Efficacy of Ceftiofur Sodium (NAXCEL®) as Therapy for Experimentally Induced Bacterial Foot Rot

J.N. Berg, C.L. Henke, B.J. Hanson
Dept. of Veterinary Microbiology
College of Veterinary Medicine
104 Connaway Hall
University of Missouri
Columbia, MO 65211

The objective of this dose finding-efficacy study was to evaluate the efficacy of 0.5 and 1.0 mg of ceftiofur sodium per pound body weight given IM once daily for three consecutive days for treatment of acute bacterial foot rot in cattle when compared to similar treated placebo controls. An established model that produces lesions virtually identical to naturally occurring acute foot rot was utilized for this study. The study was initiated and completed during April 1992.

The study was conducted according to a blinded, parallel group design. The animals were challenged with an inoculum of *F. necrophorum* and *B. melaninogenicus* in the interdigital space of three feet to induce foot rot. One foot was left uninoculated. The lesions were individually evaluated and scored on day 2 post-challenge and on post-treatment days 3, 7 and 10. Lesions were scored using a pre-established 0-5 scoring system (0=no lesion to 5=most severe). In addition, the animals were evaluated for lameness on post-treatment days 1, 2, 3, 7 and 10. Lameness was scored using a pre-established 0-3 scoring system (0=normal gait to 3=severe lameness). The combined lesion and lameness scores were used for the data analysis and as the basis for evaluation of efficacy.

Thirty-nine (39) head of yearling cattle were utilized in the study. The cattle were acclimated for at least 30 days prior to challenge. During the challenge and study periods, the animals were on a ration that was free of feed additives. The animals were double-tagged in the ears for identification. The inoculated animals began to exhibit lameness two days post-challenge and the decision was made, according to the protocol, to initiate the treatments. Prior to administration of treatments, the animals were then randomly assigned to treatment groups (1, 2, 3) of 13 cattle each according to a computer generated random numbered table on day 0 (day 2 post-challenge). The feet were scored while animals were confined to a cattle chute. The clinical evaluators were not aware of the animal treatment regimens.

The treatment groups were as follows:

Group 1 (13 cattle):
Treated with ceftiofur as ceftiofur sodium at 1.0 mg/lb body weight intramuscularly once daily for three consecutive days.

Group 2 (13 cattle):
Treated with ceftiofur as ceftiofur sodium at 0.5 mg/lb body weight intramuscularly once daily for three consecutive days.

Group 3 (13 cattle):
Treated with placebo, 5 mL sterile water per animal, intramuscularly once daily for three consecutive days.

Fusobacterium necrophorum, the key bacteria in the etiology of foot rot, was isolated from 12 of 12 of the lesions in the placebo group that were cultured on post-treatment day 3, but in only 3 of 8 ceftiofur treated cattle. On post-treatment day 7, *F. necrophorum* was isolated from 9 of 9 placebo cattle but only 1 of 4 ceftiofur treated cattle. This indicates that ceftiofur was eliminating the *F. necrophorum* in the majority of the cattle treated. *Bacteroides melaninogenicus* was isolated from all lesions cultured. This was not unexpected since *B. melaninogenicus* is commonly present in the feces and the lesions in the feet were constantly being recontaminated by the feces. Ceftiofur minimum inhibitory concentrations (MICs) data had previously determined that *F. necrophorum* is susceptible to ceftiofur (MIC range of 0.016 to 0.062 μg/mL).

The group mean combined lesion and lameness foot scores and animal scores for post-treatment days 3, 7 and 10 were compared using analysis of variance procedures. Mean combined lesion and lameness scores for both ceftiofur treated groups were significantly less ($P<0.0001$) than those of the control group on post-treatment days 3, 7 and 10. There were no significant differences (tested at = 0.05) between the ceftiofur treated groups 1 and 2 at any observation time in the study for the combined scores.

Under the conditions of this study, the 0.5 and 1.0 mg of ceftiofur per pound of body weight dosages administered intramuscularly once daily for three consecutive days was superior ($P<0.0001$) to the similarly administered sterile water regimen in reducing the severity of lesions and lameness of acute bovine foot rot. The 0.5 mg and 1.0 mg of ceftiofur per pound body weight regimens were not different when compared to each other (tested at = 0.05).