

THIS ARTICLE IS SPONSORED BY THE
MINNESOTA DAIRY HEALTH CONFERENCE.



UNIVERSITY OF MINNESOTA

College of Veterinary Medicine

VETERINARY CONTINUING EDUCATION



ST. PAUL, MINNESOTA
UNITED STATES OF MINNESOTA

Prevalence, Etiology and Self Cure Rates of Subclinical Intramammary Infections in Fresh Cows

Alfonso Lago¹, Sandra Godden¹, Russ Bey¹, Ken Leslie², Pamela Ruegg³, Randy Dingwell²

¹University of Minnesota, St. Paul, Minnesota

²University of Guelph, Guelph, Ontario

³University of Wisconsin, Madison, Wisconsin

Introduction

The dairy industry recognizes the importance of intramammary infections (IMI) that occur during the dry period and persist into the next lactation. Identifying and eliminating subclinical IMI present at the time of calving could result in milk quality, cow health and production benefits throughout the future lactation. A multi-site multi-herd controlled field study entitled “Use of an On-Farm Culture System for the Strategic Treatment of Clinical and Subclinical Intramammary Infections” aims to complete a 3-year project designed to validate the efficacy, and to quantify the cost-benefit, of incorporating on-farm culture systems into both clinical and subclinical mastitis monitoring and treatment programs. The objective of this abstract is to present preliminary results describing the prevalence, etiology and self cure rates of subclinical IMI in fresh cows and quarters enrolled into this study.

Methods

Fresh cows from 11 Canadian and US herds were enrolled in the first 3 days after calving. Cows were excluded from enrollment if they had fewer than 3 functional teats, signs of clinical mastitis at time of calving, or any other condition requiring treatment with systemic antibiotics.

The herdsman performed the CMT and collected a milk sample from all four quarters using aseptic sampling techniques. The samples were frozen, and later cultured in the laboratory following methodologies standardized among labs at all participating sites and in accordance with the identification procedures recommended by the National Mastitis Council (NMC, 1999).

Intramammary infection in a quarter was defined as isolation of 1 or 2 bacterial pathogen species from a quarter milk sample. A sample was considered contaminated if 3 or more bacterial species were isolated. A cow was considered infected if 1 or more quarters were infected.

Bacteriological cure within a quarter was assessed by reculturing all 4 quarters at approximately 14±3 and 21±3 days after enrollment. A cure within the quarter was defined as presence of one or two organisms in the enrollment milk sample, and the absence of the same specified microorganism(s) in both the 14 and 21-day milk samples.

Results and Discussion

Results describe the prevalence of IMI (%) reported at both the cow and quarter level, and the distribution of pathogens cultured from infected quarters. It is also reported the self cure rates for the different pathogens isolated in cows assigned to study groups where antibiotic intramammary treatment was not applied.

Prevalence and Etiology

At this stage of the study data are available to described culture results for a total of 1028 cows and 4044 quarters.

Seventy-two percent of all cows were infected at calving in at least one quarter. Remarkable is that the percentage of first lactation animals infected was 20% higher than that of mature cows. This pattern was present in 9 of the 11 herds. Thirty-seven percent of the quarters from all cows were infected. Again, there was a parity difference. Infected cows had an average of 2 infected quarters; 39%, 28%, 22% and 11% of the cows had 1, 2, 3 or 4 infected quarters, respectively.

The pathogen most commonly isolated from infected quarters was coagulase-negative *Staphylococcus* spp., followed by *Bacillus* spp., *Streptococcus uberis*, *Enterococcus* spp., *Escherichia Coli*, *Aerococcus* spp., *Enterobacter* spp., *Staphylococcus aureus*, *Klebsiella* spp., Yeast, *Streptococcus dysgalactiae*, *Corynebacterium bovis*, *Arcanobacterium pyogenes*, *Citrobacterium* spp., and *Acinobacterium* spp.

Table 1. Percentage (%) of infected and uninfected cows and quarters at 1-3 DIM, and pathogens isolated (%) from infected quarters.

	Heifers (n= 459)		Mature Cows (n= 569)		All Cows (n= 1028)	
	All Cows	Within Herd Range	All Cows	Within Herd Range	All Cows	Within Herd Range
COW LEVEL						
INFECTION STATUS (%)						
Uninfected	18	(0-25)	38	(0-59)	28	(0-43)
Infected	82	(75-100)	62	(41-100)	72	(57-100)
Contaminated	0.7	(0-14)	0	---	0.29	(0-6)
QUARTER LEVEL						
INFECTION STATUS (%)						
Uninfected	53	(21-64)	67	(19-84)	60	(20-74)
Infected	43	(35-73)	30	(15-77)	37	(30-76)
Contaminated	4	(2-19)	3	(0-13)	3	(1-19)
ETIOLOGY OF IMI FOR						
QUARTER INFECTIONS (%)						
<i>Staphylococcus</i> spp.	54	(32-75)	49	(34-100)	51	(43-80)
Env. streptococci	22	(0-38)	21	(0-38)	21	(0-30)
<i>Bacillus</i> spp.	11	(0-43)	21	(0-61)	16	(5-57)
Coliforms	9	(0-27)	7	(0-23)	8	(0-19)
<i>Staph. aureus</i>	3	(0-14)	0.6	(0-2)	2	(0-13)
Other	1	(0-6)	2	(0-13)	2	(0-5)

Self Cure Rates

Data were analyzed from a total of 366 infected quarters with 442 bacteria. These quarters belong to cows not assigned to antibiotic intramammary treatment study groups.

Overall bacteriological cure rates (CR) for all quarters was 54%. Cure rates for coagulase-negative *Staphylococcus* spp. and *Staphylococcus aureus* infections were very poor, as more than 60% of these infections persisted until at least two-to-three weeks after freshening. Much higher spontaneous CR were observed for environmental streptococci and coliform infections, with almost 90% of these infections being eliminated by two-to-three weeks after calving. *Bacillus* spp. infections showed an intermediate pattern, with 45% of these infections persisting until at least two-to-three weeks after calving.

Table 2. Proportion of fresh quarters with intramammary infection that self-cured in the early lactation period, by pathogen isolated.

<i>Staph. spp.</i>		<i>S. aureus</i>		<i>Bacillus spp.</i>		Env. streptococci		Coliforms	
CR (%)	Isolates (n)	CR (%)	Isolates (n)	CR (%)	Isolates (n)	CR (%)	Isolates (n)	CR (%)	Isolates (n)
37 ^a	254	38 ^{ab}	8	55 ^b	64	86 ^c	86	88 ^c	24

^{a b c} Different superscripts significant within a row at P<0.05

The parity of the cow did not have an effect on risk for a bacteriological cure within a quarter.

This preliminary analysis shows that a high prevalence of subclinical IMI infections are present at 1-3 DIM, with half of these IMI due to coagulase-negative *Staphylococcus* spp. It is remarkable that many of these infections are still present two-to-three weeks after parturition. Consequently, there is still a significant opportunity for new management tools to be implemented to further reduce IMI at calving. Once completed, this study will report on the efficacy and cost-benefit of using CMT and on-farm culture methods to identify and strategically treat subclinical IMI in fresh cows.

Reference

National Mastitis Council: Laboratory Handbook on Bovine Mastitis. Revised Edition. 1999. Natl. Mastitis Council, Inc., Madison, WI.