

# Impact of a Coagulase-negative Staphylococci or *Staphylococcus aureus* Intramammary Infection during the First Month of Lactation on Somatic Cell Count, Milk Yield, and Culling in Primiparous Cows

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## Introduction

Mastitis in heifers is not uncommon. During the last 20 years, numerous investigations have described the nature of mastitis in heifers (Fox, 2009). Coagulase-negative staphylococci (CNS) are the most prevalent cause of intramammary infections (IMI) in heifers around calving, but *Staphylococcus aureus* should not be ignored as it is also prevalent, contagious, and more likely to persist into lactation. Some studies have shown a negative impact of an elevated early lactation somatic cell count (SCC) on subsequent test-day SCC, milk production and survival in heifers (De Vlegher *et al*, 2004-2005). The impact should vary according to the pathogen causing the IMI. The objective of this study was to determine the effect of an IMI caused by CNS or *S. aureus* diagnosed during the first month of lactation in heifers on SCC, milk production, and culling risk during the first lactation.

## Materials and Methods

Data were obtained from an animal-health record system (DS@HR) used by the veterinarians of the ambulatory clinic of the Faculté de médecine vétérinaire of the Université de Montréal during monthly or bimonthly herd health visits that included a mastitis control program. This program consisted of routinely collecting a composite milk sample from all fresh cows in the herd since last visit. Bacteriological analysis data of composite milk samples taken from 2,314 heifers among 50 dairy herds were interpreted according to the National Mastitis Council guidelines. Among the 1,691 heifers meeting the selection criteria, 168 (10%) were diagnosed with CNS, 90 (5%) with *S. aureus*, and 153 (9%) were negative (no pathogen isolated). Milk yield, SCC, and culling rate of these three culture groups of heifers were compared statistically. For SCC analysis, test-day SCC transformed in natural logarithm was modeled in a repeated measures linear regression model with herd as random effect. The final model included regression terms for culture group, days-in-milk (DIM), parent

average genetic value for linear score, and interaction between culture group and DIM. A similar model was used to compare milk yield between culture groups except that age at calving, parent average genetic value for milk yield, and natural logarithm of DIM (to reflect the normal lactation curve) were included in the model. The hazard ratios (HR) of culling risk for heifers with IMI caused by *S. aureus* or CNS compared with negative heifers were estimated by a Cox survival model. Each observation entered the risk set at the time of first milk sampling and cows were censored at culling decision date, next calving date or at a maximum observation time of 400 days. Final model included estimated 305-d cumulative milk yield as covariable.

## Results

The natural logarithm SCC (lnSCC) in CNS and *S. aureus* groups were significantly higher than in negative group from 40 to 300 DIM ( $P < 0.0001$  for all contrasts). At test-day level, lnSCC in CNS and *S. aureus* groups were on average 0.8 and 1.3 units higher than negative group, respectively. Milk yield was not statistically different among culture groups from 40 to 300 DIM ( $P > 0.06$ ). Compared with negative heifers, the culling hazard ratios estimated in *S. aureus* and CNS infected heifers were not significant ( $P > 0.16$ ).

## Significance

The presence of an IMI with CNS or *S. aureus* had a negative impact on milk quality. This impact was present during the whole lactation and was more pronounced for *S. aureus* infected heifers than for CNS infected heifers. Despite the effect on SCC, there was no association between IMI in the first month of lactation and milk production or culling in heifers. The present study indicated that a positive diagnosis of CNS or *S. aureus* according to microbiological analysis of a composite milk sample taken in the first month of lactation in heifers was associated with future elevated SCC over the entire first lactation.