

Intramammary infusion of casein hydrolysate for involution of single mastitic mammary quarters that are elevating cow-level somatic cell count

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Introduction

Mastitis in a single quarter can cause high somatic cell counts (SCC), clinical mastitis, and death in dairy cows. Casein hydrolysate (CH) is an intramammary (IMM) infusion treatment reported to induce mammary involution. Objectives were to study cessation of milk production in one mastitic quarter per cow following CH IMM infusion, 3-quartered cow milk production and cow-level SCC for the remainder of lactation, and after calving, whether the mastitic quarter resumed milk production, cow and quarter-level milk production, SCC and elimination of previously isolated mastitis pathogens.

Materials and Methods

Criteria for study cows from 6 farms were: mastitic quarter SCC > 10^6 /ml, cow-level SCC > 500,000/ml, mastitic quarter producing > 20% (front) or > 25% (rear) of total cow milk, daily milk production \geq 50 lb (22.7 kg), 95-220 days until expected calving, and mycoplasma-negative milk. Cows were blocked based on parity (1st, 2nd-plus) and mastitic quarter culture results, and 3 treatments were randomized in a 2:2:1 ratio: CH, non-hydrolyzed casein (NHC), and cessation of milking only (negative; N). Target quarters were milked 1X and treated for 3 d, then not milked until after the next calving. Total-cow milk production and SCC were measured 7-14 d after treatment ended. After calving, total-cow and treated quarter SCC and milk production were measured once between 10 and 21 DIM. Bacterial cure criteria were: all 3 weekly milk cultures 1-7 DIM, 8-14 DIM and 15-21 DIM negative for pre-treatment pathogen(s).

Results

Forty cows were enrolled, 12 were culled, 28 completed the study (14 CH, 9 NHC, 5 N treated) except one more cow died before her final post-calving culture sample; 27 completed the entire protocol. No adverse effects (swelling, edema, milk leakage, etc.) were reported. 23 treated quarters had bacteria isolated pre-treatment, 17 quarters had no growth. Before treatment, cows assigned to the 3 treatment groups were not different in DIM, cow-level SCC (1,634,000/ml), mastitic quarter SCC (4,392,000/ml), milk production, or mastitic quarters' proportion of milk produced (28%) (all $P > 0.50$, ANOVA). After involution of the mastitic quarter, decrease in cow-level (3 remaining quarters) SCC (-966,000/

ml) and milk production (-14%) were significant for all treatments combined ($P < .02$, ANOVA). Among treatments, CH had a significant decrease (-1,150,000/ml) ($P = 0.003$, ANOVA) in cow-level SCC. All treated quarters returned to milk production after calving, and their proportion of total-cow milk was unchanged from before treatment (24%) ($P = 0.46$, t-test). The previously mastitic quarters' SCC were significantly decreased after calving following all treatments: CH -2,763,000/ml ($n = 14$), NHC -2,129,000/ml ($n = 9$), N -5,324,000/ml ($n=5$), all $P < 0.01$, ANOVA). Of the 23 culture-positive cows, 16 completed the milk culture protocol; 14/16 (88%) of treated quarters had a bacteriological cure post-calving, not significantly different between treatments (all $P \geq 0.35$, Fisher's exact test).

Significance

Casein hydrolysate IMM infusion was associated with involution of mastitic quarters, reduced cow-level SCC in milk of the remaining 3 quarters for the rest of lactation, and all treated quarters returning to milk production following calving. There was continued improvement of milk quality in the previously treated quarter and at the cow level early in the next lactation, with most previously isolated mastitis pathogens no longer found in milk. Infusing single mastitic quarters with casein hydrolysate to induce involution for the remainder of lactation may be a promising alternative to current methods.