Understanding Coagulase-negative Staphylococcal Mastitis in Dairy Heifers

Nicole J. Walljasper, Pamela R. Fry, John R. Middleton
University of Missouri College of Veterinary Medicine, Columbia MO

College of Veterinary Medicine
University of Missouri
Agricultural Experiment Station Funds

INTRODUCTION

Subclinical mastitis caused by coagulase-negative staphylococci (CNS) is a major cause of intramammary infection (IMI) in dairy heifers and may impact their future productivity. The prevalence of CNS IMI in primiparous heifers has been reported to be higher than in multiparous cows, with *Staphylococcus chromogenes* being the major cause of CNS IMI (Pyörälä & Taponen, 2009). Previous studies of subclinical mastitis caused by CNS have been completed, however, not much research has been performed involving the specific species and strain-type of CNS in dairy heifers. This information is needed to better understand the epidemiology of CNS infections.

The purpose of this study was to use bacteriological culture and molecular speciation methods to determine if the same species and strain-type of CNS were found in heifer mammary glands before and after parturition to help understand when heifers become infected.

METHODS

Step 1

- Pre-partum mammary quarter secretion samples (once) and post-partum quarter milk samples (twice within 10 days of calving) were collected from primiparous heifers
- Samples stored frozen (-20°C)

Step 2

- Samples thawed and cultured on blood agar
- Colonies selected based on morphology, color, positive catalase test, negative coagulase test
- Selected colonies banked in phosphate buffered glycerol (-20°C)

Step 3

- PCR amplification of the *rpoB* gene was performed on banked isolates
- PCR product was purified and submitted for DNA sequencing
- NCBI BLAST program was used to analyze the sequence data to identify the species of each isolate

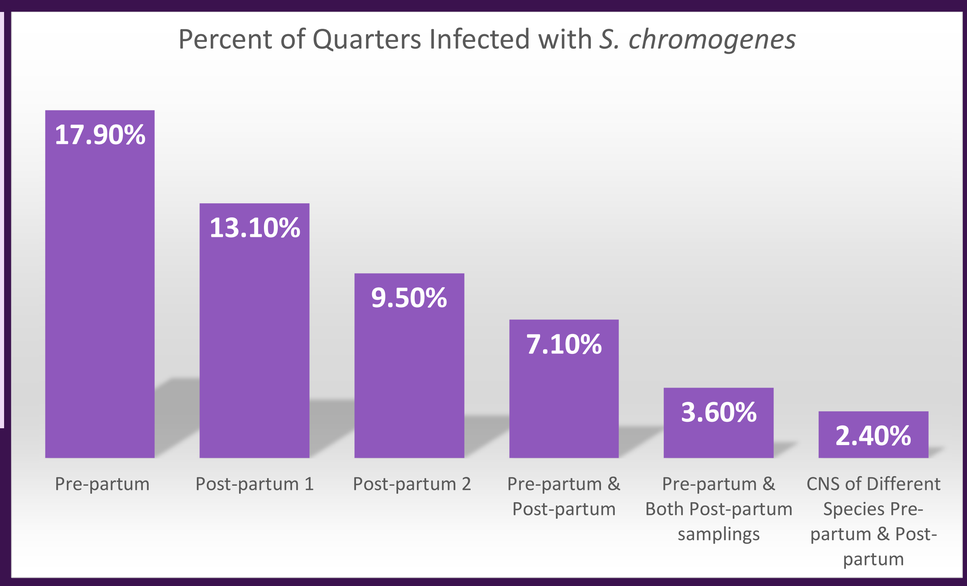
RESULTS

Overall, 84 mammary quarters were sampled pre- (n = 84 secretion samples) and post-partum (n = 168 milk samples). The median number of CNS infected quarters per heifer at any given time point was 1 (range: 1-3).

Table 1. Distribution of CNS species identified in each sample type. *S. chromogenes* is the most common species present. Parenthetic data = number identified; % = % of column total.

Isolated CNS Species	Pre-partum	Post-partum 1	Post-partum 2
S. chromogenes	65.2% (15)	73.3% (11)	80% (8)
S. agnetis	8.7% (2)	0	0
S. devriesei	4.3% (1)	0	0
S. equorum	0	6.7% (1)	0
S. pasteuri	0	0	10% (1)
S. xylosus	0	0	10% (1)
Total	23	15	10

Figure 1. *S. chromogenes* was the only species of CNS present both pre-partum and post-partum. 2.4% (2) of quarters were infected with a different species of CNS pre-partum and post-partum.



CONCLUSIONS

Coagulase negative staphylococci is a common cause of subclinical mastitis in dairy heifers. In this study, *S. chromogenes* was the most common cause of CNS IMI. This finding is consistent with previous studies that have shown *S. chromogenes* to be prevalent in primiparous heifers (Thorberg et. al., 2009). Of the 12 quarters that had a CNS infection both pre-partum and post-partum, 6 quarters contained the same species (*S. chromogenes*) in both samples. Strain-typing will be performed using pulsed-field gel electrophoresis (PFGE) to determine whether the same strain of *S. chromogenes* is present before and after parturition in a given mammary quarter. Further, a larger number of heifers will be studied and these data will be correlated with milk production and milk quality data to understand the true impact of these IMI on first lactation performance. Final results of this project will further our understanding of the epidemiology of CNS infections in dairy heifers and allow the development and study of methods to control and prevent these IMI that may impact future productivity of the dairy heifer.

ACKNOWLEDGEMENTS

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