

# Effect of Using an On-Farm Culture-Based Treatment System on Antibiotic Use and Bacteriological Cure for Clinical Mastitis

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## Introduction

Mastitis remains the most costly infectious disease, and the most frequent cause of antibacterial use on commercial dairy farms. As such, research should continue on the development and validation of new management tools that will help reduce the health and economic impact of this disease, while at the same time promoting the judicious and strategic use of antimicrobials on dairy farms. The adoption of on-farm culture systems may allow producers to make more strategic mastitis treatment decisions, potentially reducing antimicrobial use while maintaining the future production potential of the cow. The objective of this study was to describe the effect of using an on-farm culture system to guide strategic treatment of clinical mastitis cases on intramammary antibiotic use and bacteriological cure rates in affected quarters.

## Materials and Methods

Mild or moderate clinical mastitis cases from eight Holstein herds in MN, WI, and Ontario were enrolled into the study. A milk sample was aseptically collected from the affected quarter(s) immediately upon detection of a clinical case. The case was then randomly assigned to either 1) a positive-control group or 2) an on-farm-culture-based treatment group. Positive-control cases received immediate on-label intramammary treatment with cephapirin sodium (Cefa-Lak®, Fort Dodge, IA). Quarters assigned to the culture-based treatment group underwent on-farm culture over a 24 hr period (Minnesota Easy Culture System – Biplate. University of Minnesota, St. Paul, MN). Quarters showing Gram-positive growth were treated the next day with on-label intramammary treatment with cephapirin sodium (Cefa-Lak®, Fort Dodge, IA). Quarters with gram-negative growth or no growth did not receive intramammary therapy. Intramammary infection (IMI) in a quarter was defined as isolation of one or two bacterial pathogen species from a quarter milk sample. Bacteriological cure within a quarter was assessed by repeated sampling and culture performed at approx. 14 ± 3 and 21 ± 3 days post-enrollment. A bacteriological

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. Data were analyzed using the GLIMMIX procedure of SAS to determine the effect of mastitis treatment group (positive control group vs. on-farm culture group) and of other variables on risk for a bacteriological cure. Herd and cow were controlled for as random variables. A significance level of  $P < 0.05$  was used.

## Results

Four-hundred and fifty-two quarter cases of clinical mastitis were enrolled into the study. Enrollment culture results were available for 421 quarters. Sixty-four percent of the enrollment samples from quarters with clinical mastitis grew bacteria. Coliforms were the pathogens most commonly isolated (37% of IMI), followed by environmental streptococci (23%), coagulase-negative *Staphylococcus* spp (15%), *Staphylococcus aureus* (10%), and other infections (15%). In the culture-based treatment group IMM antibiotics were used for only 43% of the clinical cases (vs. 100% for the positive-control group). Bacteriological cure rates were calculated for 182 infected quarters for which all three follow-up samples were available. The proportion of quarters with bacteriological cure were 71% and 60% for cases assigned to the positive-control group and the culture-based treatment group, respectively. This difference was not statistically significant ( $P = 0.15$ ). Bacteriological cure risk was different among the different types of bacterial infections. However, the effect of mastitis treatment group was not statistically different among the bacterial infection classification groups.

## Significance

Use of an on-farm culture system to guide strategic treatment decisions resulted in a significant reduction in antibiotic use, but no significant decrease in bacteriological cure risk for mild or moderate clinical mastitis cases.