

# Pilot study: Refining a culture-guided selective dry cow therapy program to enhance antimicrobial stewardship on dairy farms

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## Introduction

Selective dry cow therapy (SDCT) programs typically use either milk culture or algorithm methods to identify cows with a high risk of infection, and thereby warranting antimicrobial therapy (AMX) at dry off (DO). Multiple studies have demonstrated that SDCT programs can maintain future cow health while significantly reducing antimicrobial use (AMU), as compared to blanket DCT (BDCT). However, we may be able to further reduce AMU at DO by targeting only specific types of intramammary infection (IMI) that will benefit from AMX. A recent meta-analysis concluded that IMI caused by *Streptococcus* spp. or *Streptococcus*-like organisms (SSLO) do benefit from DC therapy, while IMI caused by coliform or non-aureus *Staph* spp. (NAS) do not. Similarly, IMI caused by other Gram-positive bacteria, including *S. aureus*, occur with a relatively low frequency in most herds, and often do not respond to AMX. The Minnesota Easy® Focus® media is selective for SSLO growth in milk samples. This pilot study aimed to evaluate the effect of a SDCT program that identifies and treats only IMI caused by SSLO (vs. BDCT) on quarter health and AMU.

## Materials and methods

This randomized controlled trial was conducted in summer 2021 on 2 Midwest dairies. Technicians made weekly visits 2 days prior to DO to collect lactation records and aseptic quarter milk samples from all cows to be dried off. After blocking within farm and day, eligible cows were randomly assigned to either a SSLO-targeting SDCT (S) or a BDCT (B) group. At the UMN Lab for Udder Health, quarter samples for S cows were swabbed onto 1 quadrant of a Minnesota Easy Focus media plate and incubated for 36 hrs, after which the PI interpreted plates and recorded the results of as “Neg.” or “Pos.” for SSLO growth in each quarter. All milk samples (S & B) underwent separate routine culture by lab technicians. On the morning of DO technicians returned to the farm to assist with DO. For B cows, all 4 quarters were infused with AMX and a teat sealant (Spectramast® DC and OrbeSeal™, Zoetis). For S cows, quarters classified as Neg. for SSLO were infused with sealant only, while quarters classified as Pos. for SSLO were infused with AMX plus sealant. All cows were resampled for routine culture between 1-8 days post-calving (PC). Mixed logistic regression, controlling for cow-within-herd as a random effect, and offering to control for quarter, was used to describe the effect of treatment (S or B) on the following: 1) odds for a cure during dry period, 2) odds for a new IMI during dry period, and 3) odds for presence of IMI after calving. AMU at DO was reported for both groups.

## Results

We enrolled 102 cows (S = 51; B = 51). However, PC samples were missed for 2 cows with clinical mastitis (S = 1; B = 1) and for 23 cows (S = 9; B = 14) due to PC sampling logistics in 1 herd. Analysis was conducted on 77 cows (S = 41; B = 36). The quarter-level prevalence of IMI at DO was similar between groups (S = 0.50%, B = 0.55%, P = 0.55). The quarter-level cure rate (SE) and odds (95% CI) of a cure between DO and PC were not affected by treatment (S = 0.90(0.036), B = 0.91(0.038), O.R.(B) = 1.15(0.34, 3.94), P = 0.82). The quarter-level rate and odds for a new IMI were numerically higher for the B group (vs S) (S = 0.17(0.032), B = 0.27(0.043), O.R.(B) = 1.80(0.97, 3.36), P = 0.063). Also, the quarter-level prevalence and odds for presence of IMI at PC sampling were numerically higher for the B group (vs S) (S = 0.22(0.035), B = 0.32(0.044), O.R.(B) = 1.71(0.97, 3.02), P = 0.065). AMX was administered at DO to 15% and 100% of quarters in the S and B groups, respectively.

## Significance

This pilot study showed that a SSLO-targeting SDCT program resulted in an 85% reduction in AMU at DO, with similar infection dynamics during the dry period as compared to BDCT. Further analysis will investigate the impact of this refined SDCT program on clinical mastitis and culling risk, early lactation SCC and milk production, and DO costs, as compared to BDCT. If larger controlled trials can demonstrate that these results are repeatable, then SSLO-targeting SDCT programs could represent an opportunity for dairy producers to further enhance antimicrobial stewardship and reduce costs at DO, while maintaining cow health.

