Preliminary results from a non-inferiority clinical trial evaluating the efficacy of three commercial dry cow mastitis preparations

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Introduction

Although the practice of blanket dry cow therapy (DCT) has been widely adopted in North American dairy herds, the efficacy of various antimicrobial formulations was typically established many years ago and studies comparing efficacy among various commercial DCT products are largely lacking. The objectives of this study were to evaluate and compare the 1) ability to cure existing intramammary infections (IMI) present at dry-off, 2) ability to prevent new IMI during the dry period, and 3) overall risk for presence of IMI after calving among three DCT products.

Materials and Methods

The study included 1,091 cows (4,364 quarters) and was conducted on six commercial dairy farms located in Minnesota (n = 1), California (2), Iowa (1), and Wisconsin (2). The antimicrobial formulations evaluated were penicillin-dihydrostreptomycin (QUARTERMASTER®, QT, Pfizer Animal Health), ceftiofur hydrochloride (SPECTRAMAST® DC, SP, Pfizer Animal Health) and cephapirin benzathine (ToMORROW® Dry Cow™, Boehringer Ingelheim Vetmedica, Inc), and the treatments were randomly allocated to individual cows. Cows that met eligibility criteria had duplicate quarter milk samples aseptically collected prior to dry-off, between 0 and 6 days in milk (DIM), and between 7 and 13 DIM. Samples were cultured for determination of bacterial pathogens in accordance with NMC Guidelines. For any sample that was considered contaminated (≥ 3 pathogens isolated), the duplicate sample was subsequently cultured.

Data analyses were performed with SAS version 9.2. Preliminary analysis was completed at the quarter level. For quarters that had one or two bacterial pathogens cultured at dry-off, a cure was defined as lack of bacterial pathogen growth in both milk samples collected after calving. A new infection was defined as growth of one or two bacterial pathogens on samples collected at either 0 to 6 DIM or 7 to 13 DIM that had not been isolated from the milk sample collected at dry-off. Multivariable logistic regression (PROC GLIMMIX) was used to examine the relationship between treatment (explanatory variable) and each of the outcomes (dependent variable). Additional covariates tested in the model included region, parity teat-end score at dry-off, previous lactation milk production, and linear score. Cow and herd were included in the models as random effects.

Results

The overall prevalence of IMI at dry-off was 19.2% The risk for the presence of IMI at dry-off did not differ among the treatment groups ($P = 0.7$). At dry-off, 94.4% of the IMIs were attributed to gram-positive organisms 4.9% were attributed to gram-negative organisms, and 0.6% to other organisms. The most prevalent pathogen isolated from dry-off milk samples was coagulase negative *Staphylococcus* (53.9%), followed by *Aerococcus* spp (12.3%), and *Corynebacterium* spp (7.0%).

Overall, 88.9% of quarters were cured. The percentage of quarters cured did not differ among the three treatments ($P = 0.8$). The proportion of quarters that developed a new IMI between dry-off and 0 to 6 DIM and between dry-off and 7 to13 DIM was 13.3% and 13.4%, respectively The risk for developing a new IMI between dry-off and 0 to 6 DIM ($P = 0.3$) and between dry-off and 7 to 13 DIM did not differ among the three treatments. The prevalence of IMI was 14.7% for samples collected at 0 to 6 DIM, as well as for samples collected at 7 to 13 DIM. The risk of an IMI after calving did not differ among the three treatments ($P = 0.3$ for samples collected at 0 to 6 DIM and $P = 0.4$ for samples collected at 7 to 13 DIM).

Significance

These preliminary findings suggest that the three DCT products did not differ in terms of their ability to cure pre-existing IMIs, ability to prevent new IMI during the dry period, or risk for the presence of an IMI at calving. Data analyses to examine the effect of treatment on other important outcomes reflecting health and performance in the subsequent lactation, such as milk production, somatic cell count, risk for clinical mastitis, and risk for culling or death, are ongoing. Once completed, the results of this study will provide veterinarians and producers with much needed science-based information on the efficacy of commercial DCT products commonly used in North America.