Mastitis Extended Antibiotic Therapy Using Ceftiofur

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Trying to cure intramammary infections in lactating dairy cows is a challenge. Cure rates for infections caused by certain types of pathogens (like \textit{Strep. ag.}) have been very good, but the tough guys like \textit{Staph. aureus} and some of the environmental organisms have posed a much greater problem. Most of the antibiotic products available for use have not been maximally effective for several reasons, with the degree and length of time of the infection being a major one. Other reasons associated with the action and use of the antibiotic that affect cure rates include the fact that the antibiotic may not have been infused into the udder for enough days, or the concentration of the active ingredient was not high enough, or the product did not stay in the udder long enough because the cow was milked two or more times a day.

Administering an antibiotic for several consecutive days is a practice that is used to treat many types of infections. Researchers and veterinarians have used this practice in their attempts to increase the cure rates when treating mastitis infections. Extended therapy treatment (beyond the usual two days) using pirlimycin has been shown to improve the cure rate of \textit{Staph. aureus} mastitis infections. Since pirlimycin is not labeled for daily infusion for more than two consecutive days, to follow an off label daily infusion regime beyond two days requires that pirlimycin be given under the supervision of a veterinarian. Producers wanting to use pirlimycin could also follow the treatment regime of treat for two days, wait thirty-six hours, and then repeat the regime one or more additional times. Until recently no antibiotic had been approved and labeled for use beyond three consecutive days. Ceftiofur hydrochloride was recently given FDA approval for infusing up to eight consecutive days for treating clinical mastitis caused by coagulase negative staphylococci (CNS), \textit{Streptoccus. dysgalactiae}, and E. coli.

Ceftiofur hydrochloride is a new broad-spectrum, third generation cephalosporin antibiotic that has the potential for improving mastitis cure rates. The product works by inhibiting bacterial cell wall synthesis, thereby preventing the bacteria from multiplying in the udder and maintaining an infection. It can be used in an extended therapy regime for up to eight continuous days in lactating cows to provide some level of cure against a wide range of both contagious and environmental mastitis pathogens.

Dr. Steve Oliver and his colleagues at the University of Tennessee studied the effectiveness of the new antibiotic in three research herds and reported their results in the Journal of Dairy Science. In their study, cows with one or more subclinical intramammary infections (based upon quarter milk samples with an SCC >400,000/ml) were blocked by parity and days in milk, and were randomly divided into four treatment groups – no antibiotic treatment, or ceftiofur infusion into the infected quarter once a day for either 2, 5 or 8 days. A bacteriological cure was considered to have occurred when the pretreatment infected quarter was free of the pathogen causing the infection on days 14 and 28 after the last antibiotic treatment.
Ceftiofur proved to be the most effective when it was administered for 8-days, with an overall infection cure rate from all types of pathogens of about 66%. Cure rates for the 5 and 2-day administration times were reduced to about 54% and 39%, respectively. The non-treatment group had a 11% spontaneous cure rate. While ceftiofur is not labeled for treating *Staph. aureus* infections, the researchers found that the cure rates of infections caused by *Staph. aureus* were 36% for the 8-day treatment group, but only 17% for 5-day, 7% for 2-day, and 0% for the no treatment groups. The cure rates for CNS caused infections, however, were not significantly different for the three antibiotic treatment groups (70%, 62%, and 86%, respectively for the 2, 5, and 8-day groups). The researchers further found that when all the environmental *Strep.* species caused infections were grouped together, the cures rates for the 2, 5, and 8-day treatment groups were also similar (50%, 67%, and 78%, respectively), but they were greater than for the non-treatment group (17%).

While this study showed that overall an 8-day extended therapy infusion regime of ceftiofur was the most effective for curing existing intramammary infections, it did not show overwhelming evidence that treating for 8 days would be justified in all herds. In herds with mostly non-contagious environmental pathogen infections and a low level of *Staph. aureus* mastitis, treating for 2 or 5 days appeared to be nearly as effective as an 8 day treatment regime. Herds with a considerable amount of *Staph. aureus* infections may have a better cure rate from a different product and/or treatment regime, e.g. multiple day treatment at time of dry-off.

Producers should consider the feasibility of obtaining a cure and the costs of treating for an extended time period before implementing this practice, regardless of the antibiotic used. Remember that milk must be discarded during the entire treatment period, plus for a designated number of hours after the last infusion. Extended mastitis treatment therapy is not a practice to follow for all cows or in all herds. Consideration must be given to how long the cow has been infected and the type of pathogen causing the infection. Some infections will not be worth the effort and expense to try and cure. I urge producers to discuss the pros and cons of using extended mastitis therapy treatment with their veterinarian, regardless of the antibiotic being considered. Extended therapy may be a useful treatment approach in many herds or in selective cows, but it is not a cure-all approach for all mastitis infections.