IN</th>
<th># DEADS</th>
<th>% MORTALITY</th>
<th>ADG</th>
<th>FE (GAIN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>675</td>
<td>14</td>
<td>2.07</td>
<td>865</td>
</tr>
<tr>
<td>B</td>
<td>1248</td>
<td>30</td>
<td>2.4</td>
<td>806*</td>
</tr>
</tbody>
</table>

- * Tail biting at the end, lower weight
  - PRRS and Myco +
  - Usually: 10-15% mortality and 10-15% BBQ

Marie-Claude Germain, Isoporco

#### Intervet Circovirus Vaccine

<table>
<thead>
<tr>
<th># IN</th>
<th># DEADS</th>
<th>% MORTALITY</th>
<th>ADG</th>
<th>FE (GAIN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VACC</td>
<td>1046</td>
<td>11</td>
<td>1.05</td>
<td>25</td>
</tr>
<tr>
<td>NON-VAC</td>
<td>475</td>
<td>43</td>
<td>9.0</td>
<td>61</td>
</tr>
</tbody>
</table>

- * Mainly hernias
- ** PCVAD related
  - PRRS and Myco +

Marie-Claude Germain, Isoporco

### Dr. Camille Moore - Big Bug Day III
PCVAD Vaccination Results
Intervet Circovirus Vaccine

System 2:
- 8000 pigs vaccinated
  - 2.5% - 1.5% - 2% - 3.5% - 3% - 1.7%
  - Usually: **12%**

System 3
- 700 pigs vaccinated
  - **1.2%**
  - Usually: **4.5%**
  - 910 g ADG and 2.45 FE

Dr. Camille Moore - Big Bug Day III

System 4:
- 8000 pigs vaccinated
  - 1% - 3.5% - 6.5% - 6%
  - Usually: **12%**
- 10,000 pigs vaccinated
  - 2.4% - 4% - 1% - 1.2% - 3% - 3.4% - 10%
  - Usually: **12%**
- 2,000 pigs vaccinated: **1 dose / ran out of vaccine**
  - 2.0%
  - Usually: **12%**

Dr. Camille Moore - Big Bug Day III

System 5:
- 10,000 pigs vaccinated
  - 3 to 4%
  - Usually: **8.5 to 9%**
- Farrow to finish, 3 sites,
  - **1.5%**
  - Usually: **6%**

Dr. Camille Moore - Big Bug Day III

Single source, multi-site
- **Pre-Madec:** 9 to 10%
- **With Madec:** 5 to 6%
- **With Madec + vaccine:** 2.85%

Dr. Camille Moore - Big Bug Day III
### PCVAD Vaccination Results

**Intervet Circovirus Vaccine / System 2**

<table>
<thead>
<tr>
<th>Vaccine Group</th>
<th>Previous Group</th>
<th>System average last 12 groups</th>
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</thead>
<tbody>
<tr>
<td>ADG</td>
<td>913</td>
<td>793</td>
</tr>
<tr>
<td>Mortality %</td>
<td>2.0</td>
<td>7.6</td>
</tr>
<tr>
<td>Cull %</td>
<td>1.1</td>
<td>4.2</td>
</tr>
<tr>
<td>FC</td>
<td>2.63</td>
<td>2.98</td>
</tr>
</tbody>
</table>

Doug MacDougald, Stratford, Ont. - Big Bug Day III

### PCV2 Vaccination in Nursery

**Farm Case Study # 1 - 2 Site Operation**

Finishing unit interim results @ 7 weeks into finishing Vaccinates and Non-vaccinates housed in the same barn

- Vaccinated - 400 head
  - Mortality: 0.25% Morbidity: 0.25%
- Non-vaccinated - 230 head
  - Mortality: 1.5% Morbidity: 2.5%

### PCV2 Vaccination in Nursery

**Farm Case Study # 2 - 3 Site Operation**

Finishing unit interim results @ 10 weeks into finishing Vaccinates and Non-vaccinates housed in the same barn

- Vaccinated - 700 head
  - Mortality: 1.7% Morbidity: 0.5%
- Non-vaccinated - 1300 head
  - Mortality: 4.75% Morbidity: 4.75%

### PCV2 Vaccination in Nursery

**Farm Case Study # 3 - 3 Site Operation**

Finishing unit interim results @ 11 weeks into finishing Vaccinates in a single barn 1000head barn

- Vaccinated -1022 head
  - Mortality: 0.75% Morbidity: 0.50%
- Non-vaccinated - 1000 head Prior Week of Production
  - Mortality: 3.00% Morbidity: 3.00%
- Non-vaccinated - 1000 head Post Week of Production
  - Mortality: 3.50% Morbidity: 3.50%
### PCV2 Vaccination in Nursery

**Farm Case Study # 4 - 3 Site Operation**

Nursery unit close out in 4000 head nursery  
Vaccinates and Non-vaccinates housed in the same barn

<table>
<thead>
<tr>
<th>Vaccinated</th>
<th>Mortality</th>
<th>Morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 head @ weaning then 21 days later</td>
<td>3.00 %</td>
<td>2.00 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-vaccinated</th>
<th>Mortality</th>
<th>Morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 X 1000 in same building</td>
<td>5.00 %</td>
<td>5.00 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vaccinated</th>
<th>Mortality</th>
<th>Morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 X 1000 in same building</td>
<td>6.00 %</td>
<td>6.00 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vaccinated</th>
<th>Mortality</th>
<th>Morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 X 1000 in same building</td>
<td>13.00 %</td>
<td>13.00 %</td>
</tr>
</tbody>
</table>

### PCV2 Vaccination in Nursery

**Farm Case Study # 5 - 3 Site Operation**

Finishing unit interim results @ 9 weeks into finishing  
Vaccinates and Non-vaccinates housed in the same barn

<table>
<thead>
<tr>
<th>Vaccinated</th>
<th>Mortality</th>
<th>Morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>508 head</td>
<td>0.4 %</td>
<td>0.4 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-vaccinated</th>
<th>Mortality</th>
<th>Morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>544 head</td>
<td>2.6 %</td>
<td>2.6 %</td>
</tr>
</tbody>
</table>

### PCV2 Vaccination in Nursery

**Farm Case Study # 6 - 3 Site Operation**

Finishing unit interim results @ 9 weeks into finishing  
Vaccinates and Non-vaccinates housed in the same barn

<table>
<thead>
<tr>
<th>Vaccinated</th>
<th>Mortality</th>
<th>Morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1100 head</td>
<td>0.5 %</td>
<td>0.5 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-vaccinated</th>
<th>Mortality</th>
<th>Morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1100 head</td>
<td>2.7 %</td>
<td>1.6 %</td>
</tr>
</tbody>
</table>

### PCVAD Vaccination Results

- Reported results almost too good to be true
- Reported results better then before the PCVAD?
  - Perhaps PCVAD was there and not diagnosed?
  - Reflection of the other work done prior to the vaccine?
  - Other diseases under control?
  - ???
PCVAD Vaccination Results
Intervet Circovirus Vaccine

Due to a lack of vaccine we have tried:
- 1 full dose of the 2 dose product
- 2 X 1/2 dose of the 2 dose product

Some producers “reporting” effectiveness in low challenge situations

PCVAD and Genetics

* Rose et al., 2003 (Northern France)  
  Pietrain - no reduction in PMWS
* Lopez-Soria et al., 2005  
  100 % Pietrain   1.5 to 2.5 %    PMWS  
  50% Pietrain    4.7 to 5.9 %    PMWS  
  Duroc          9.8 to 26.3%    PMWS.
* Halbur, P., 2004,  
  Landrace       3/19       PMWS  
  Duroc          0          PMWS  
  Large White    0          PMWS

SSG PCVAD Score Card

147 Farms In The Practice
- 100 to 8000 sows
- farrow to finish, farrow to feeder pig farrow to isowean
- problem herds had doubling of mortality for two or more months
61 of 147 farms (41%) have reported problems with PCVAD since fall 2004

24 of 61 farms (39%) report that they no longer have the severe clinical signs

Why?
- 6 of 24 farms (25%) depopulated
- 2 of 24 farms (8%) barn fires
- 16 of 24 farms (67%) success with interventions

Of the 16 farms that have had positive response to interventions

Why?
- 9 / 16 (56%) Best Management Practice
- 6 / 16 (38%) Trigger - PRRS elimination/control
- 1 / 16 (6%) Cofactor - Genetics / Terminal Sire

Vaccination Usage

<table>
<thead>
<tr>
<th>Vaccine Type</th>
<th>Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merial CircoVac</td>
<td>21</td>
</tr>
<tr>
<td>Intervet Circo</td>
<td>17</td>
</tr>
<tr>
<td>BI CircoFLEX</td>
<td>17</td>
</tr>
<tr>
<td>Any Type of Circo Vaccine</td>
<td>37</td>
</tr>
</tbody>
</table>

* Vaccines have been limited in availability
Fort Dodge vaccine still not available
Thank You

George Charbonneau DVM
Iowa Pork Congress
Des Moines, Iowa
January 24, 2007