



# PorkFACTS™

AN UPDATE OF RECENT SWINE RESEARCH

## Efficacy of Aureomycin® Chlortetracycline for Decreasing Potentiation of PRRSV Pneumonia by *Mycoplasma hyopneumoniae*

### ► SUMMARY

A research study was conducted to investigate the effects of chlortetracycline feed medication on *Mycoplasma hyopneumoniae* (*M. hyo*) potentiation of PRRSV pneumonia.<sup>1,2</sup> The study involved pigs with pneumonia induced by co-infection with PRRSV and/or *M. hyo*. Two groups of 16 pigs were fed Aureomycin® at 10 mg/lb body weight for 14 days starting 3 days before co-infection challenge. Compared to non-medicated controls, pigs fed Aureomycin showed significantly reduced numbers of *Mycoplasma* organisms, reduced lesions associated with PRRSV pneumonia, and significantly improved weight gains. Aureomycin feed medication appears to indirectly moderate the severity and duration of PRRSV pneumonia by limiting disease potentiation by *M. hyo*. Aureomycin also reduced the severity of early occurring *Mycoplasma* pneumonia in co-infected pigs.

### ► RATIONALE

- Pigs displaying clinical signs of porcine respiratory disease complex (PRDC) are often infected with two major pathogens, porcine reproductive and respiratory syndrome virus (PRRSV) and/or *Mycoplasma hyopneumoniae* (*M. hyo*).<sup>1,2</sup>
- Earlier research has demonstrated that the presence of *M. hyo* increases the duration and intensity of pneumonia caused by PRRSV.<sup>3</sup>
- *Pasteurella multocida*, another bacterial pathogen commonly isolated from pigs with PRDC, has been shown to intensify disease associated with *M. hyo* infection.<sup>4,5</sup>
- Aureomycin® is the premier granulated chlortetracycline feed-additive premix that optimizes the amount of drug that is delivered to the gut and available for systemic distribution throughout the body of swine. Aureomycin is approved for high-level therapeutic use (10 mg/lb body weight/day for up to 14 days) for treatment of pneumonia caused by *P. multocida*.
- Although Aureomycin is not approved for control of *M. hyo*-associated disease, administration of Aureomycin in the feed starting 3 days prior to *M. hyo* challenge has been shown to significantly reduce both the severity of pneumonia and the number of *M. hyo* organisms in infected pigs.<sup>6</sup>

**Chlortetracycline is effective in controlling *M. hyo* and limiting its potentiating effects on PRRSV pneumonia.**

## ▶ RATIONALE (CONT.)

- Because of this known ability of Aureomycin to help manage *M. hyo* pneumonia, a PRRSV/*M. hyo* co-infection challenge study was conducted to evaluate the efficacy of Aureomycin for reducing *M. hyo* potentiation of PRRSV pneumonia.<sup>1,2</sup>

## ▶ EXPERIMENT DESIGN

- The study involved 85 healthy crossbred barrows, 10 to 12 days of age, randomly assigned to 5 treatment groups of 16 pigs each (8 pigs/pen, 2 pens/treatment).
- Pigs were sourced from a herd seronegative and not vaccinated for PRRSV and *M. hyo*, and acclimated to the study site for approximately 1 week before study initiation.
- Starting 3 days prior to challenge infection, Aureomycin was included in the diets of 2 groups of pigs at the rate of 10 mg/lb body weight per day for a total of 14 days.
- Challenge infections were administered on study day 0, with the *M. hyo* challenge administered intratracheally and the PRRSV challenge administered intranasally later that same day. The 5 treatment groups were:
  1. PRRSV challenge;
  2. *M. hyo* challenge;
  3. *M. hyo* and PRRSV challenges;
  4. *M. hyo* challenge plus Aureomycin (10 mg/lb body weight/day) for 14 days;
  5. *M. hyo* and PRRSV challenges plus Aureomycin (10 mg/lb body weight/day) for 14 days.
- Six pigs in each group were necropsied at 10 days post-infection, the time-point when maximal lesions for PRRSV-induced pneumonia are known to occur and also to evaluate the degree of early occurring *Mycoplasma* pneumonia.
- The remaining 10 pigs in each group were necropsied at day 32 to determine both the potentiation of PRRSV pneumonia and the extent of pneumonia due to *M. hyo* infection.
- Parameters assessed during the study included clinical observations for signs of pneumonia (i.e., coughing score), body weights, necropsy evaluations of pneumonic lungs, and quantification of *M. hyo* organisms via real-time PCR on bronchoalveolar lavage (BAL).

**Challenged pigs fed Aureomycin had 25% better average daily gain compared to non-medicated animals.**

## ▶ RESULTS

- The addition of Aureomycin to the diet of pigs challenged with both *M. hyo* and PRRSV produced 25% better average daily gain compared to pigs fed non-medicated rations ( $P=0.0002$ ) (Tables 1 and 2).
- Coughing is considered a classical sign of *M. hyo* infection and contributes to spread of disease; no coughing was observed in either group of Aureomycin-treated pigs ( $P=0.0489$ ) (Tables 1 and 2).

**TABLE 1. Average daily gains (days 1-32) and coughing scores (days 1-10).**

Treatment group	Average daily gain (lb)	Coughing score
PRRSV challenge	0.825 <sup>a</sup>	0 <sup>a</sup>
<i>M. hyo</i> challenge	0.844 <sup>a</sup>	0.38 <sup>b</sup>
<i>M. hyo</i> & PRRSV challenge	0.616 <sup>b</sup>	0.31 <sup>ab</sup>
<i>M. hyo</i> chall. + Aureomycin	0.881 <sup>a</sup>	0 <sup>a</sup>
<i>M. hyo</i> & PRRSV chall. + Aureomycin	0.809 <sup>a</sup>	0 <sup>a</sup>

<sup>ab</sup> Means in columns with different superscripts are significantly different ( $P < 0.05$ )

## RESULTS (CONT.)

- At 10 days post-challenge, pneumonic lesions associated with *M. hyo* infection were reduced 85% ( $P=0.0001$ ) in pigs fed Aureomycin compared to non-medicated animals (Table 2, Figure 1).
- Similarly, pneumonic lesions associated with PRRSV infection were reduced 69% ( $P=0.0001$ ) at day 10 in pigs fed Aureomycin (Table 2, Figure 2).
- At the day-32 necropsy, pneumonic lesions associated with *M. hyo* and PRRSV were reduced by 94% ( $P=0.0001$ ) and 88% ( $P=0.0001$ ), respectively, in the Aureomycin-medicated pigs (Table 2, Figures 1 and 2).

***M. hyo* pneumonic lesions were reduced 85% at 10 days post-challenge in pigs fed Aureomycin.**

**TABLE 2. Summary of improvements due to Aureomycin compared to chall. controls.**

Parameter	Improvement due to Aureomycin	P value
Average daily gain	25%	$P=0.0002$
Coughing	100% <sup>a</sup>	$P=0.0489$
Day 10 <i>M. hyo</i> lesions	85%	$P=0.0001$
Day 10 PRRSV lesions	69%	$P=0.0001$
Day 10 <i>M. hyo</i> numbers	100% <sup>a</sup>	$P=0.0107$
Day 32 <i>M. hyo</i> lesions	94%	$P=0.0001$
Day 32 PRRSV lesions	88%	$P=0.0001$
Day 32 <i>M. hyo</i> numbers	100% <sup>a</sup>	$P=0.0001$

<sup>a</sup> none detected

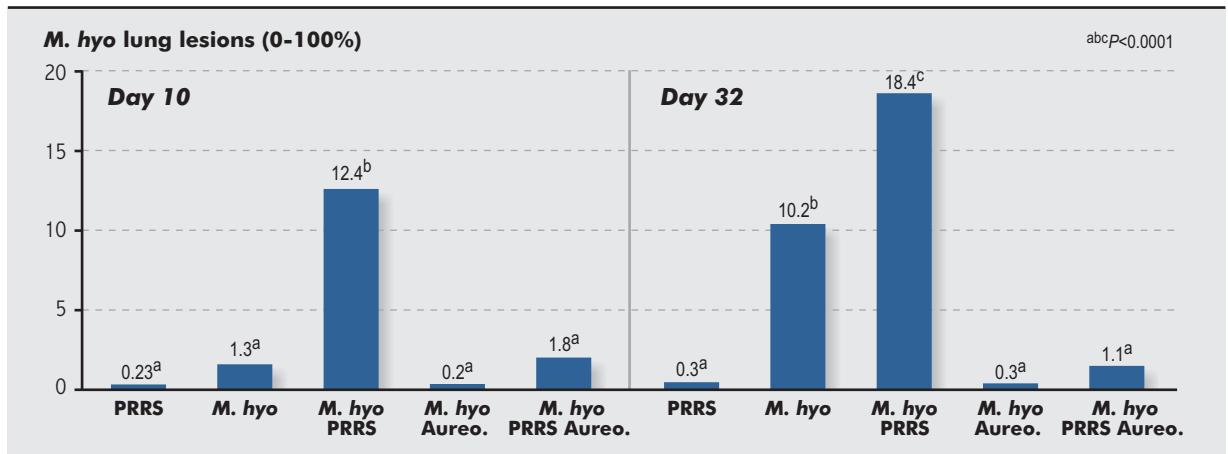


FIGURE 1: Lung lesions associated with *M. hyo* (% lung involvement).

**PRRSV lesions were reduced 69% at 10 days post-challenge in Aureomycin pigs.**

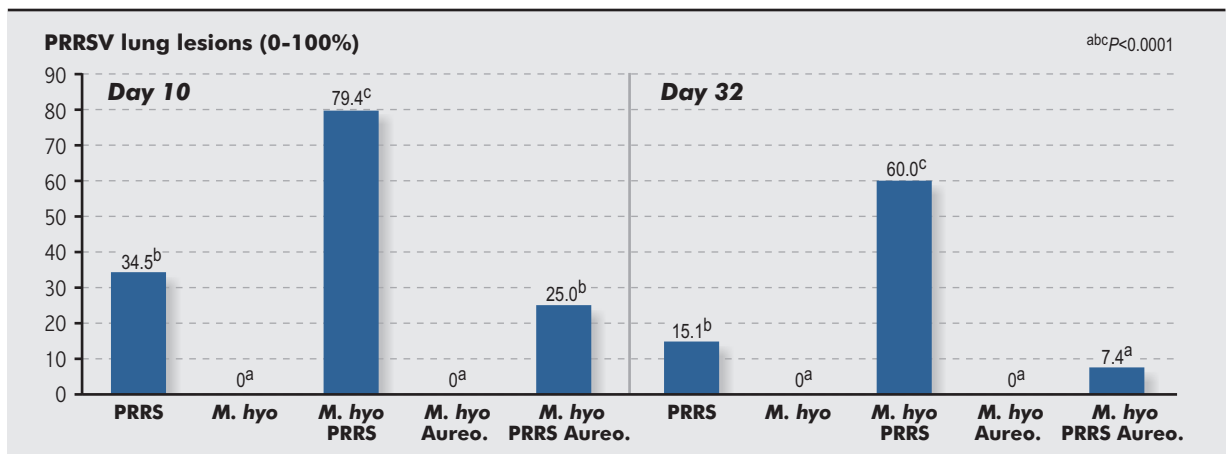


FIGURE 2: Lung lesions associated with PRRSV (% lung involvement).

## RESULTS (CONT.)

Numbers of *M. hyo* organisms were below detectable levels in pigs fed Aureomycin.

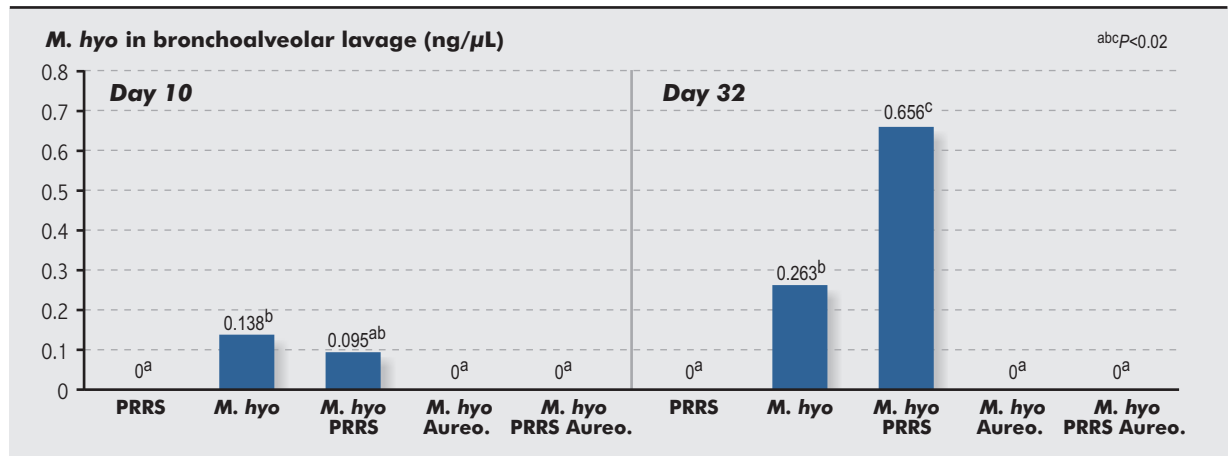


FIGURE 3: Recovery of *M. hyo* organisms from bronchoalveolar lavage.

- The number of *Mycoplasma* organisms at day 10 was below detectable levels ( $P=0.0107$ ) in both groups of challenged pigs treated with Aureomycin (Figure 3).
- *Mycoplasma* numbers in pigs fed Aureomycin remained below detectable levels ( $P=0.0001$ ) at 32 days post-challenge, 22 days after conclusion of the 14-day medication period (Figure 3).

## CONCLUSIONS

Aureomycin chlortetracycline fed at 10 mg/lb body weight for 14 days starting 3 days prior to challenge with PRRSV and *M. hyo* was effective in controlling *M. hyo* and limiting its potentiating effects on PRRSV pneumonia. While challenged non-medicated pigs experienced severe reductions in average daily gains, challenged pigs fed Aureomycin maintained weight gains. Medicated pigs demonstrated significant reductions in the severity and duration of PRRSV-induced pneumonia, and lung lesions and *Mycoplasma* numbers were reduced in treated animals. Aureomycin appeared to indirectly moderate PRRSV-induced pneumonia by directly controlling the *M. hyo* which often amplifies disease within individual hosts, and by reducing coughing so as to minimize *M. hyo* transmission within the herd.

Aureomycin should be used in conjunction with vaccination programs, not in lieu of vaccinations. Use of Aureomycin in conjunction with vaccination can help provide sufficient time for development of a mature, active vaccine-induced immune response, decreasing the potential for *Mycoplasma*-potentiated PRRSV pneumonia.

## REFERENCES

1. Thacker EL, Nilubol D, Halbur PG. Efficacy of Aureomycin® chlortetracycline (CTC) granulated premix in decreasing the potentiation of PRRSV pneumonia by *Mycoplasma hyopneumoniae*. *Proc 19th IPVS* 2006; 302.
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3. Thacker EL, Halbur PG, Ross RF, et al. *Mycoplasma hyopneumoniae* potentiation of porcine reproductive and respiratory syndrome virus-induced pneumonia. *J Clin Microbiol* 1999; 37:620-627.
4. Amass SF, Clark LK, van Alstine WG, et al. Interaction of *Mycoplasma hyopneumoniae* and *Pasteurella multocida* infections in swine. *J Am Vet Med Assoc* 1994; 204:102-107.
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6. Thacker EL, Thacker BJ, Wolff T. Efficacy of Aureomyin granular premix against experimental *Mycoplasma hyopneumoniae* infection. *Proc Am Assoc Swine Vet* 2001; 83-85.

## NOTE:

In this technical bulletin, there may be references beyond the scope of the approved labeling for the discussed product(s) as well as investigational uses. However, the information included in this technical bulletin may be freely shared with veterinarians and other professionals.