Table 3 Madec 20-Point Plan

Farrowing Units
1. Application of strict all-in and all-out production with thorough cleaning and disinfecting between batches.
2. Dams should be washed and treated for parasites before farrowing.
3. Cross-fostering should be limited.

Post-weaning Facilities
4. Post-weaning pens should be small and separated by solid partitions.
5. Pits should be emptied, cleaned and disinfected on a regular basis.
6. The stocking density should be lowered to 3.55 ft² per pig.
7. The feeder space should be increased to more than 2.76 inch per pig.
8. The air quality should be improved so that ammonia is less than 10 ppm, carbon dioxide is less than 0.1%, and the relative humidity is less than 85%.
9. The temperature should be controlled.
10. There shouldn’t be any mixing of batches.

Grow/Finisher Facilities
11. Grow/finish pens should be small and separated by solid partitions.
12. The pits should be emptied, cleaned and disinfected on a regular basis and strict all-in, all-out rules should be applied.
13. There should be no mixing of pigs from the post-weaning pens.
14. There should be no remixing between finishing pens.
15. The stocking density should be lowered to more than 8.07 ft² per pig.
16. The air quality and temperature should be improved.

In addition, the following should be considered:
17. The vaccination program should be appropriate.
18. The air and animal flow within buildings should be carefully controlled.
19. Strict hygiene should be applied (tail and teeth clipping, injections).
20. Sick pigs should be removed as soon as possible to a hospital room or should be euthanized.
Clinical Expressions and Case Definition

Currently, a number of variable clinical presentations are being described and associated with PCV2 infection. However, due to its ubiquitous nature, PCV2 is a common finding in pigs submitted for diagnostic work-up. Thus, it was recognized that a set of criteria was needed to determine when a disease manifestation was likely associated with PCV2 infection. PMWS is recognized as a major clinical manifestation of PCVAD, but not the only one. Although research has yet to confirm Porcine Dermatitis Nephropathy Syndrome (PDNS) as one aspect of PCVAD, it is included as one of the possible or potential clinical expressions until further knowledge becomes known.

While individual animals may exhibit clinical signs, the herd does not always experience PCVAD which may lead to misdiagnosing the problem. To derive the following case definition, the committee adopted the approach utilized by the Centers for Disease Control and Prevention (CDC) to define “cases” in human medicine where a definitive etiology remains unknown. The following criteria were selected as the basis of a case definition so all researchers and veterinarians will know what constitutes PCVAD.

This case definition is considered to be a dynamic document which will be altered with additional information becomes available. PCVAD can be subclinical (at least PCV2 can be subclinical) or include one or more of the following clinical manifestations concurrently:

1. Multisystemic disease with weight loss (formerly known as PMWS).
2. Respiratory signs including pneumonia.
3. Porcine Dermatitis and Nephropathy Syndrome (PDNS).
4. Enteric signs including diarrhea and weight loss.
5. Reproductive disorders including abortions, stillbirths and fetal mummification.
6. Fetal myocarditis lesions, Park et al.)

Experimentally infecting gestating animals with PCV2 has fetal myocarditis associated with PCV2 antigen in lesions. Fetal mummification (diagnosis requires the presence of PCV2 antigen in fetal myocarditis lesions.

Case Presentation

A 1200-sow, farrow-to-finish operation located in the eastern corn belt of the United States was diagnosed with PCVAD in December 2004. Pigs are placed in conventional 1000-head finishing units. The system is PRRS virus negative. A diagnosis was made in 12-16 week old growing pigs. Histopathological and immunohistochemical testing revealed the presence of PCV2 antigen within lesions of multifocal granulomatous lymphadenopathy, meeting the criteria established for PCV2 associated disease.

Production records were collected from the farm and seasonally adjusted into six-month periods, (December though May) for two years prior to the clinical break and the beginning of the current, ongoing outbreak. Parameters were evaluated in a batch or group for all performance data. Parameters included average daily gain (ADG), feed efficiency (FE), number of pigs placed (Placed), and mortality rate (Mortality).

Economic analysis was made with the following valuation assumptions: average feed cost - $0.0599/lb and mortality opportunity cost - $125 per animal. All values are listed in US dollars.

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Economic analysis was made with the following valuation assumptions: average feed cost - $0.0599/lb and mortality opportunity cost - $125 per animal. All values are listed in US dollars. Student’s t-test was used for analysis. The reported P values for Mortality, ADG and FE were one tailed. The P value for Placed was two tailed. All were significant at or below P=0.05.

Results

The PCV2 outbreak significantly impacted mortality, ADG and FE (Table 1). The economic analysis revealed a combined loss of $6.60 per animal in the outbreak phase (Table 2). The bulk of the cost impact was through mortality, excluding culls, which were not analyzed in this study. Mortality was analyzed as animals per 1000-head placed into finishing units.

Vaccine Response

The response that veterinarians and producers have observed in North America has been extremely good when considering mortality alone. A common comment has been that “mortality rates have not been this low in years!” Three companies, i.e. Boehringer Ingelheim Vetmedica, Fort Dodge Animal Health, and Intervet, have been fervently trying to meet the North American demands for commercially available vaccine. Vaccine availability has recently improved so in the near future supply should not be as much of a concern. Production data from group close outs are beginning to show very nice responses. Mortality has been reduced from the high rates of 8% to 20% + back to more normal levels. In addition, an improvement in average daily gain (ADG) of 0.1 to 0.2 lb during the finisher phase (100-110 days) will result in 10-20 lb heavier market weight.

Management Practices

While the vaccine has provided a very nice response, swine producers need to examine their routine management practices with their veterinarian to support the vaccine and to attain the maximum benefits. France began to recognize a problem in 1994/1995 and what resulted is now known as the Madec 20-point plan (Table 3 on back page). It is recommended that at least 16 points be incorporated for the best response, although most of the points are “common sense” suggestions, deviation from good management practices will occur over time in most units.

It has been shown that several commonly available disinfectants are useful against PCV2. Proper sanitation programs with adequate drying before animals are placed are useful practices in reducing not only PCV2 but most pathogens that are associated with causing economic concerns to modern day swine producers.

Summary

As veterinarians are conducting farm trials to find answers for their clients, researchers are testing theories about how this virus can be associated with the variable clinical expressions and mortality observed across a wide range of production situations. Pharmaceutical and biological companies are striving to provide quality vaccines and products. Research, effective vaccines, improved diagnostics and enhanced management are all tools to help prevent and minimize the clinical signs associated with exposure to PCV2 and lessen the devastating losses.

Table 1 Means and SE for Performance Parameters Pre- and Post-PCV2

<table>
<thead>
<tr>
<th>Parameter</th>
<th>2003/2004</th>
<th>2005</th>
<th>P Value</th>
</tr>
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<tbody>
<tr>
<td>N</td>
<td>24</td>
<td>12</td>
<td></td>
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<tr>
<td>Pigs Placed</td>
<td>1175.9±21.8</td>
<td>1106.8±37.8</td>
<td>0.09 (moderately significant)</td>
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<tr>
<td>Mortality</td>
<td>1.81±0.14</td>
<td>4.85±0.56</td>
<td>&lt;0.001 (highly significant)</td>
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<tr>
<td>ADG, lb</td>
<td>0.47±0.01</td>
<td>0.92±0.02</td>
<td>0.05 (significant)</td>
</tr>
<tr>
<td>FE</td>
<td>2.68±0.06</td>
<td>2.83±0.04</td>
<td>0.05 (significant)</td>
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</tbody>
</table>

Table 2 Economic Impact of PCV2 in PRRS Negative Finishing Pigs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Production Change</th>
<th>Value, USD</th>
<th>Total</th>
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<tbody>
<tr>
<td>Mortality, %</td>
<td>+ 3.24</td>
<td>$27.98</td>
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<tr>
<td>ADG, lb</td>
<td>-0.05</td>
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<tr>
<td>FE</td>
<td>+0.15</td>
<td>$1.73</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>$6.60</td>
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