



Porcine Circovirus Type 2 (PCV-2) – associated diseases

Research update on the role of *M. hyopneumoniae* and control methods, including Tiamutin[®]/CTC or Doxycycline application

“Take home” messages

- PCV-2 virus is now recognized as the causal agent of postweaning multisystemic wasting syndrome (PMWS) in pigs.
- PCV-2 virus is also strongly associated with other clinical conditions e.g. porcine respiratory disease complex (PRDC).
- *M. hyopneumoniae* (*M. hyo*) has a key role as an important co-pathogen with PCV-2. Recent research in USA has demonstrated that *M. hyo* increases the severity and duration of PCV-2 induced lung and lymphoid lesions.
- Strategically applied “pulse medication” with Tiamutin plus CTC or doxycycline can be effectively used to minimize the effects of both *M. hyo* and bacterial co-infections e.g. *S. suis*, *A. pleuropneumoniae*, *P. multocida* and *H. parasuis* in PCV-2 related disorders.

*Tiamutin plus CTC or doxycycline can be effectively used to minimize the effects of both *M. hyo* and bacterial co-infections*

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PCV-2 is associated with several significant disease syndromes including post-weaning multisystemic wasting syndrome (PMWS), respiratory disease (PRDC), reproduction disorders, enteritis and porcine dermatitis and nephropathy syndrome (PDNS).

PCV-2 is the essential cause of PMWS but is not likely to be a primary pathogen in the conventional sense. PCV-2, on present knowledge, is best considered as a ubiquitous secondary pathogen which, given adequate co-factors and susceptible hosts, can cause disease.

M. hyopneumoniae has a key role as an important co-pathogen with PCV-2. Recent research at Iowa State University in the USA by Opriessnig, Thacker and Halbur has been conducted to investigate the interactions between PCV-2 and *M. hyo*. 68 pigs of segregated early weaning (SEW) origin were randomly assigned to 4 groups (17 pigs in each group):

- Group 1 Served as a non-infected control group
- Group 2 Pigs were inoculated with *M. hyo*
- Group 3 Pigs were infected with both *M. hyo* and PCV-2
- Group 4 Pigs were inoculated with PCV-2

Pigs co-infected with *M. hyo*/PCV-2 had:

- More severe clinical respiratory disease.
- Significantly reduced average daily gain.
- Significantly higher amounts of PCV-2 in serum.
- Longer period of PCV-2 viraemia.
- More severe macroscopic lung lesions.
- Higher incidence and greater amount of PCV-2 antigen in lymphoid and lung tissues.
- Higher incidence and more severe microscopic lung and lymphoid lesions compared to the single *M. hyo* and PCV-2 infected groups.

The characteristic peribronchial lymphoid hyperplasia associated with *M. hyo* infection appears to provide an important site for the replication of PCV-2 in the lung tissues.

The results of this important and recent research indicate that *M. hyo* increases the severity and duration of PCV-2 induced lung and lymphoid lesions, PCV-2 replication in tissues and the incidence of PMWS in conventional pigs. The control methods currently advocated by the Iowa workers are:

- Establish, at a diagnostic laboratory, by postmortem, histopathology, immunochemistry or in-situ hybridization that a PCV-2-associated problem is present on the farm.
- Identify specific concurrent infections, e.g. those based on *M. hyopneumoniae*.
- Eliminate or minimize the effects of PRRS virus co-infection, if present, by maintaining balance between gilts/sows in breeding herds, pig flow changes and/or PRRS vaccination.
- Eliminate or minimize the effects of swine influenza virus (SIV) co-infection, if present, with SIV vaccination in breeding and possibly growing/fattening pigs.
- Determine if Porcine Parvovirus (PPV) is present in the tissues of affected pigs by Fluorescent Antibody (FA) or Polymerase Chain Reaction (PCR) tests and in the population by the demonstration of seroconversion to PPV during the time where PCV-2-associated disease occurs; consider implementing PPV vaccination of growing pigs if PPV and PCV-2 co-infection is confirmed.
- Minimize the effect of pneumonia caused by *M. hyo*, if present, with vaccination and strategically applied pulse medication (the synergistic premix combination of Tiamutin and CTC or doxycycline is particularly suitable for this purpose).
- Treat specific bacterial co-infections e.g. *S. suis*, *A. pleuropneumoniae*, *Past. multocida*, *H. parasuis* with appropriate antimicrobials.
- If herd evidence suggests an association between vaccination practices and PCV-2-associated disease re-evaluate the necessity and timing of the administration of the vaccines in use. It may be beneficial to change the brand of the vaccine used and/or the timing of administration of the vaccines.
- Consider the use of corticosteroid injections. UK work by Baird et al in 2000 suggested that treatment with 0.5 mg/kg bwt. of a corticosteroid intramuscularly, improved pig condition after 48 hours and dramatically reduced mortality. (PMWS may be an immune-regulated disease since corticosteroids down-regulate the immune system and dysfunction of the immune system appears to play a critical role in the development of PMWS).
- Remove pigs which do not respond to treatment.
- Adhere to "all-in all out" pig flow rules.
- Minimize mixing and moving of pigs where possible.
- Decrease pig density.

- Use disinfectants in buildings and transport vehicles which have been demonstrated to be effective against PCV-2, e.g. phenol, quaternary ammonium hypochloride and sodium hydroxide based products, also “Virkon-S”.
- Consider changing sourcing of pigs if problem occurs repeatedly and alternative suppliers are available.

Additional work from Iowa State University by Dr. G. Osweiler, of their Diagnostic Laboratory, has confirmed that the % susceptibility of significant respiratory bacterial co-pathogens for PCV-2 infection, such as: *S. suis*; *H. parasuis* (*Hps*); *Actinobacillus pleuropneumoniae* (*App*), *Pasteurella multocida* (*Past. mult*) and *Actinobacillus suis* (*As*) to the antibiotics Tiamutin and chlortetracycline, is high (see Table 1 below).

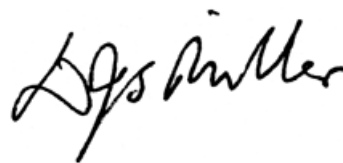
Table 1: Susceptibility profile of certain bacterial respiratory pathogens of pigs to CTC, Tiamutin, tylosin and tilmicosin in 2002 (%)

Antibiotic	<i>Past. mult.</i> Type A	<i>Past. mult.</i> Type O	<i>S. suis</i>	<i>Hps</i>	<i>App</i>	<i>As</i>
CTC	96	91	11	100	48	80
Tiamutin	13	2	90	76	88	8
Tylosin	2	0	21	10	0	1
Tilmicosin	94	64	20	98	100	96

There is a high level of ‘complementarity’ between the effects of CTC and Tiamutin, i.e. where the effect of Tiamutin is weak, (*Past. multocida*) the effect of CTC is strong. However susceptibilities to the combination of Tiamutin + CTC were not specifically reported in this work.



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Further information on the Tiamutin® (tiamulin) range of products is available from the Pig Products Manager at Novartis Animal Health operations in over 50 countries worldwide.