

Risk of New Intramammary Infections during the Dry Period in Holstein Dairy Cattle Enrolled in the CBMRN National Cohort of Dairy Farms

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Introduction

Intramammary infections acquired during the dry period are difficult to diagnosis and tend to lead to decreased production in the subsequent lactation. In addition, the use of dry cow therapies (DCT) have virtually eliminated major pathogens, such as *Streptococcus agalactiae*. However, use of dry cow therapy or teat sealants may have questionable efficacy against other pathogens. Selective dry cow therapy, based on farm- or cow-specific pathogen profiles, tend to decrease usage of antimicrobial products. However, to generate farm-specific pathogen profiles, knowledge of incidence of intramammary pathogens is needed.

The objectives of this observational study were to determine the incidence of new intramammary infections (NIMI) in dairy cattle during the dry period and risk factors associated with NIMI incidence risk.

Materials and Methods

Ninety-one dairy farms in Canada were initially enrolled in this study in 2007. A subset of 71 farms were re-enrolled in 2008. Four geographic regions (Western, Ontario, Quebec, and Atlantic) were identified as study centers, with the Western region contributing 17 and 15 farms in 2007 and 2008, respectively, Ontario contributing 27 and 15 farms, Quebec contributing 29 and 25 farms, and Atlantic Canada contributing 18 and 16 farms. Fifteen Holstein dairy cows were identified from each farm and enrolled.

Quarter milk samples were aseptically collected 14 to 30 days prior to expected dry off date (DC-1), 0 to 14 days prior to expected dry off date (DC-2), 24 to 48 hours after time of parturition (FC-1), and 7 to 14 days after parturition (FC-2). Pre-dry off (DC-1 and DC-2) samples were taken in a manner to ensure at least a 14-day time differential. All milk samples were cultured for bacteriological analysis. A technician-administered questionnaire inquiring about various dry period management factors was also completed by all farms enrolled in the 2008 calendar year. Incidence risk of NIMI was calculated as proportion of pathogen-positive quarters (FC-1) to pathogen-negative quarters (DC-2).

Probability of perceived cure was calculated as proportion of pathogen-negative quarters (FC-1 and FC-2) to pathogen-positive quarters (DC-2). Generalized mixed models were constructed to evaluate effects of various management factors on the risk of NIMI.

Results

The most prevalent pathogens during the dry period were coagulase-negative *Staphylococcus* spp (CNS), *S. aureus* (SAU), *C. bovis* (CBS), and *Streptococcus* spp (STS). Risks of cure and NIMI of CNS were 50.9% and 26.5%, respectively. Risks of cure and NIMI of SAU were 68.3% and 2.6%. Risks of cure and NIMI of STS were 88.8% and 4.5%. Risks of cure and NIMI of CBS were 87.3% and 3.5%.

Using a random effects logistic regression mixed model, there was no association noted between use of internal teat sealants and risk of CNS NIMI ($P = 0.45$). A reduction in SAU NIMI risk in quarters that were treated with an internal teat sealant (odds ratio = 0.71) was noted.

Significance

Applying a universal definition of NIMI or cure based solely on presence of a bacterial pathogen may present limitations. This study uses a NIMI definition based on pathogen isolation only in the immediate postpartum period based on a population of quarters at risk being negative isolation in the immediate pre-dry period. Additionally, these definitions only use presence of bacterial pathogens at these time points. Colony counts, somatic cell count, and/or presence of a second isolate identified within a sample are being explored as well to determine the most suitable definitions of IMI in the pre-dry period and NIMI in the dry period. The cure rate of *S. aureus* is unusually high in this study as compared to others. Genotype of *S. aureus* or DCT may be the attributable factor for such differences. However, the cure rate may be overestimated if some pre-dry samples are actually false positives or if some postpartum samples are actually false negatives.