Assessing the risk of subclinical infections in cows with clinical mastitis

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Introduction

Clinical mastitis (CM) is an expensive disease, with an estimated cost of $400 (Rollin, 2015) per case. One approach to treatment and management of cows with CM is to focus efforts on the quarter(s) with abnormal milk and signs of inflammation, disregarding quarters with visibly normal milk. Current recommendations for pathogen-based mastitis treatment result in a decrease in antibiotic use, increasing saleable milk. However, when comparing the estimated percentages of CM (Barkema, 1998) to all infected quarters in a herd (Eberhart, et al, 1982) based on bulk tank SCC, CM infections can be "the tip of the iceberg." Subclinical mastitis (SCM) can negatively impact milk quality and production (Huijps, et al., 2008) and may go undiagnosed in cows with clinically normal quarters. Previous research has reported that 67% of cows with CM also had SCM in a nonclinical quarter (NCQ; Lago and Silva-del-Rio, 2014). This research continued to report that sampling NCQs increased the percentage of cows with identifiable intramammary pathogens from 52% to 82%.

The objective of this project was to evaluate the risk of SCM in NCQs of cows with CM in comparison to animals with normal milk. Our hypothesis is that cows with CM in one quarter are at a higher risk of SCM in NCQs when compared to low and high somatic cell count (SCC) control groups.

Materials and Methods

Four herds in New York aseptically quarter sampled all cows with CM at the time of CM identification. Samples were cultured using standard microbiological methods (NMC, 1999) by Quality Milk Production Services (Canton, NY). The farms appropriately managed clinical quarters, using either blanket treatment or pathogen-based mastitis treatment protocols.

Control cows were matched on days in milk (DIM) and parity to CM cows. Control cows were classified as low SCC (LSCC; <200,000 cells/ml) or high SCC (HSCC; >200,000 cells/ml) based on DHIA SCC or decrease in milk production and conductivity. Control cows were quarter sampled aseptically. All quarters (CM and control) with bacterial intramammary infections (IMI; control and clinical) were re-sampled within 2-4 weeks for aerobic culture and SCC.

Statistical analysis was conducted to compare risk of subclinical IMIs between NCQs from cows with CM and cows with otherwise normal milk (control cows), follow-up sample data was analyzed to determine rate of bacteriological cure.

Results

A total of 1698 quarters (CM =246, NCQ = 575, LSCC = 486, HSCC = 391) were included in the study. Average DIM (mean = 150.7; range = 1 to 484) and parity (mean = 2.7; range = 1 to 9) did not vary across CM and control cow groups.

Overall, 25.7% of all quarters sampled (n = 1698) had an IMI. Positive culture results occurred in 55.3% of CM quarters, and 24.63% of NCQ from a clinical cow. High SCC cows had an IMI in 26.6% of quarters samples, while LSCC cows only had a IMI in 11.5% of quarters sampled. Samples from NCQ of a CM cow and quarters from a HSCC cow were at a greater risk of having an IMI as compared to samples from LSCC cows (OR = 2.7207; CI = 1.9833 – 3.7322).

The most common pathogens present in initial samples included Staphylococcus spp. (n = 177), Gram negative organisms (n = 119) and Streptococcus spp. (n = 95). Overall, 38.9% of follow-up samples showed a persistent IMI. Samples from HSCC quarters were most likely to have a follow up IMI (57.4%) as compared to CM (28.3%), LSCC (29.8%) and NCQ (38.9%).

Follow up samples from HSCC cows had a greater percentage of IMIs as compared to all other groups.

Significance

While nonclinical quarters in a cow with CM had an increased risk of infection as compared to quarters from a low SCC cow, the risk was similar to that in a quarter from a cow with a high SCC and visibly normal milk. Data from this study indicates that only 55.3% of CM quarters had a positive culture result, displaying the importance of using a pathogen based treatment protocol.