# Efficacy of Two Fresh Cow Subclinical Mastitis Treatment Programs on Antibiotic Use, Days out of Tank, Bacteriological Cure, Clinical Mastitis, Somatic Cell Count, Milk Yield, Reproduction, and Culling

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## Introduction

This study aimed to investigate the efficacy of using the California Mastitis Test (CMT) alone, or the CMT and on-farm culture (OFC) in series, to diagnose and treat subclinical mastitis after calving.

## Materials and Methods

Cows from 14 Holstein herds in MN, WI, and ON were enrolled in the first three days after calving. Quarter milk samples were collected and the CMT was performed on all four quarters. For cows with all four quarters CMT-negative, no treatment was assigned. Cows with at least one CMT-positive quarter were randomly assigned to a negative-control (NC), a CMT-based (CMTB), or to a culture-based treatment group (CB). Quarters from cows assigned to NC did not receive intramammary (IMM) antibiotic treatment. CMT-positive quarters from cows assigned to CMTB received on-label cephapirin sodium (Cefa-Lak®, Fort Dodge, IA). CMT-positive quarters from cows assigned to CB were not treated until OFC results were available after 24 h of incubation (Minnesota Easy Culture System - Biplate. University of Minnesota, St. Paul, MN). Only quarters with a gram-positive result received IMM cephapirin sodium treatment. Outcomes evaluated included a) quarter risk to receive IMM treatment (TX); b) quarter bacteriological cure risk (BACTCUR) in the 21-days after enrollment; c) days out of tank (DOOT) after calving; d) quarter risk and days to clinical mastitis (CM); e and f) linear SCC (LSCC) and milk yield (MILK) using monthly DHIA test records; g) risk and days to conception (PREG); and h) risk and days to removal from herd (CULL) for the rest of lactation (up to one year after calving). Generalized Mixed Models were used for the analysis of dichotomous outcomes (BACTCUR), Cox Frailty Models for time-to-event outcomes (CM, PREG and CULL), and General Mixed Models for continuous outcomes (DOOT, MILK and LSCC). Herd was included as a random effect. A significance level of $P < 0.05$ was used.

## Results

A total of 1,885 cows were enrolled in the study. Of those, 1,168 had a negative CMT result on all four quarters, and 717 had at least one CMT-positive quarter: 241 were assigned to NC, 232 to CMTB, and 244 were assigned to CB. The TX risks for CMT-positive cows and quarters assigned to CMTB were 100% and 50%, respectively. These risks for cows and quarters assigned to CB were 40% and 15%, respectively. Consequently, there was an increase in DOOT for both antibiotic treatment groups, 6.3 d for CMTB and 4.4 d for CB, compared to 1.7 d for NC. Using NC as the reference, the odds ratio (OR) for a BACTCUR was higher for quarters assigned to CMTB [$OR_{NC}$ (95% confidence interval (CI)) = 2.4 (1.5, 3.7); P = 0.0002], and there was a trend for a higher BACTCUR for quarters assigned to CB [$OR_{NC}$ (95% CI) = 1.5 (0.9, 2.4); P = 0.07]; CM hazard ratios (HR) were lower for quarters assigned to CMTB [$HR_{NC}$ (95% CI) = 0.6 (0.4, 0.9); P = 0.04] and to CB [$HR_{NC}$ (95% CI) = 0.6 (0.4, 0.9); P = 0.02]. The difference estimation (Diff) for LSCC was lower for cows assigned to CMTB than for cows assigned to NC [$Diff_{NC}$ (95% CI) = -0.31 (-0.61, 0.01); P = 0.04]. However, LSCC, although numerically lower, was not significantly lower for cows assigned to CB [$Diff_{NC}$ (95% CI) = -0.22 (-0.45, 0.08); P = 0.14]. Having NC as the reference, there were no significant differences in MILK for cows assigned to CMTB [$Diff_{NC}$ (95% CI) = -1.12 lb/d (-4.28, 2.05) (-0.51 kg/d (-1.94, 0.93)); P = 0.48] and to CB [$Diff_{NC}$ (95% CI) = 2.43 lb/d (-5.53, 0.68) (-1.1 kg/d (-2.51, 0.31)); P = 0.12]; there were no significant differences in PREG for cows assigned to CMTB [$HR_{NC}$ (95% CI) = 1.0 (0.8, 1.2); P = 0.99] or to CB [$HR_{NC}$ (95% CI) = 1.2 (0.9, 1.6); P = 0.20]; and there were no significant differences in CULL for cows assigned to CMTB [$HR_{NC}$ (95% CI) = 0.9 (0.6, 1.2); P = 0.46] or to CB [$HR_{NC}$ (95% CI) = 0.7 (0.5, 1.0); P = 0.09].

## Significance

Both treatment programs resulted in a higher BACTCUR, significantly lower CM, and lower LSCC during lactation. However, they did not have and effect on MILK, REPRO or CULL. Increased incomes and additional expenses, including the higher TX and DOOT, will be used to evaluate the overall cost-benefit of implementing both programs.