

## EFFECTIVE ANTIBIOTIC TREATMENT

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Antibiotics are a powerful tool in the fight against many diseases of livestock. They are the main tool in the treatment of most bacterial infections in swine. During disease outbreaks they not only are useful in treatment of those that are sick, but also in reducing the impact of, or even preventing, disease in other pigs in the group that are at high risk of infection. When confronted with a disease break, where bacteria play a role, there are several questions a producer and/or his veterinarian asks:

- What's the nature of the disease and what systems are involved (based on clinical signs)?
- What type of antibiotic to use – usually based on what type of bacterial infection (best assessed by laboratory analysis)?
- What way should the medication be administered – injectable, water or feed?
- How long to treat?
- What would be the cost of treatment compared to the potential loss?
- What dose of product to use based on animal weight and label instructions (unless an off-label dose is prescribed by your veterinarian)?

Even with all bases covered, most producers have seen treatment failures. Why do these occur? Often the reasons are not clearly evident and are subject to speculation but include:

- The animal treatment started too late relative to the aggressiveness of the infection.
- Some of the bacteria causing the problem were resistant to the antibiotic used.
- The wrong type of antibiotic was used for the type of bacteria responsible or the body system affected.
- The antibiotic was right but the dose was inadequate (either a miscalculation of the weight of the animal(s) treated, technical errors or failure of the administration equipment (inaccurate water medicators) or the treatment was not given for a sufficient number of days.
- The injections were made into the fat layer rather than muscle (inappropriate technique), or, in the case of oral products, intake was less than anticipated.
- The wrong delivery form of the drug was used (for example an oral product was used where an injectable product would have delivered a higher medication level to internal organs).
- The level of active ingredient in the product is reduced perhaps due to inappropriate storage.
- Bacteria did not cause the disease in the first place as in the case of viral infections.
- Concurrent infections or environmental conditions are exacerbating the disease.
- The animal's immune system was weakened - even with the antibiotic, they cannot control the infection.

In this seminar, I will solicit the groups' experiences with treatment failure. To lead this discussion, I would like to highlight a specific case of an acute diarrhea break in gilts and sows in a 3000 sow farrow-to-wean herd in southern Manitoba. This herd was a very high performing herd reproductively. The average parity was 3.9. It was regarded as a stable herd in disease and productivity status.

The problem began when the breeding/gestation manager of the barn found two mature sows dead in one section of the gestation area during the morning checks. They were both pale and one had some brownish-black staining of the skin in the area below the anus. The afternoon check revealed another sow dead. The next morning three more dead sows were found with similar signs and sixteen sows were not eating. Five of these had a reddish-brown pasty diarrhea. The manager submitted the dead sows to the local diagnostic laboratory and treated the animals off-feed with injectable oxytetracycline – 300 mg per 100 pounds body weight intramuscularly. This treatment was continued over three days for all sows that survived that long. Of those sixteen sows, ten died within 48 hours.

The preliminary diagnosis from the diagnostic laboratory was that the sows had died from proliferative hemorrhagic enteropathy (PHE). PHE is caused by a microorganism called *Lawsonia intracellularis*. These sows were afflicted by the acute or sudden form of the disease that can also cause a disease called ileitis in grower pigs. In ileitis, the effects are more prolonged (chronic) and results in pigs that do not grow well and fall behind the rest of the group. The organism attacks the cells that line the small and large intestine causing proliferation of the cells. Ultimately this disrupts the integrity of the inner surface of the intestine leading to poor absorption of nutrients from the digestive tract in the chronic case, to sloughing and bleeding of the intestinal lining in the acute case.

With this information, the barn manager elected to put tylosin phosphate (Tylan® Elanco Animal Health) into the feed at the label dose of 110 ppm for all animals in the breeding gestation areas. Tylosin is an effective treatment for *Lawsonia intracellularis* infections. The farm continued to treat sows with oxytetracycline injectable. The in-feed treatments were maintained over the next sixteen days. But in spite of this, the numbers of animals sick or dead from *Lawsonia intracellularis* infection increased rapidly over the first ten days of the outbreak. The numbers affected then stabilized and started to decline until no new cases were seen at eighteen days after the start of the problem. The final tally was two hundred eighty sows (all parities were similarly represented) that were clinically ill and treated by injection and eighty-four dead (most of these would have been injected at least once). Also eight percent of the affected sows that were pregnant aborted their litters.

The barn manager thought that the treatments provided some help to keep affected sows alive. But why did sows become ill and die days to weeks after the start of a preventative in-feed medication program with a product that is regarded as very effective against *Lawsonia intracellularis* infections? Was it a case of antibiotic resistance, appropriate medication or dose, disease dynamics or other possible causes as listed above?

We may never know exactly. A key question pertaining to this case: Did the animals in this case consume an effective amount of medicated feed? The poorer than expected response to

therapy may be related to the ineffective delivery of the proper dose of medication to the site of bacterial activity. Doses given on the label of most oral products indicate the level of medication to mix into a certain amount of water or feed. The underlying assumption for these label directions is that the targeted animals will consume enough feed or water containing the medication to hit a target dose based on the animal's body weight. In this seminar, we'll explore and discuss this and other possible causes of the treatment failure.