

Prepartum application of internal teat sealant and/or intramammary amoxicillin on dairy heifers: impact on udder health, survival, and performance

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Introduction:

Intramammary infusion of antimicrobials (IA) and application of an internal teat sealant (ITS) at the end of the lactation is a common strategy to prevent and treat intramammary infections during the dry period. In heifers, pre-calving IA has been reported to improve udder health and milk quality. However, the effect of ITS in heifers housed in free-stall barns is still unknown. The objective of this study was to investigate the effect of prepartum application of ITS and/or IA on udder health of dairy heifers.

Materials and Methods:

A total of 886 heifers were randomly allocated when they were 245 ± 3 days pregnant into one of four treatment groups. Control heifers (CON) did not receive any treatment. Heifers in ITS group received the application of ITS containing 2.6 g of bismuth subnitrate (Orbeseal®, Zoetis Animal Health, Florham Park, NJ). Animals in IA group received intramammary administration of 62.5 mg of amoxicillin (Amoxi-Mast®, Merck Animal Health, Madison, NJ).. Heifers in IA+ITS group received intramammary administration of amoxicillin followed by ITS application. Clinical mastitis was diagnosed and treated by trained farm personnel who follow a specific diagnostic protocol designed by the staff of the Ambulatory and Production Medicine Clinic, Cornell University. Composite milk SCC were determined monthly by Dairy Herd Improvement Association (DHIA), and the SCC linear score was automatically calculated and inputted into the farm's DairyComp 305 database. Subclinical mastitis was defined as a cow having a SCC $>200,000$ cells/ml for at least one test day and not diagnosed with clinical mastitis during the study period. Composite milk samples were collected for a subset of the study animals ($n=509$) at 7 ± 3 DIM, immediately after the morning milking. Samples were submitted to the Quality Milk Production Services (QMPS) laboratory at Cornell University for bacterial identification using standard aerobic culture. Logistic regression, repeated measures ANOVA, and Cox' proportional hazard models were used to analyze the data.

Results:

The presence of pathogens in milk at 7 ± 3 DIM was more frequently detected in the CON heifers (17.1%) compared to animals enrolled in the groups ITS (0%), IA (9.1%), and IA+ITS (1.1%, $P < 0.01$). Heifers in IA+ITS group had decreased incidence of clinical mastitis compared to CON heifers (21.4% vs 12.9%; $P = 0.05$), but clinical mastitis incidence was not different between heifers in ITS, IA and CON groups. Additionally, the incidence of subclinical mastitis was decreased for IA+ITS heifers compared to CON counterparts (43.8% vs 20.1%); $P < 0.01$. During the first nine months of lactation, IA and IA+ITS heifers had lower SCC linear scores compared to ITS and CON counterparts ($P < 0.01$). The overall SCC linear score during the study period for CON, IS, IA, and IA+ITS was 2.4, 2.2, 1.9 and 1.8, respectively. Although IA+ITS treatment successfully improved udder health, it did not result in better milk yield, fertility and culling outcomes.

Significance:

Alone, ITS was not effective in improving udder health. However, the combination of ITS and IA improved udder health and milk quality by decreasing the incidence of clinical and subclinical mastitis, and had a long term effect on the SCC linear score throughout the lactation. It is important to highlight that intramammary infusion of antibiotics in pre-calving heifers may represent extra-label drug use. Therefore, it should be supervised by the herd veterinarian.