

# Selective dry cow therapy on US dairy farms: Impact on udder health and productivity

S. Rowe, BVSc, MVM, DABVP<sup>1</sup>; S. Godden, DVM, DVSc<sup>1</sup>; E. Royster, DVM, MS<sup>1</sup>; J. Timmerman, BS<sup>1</sup>; D. Nydam, DVM, PhD<sup>2</sup>; A. Vasquez, DVM, PhD<sup>2</sup>; P. Gordon, DVM, PhD, DACVCP, DABVP<sup>3</sup>; A. Lago, DVM, PhD<sup>4</sup>

<sup>1</sup>University of Minnesota, Saint Paul, MN 55108

<sup>2</sup>Cornell University, Ithaca, NY 14853

<sup>3</sup>Iowa State University, Ames, IA 50010

<sup>4</sup>DairyExperts, Tulare, CA 93274

## Introduction

There is an opportunity to reduce antibiotic (ABX) use at dry-off in US dairy farms, as approximately 80% of herds practice blanket dry cow therapy (BDCT), despite most quarters (~80%) being uninfected at that time. Selective dry cow therapy (SDCT) strategies use screening tests to determine which quarters or cows require ABX treatment at dry-off. A small number of trials conducted in North America recently found that SDCT reduced ABX use by up to 60% without negatively impacting udder health, culling risk or milk production when compared to BDCT. However, more research is needed to validate SDCT before it can be widely implemented. The objective of this study was to compare 2 SDCT approaches (Culture-based or Algorithm-based) against BDCT in a multi-herd randomized, positively controlled, clinical trial for the following outcomes; reduction in ABX use at dry-off, clinical mastitis (CM) risk, culling risk, milk yield, and somatic cell count (SCC) in the first 120 days in milk (DIM).

## Materials and Methods

Seven herds were recruited from 4 study sites (CA, IA, MN and NY) from May to July 2018. Cows were eligible for enrollment if they had 4 functional quarters, had an expected dry period length of 30 to 90 d, no recent (<14 d) antimicrobial treatment, no CM, and not lame or in poor body condition. At enrollment (2 days prior to dry-off), duplicate aseptic quarter-milk samples were collected and cows were randomly allocated to 1 of 3 treatment groups; BDCT ("Blanket", n=429); Culture-based SDCT ("Culture", n=432), and Algorithm-based SDCT ("Algorithm", n=414). On the day of dry-off, all quarters of the Blanket group were treated with intramammary ABX (500mg ceftiofur hydrochloride). In the Culture group, quarters were treated with ABX if bacterial growth was observed after 30 to 40 h incubation on the MN Easy™ 4Cast™ plate. Algorithm cows had all quarters treated with ABX if they met any of the criteria for treatment: ≥2 cases of CM during lactation, any CM during the 14 d prior to dry-off, or any test day SCC > 200 × 10<sup>3</sup> cells/ml during lactation. All quarters of all cows were treated with an inter-

nal teat sealant. Cows were followed from enrollment until 120 DIM. DHIA SCC and milk yield data were measured at monthly intervals. CM, culling or death events were extracted from farm records. Multivariable Cox Proportional Hazards regression and linear mixed models were used to determine the effect of treatment on dichotomous and continuous outcomes, respectively. Within these models, random effects for cow and herd were used to account for the hierarchical structure of the data.

## Results

Treatment groups were balanced at enrollment for parity, milk yield, and SCC at last herd test, and clinical mastitis history. The Culture-based and Algorithm-based SDCT programs reduced ABX use at dry-off by 55.5% (936/1688) and 55.2 % (892/1616), respectively, at the quarter level. Cow-level CM incidence (1 to 120 DIM) was similar in Blanket (14.5%, 59/407), Culture (12.2%, 50/410, Hazard ratio [HR] = 0.82, 95% CI: 0.6 – 1.2), and Algorithm (12.2%, 48/394, HR = 0.82, 95% CI: 0.6 – 1.1) groups. Risk of culling (1 to 120 DIM) was also similar in Blanket (10.8%, 44/407), Culture (9.8%, 40/410, HR = 0.89, 95% CI: 0.6 – 1.3), and Algorithm (10.6%, 42/397, HR = 0.98, 95% CI: 0.7 – 1.4) groups. Adjusted geometric mean SCC (10<sup>3</sup> cells/ml) at all herd tests (1 to 120 DIM) were similar for Blanket (55, 95% CI: 47 – 65), Culture (57, 95% CI: 49 – 68), and Algorithm (59, 95% CI: 50 – 69) cows. Adjusted average daily milk yield (kg/day) during the same time period for each treatment group were: Blanket (48.6 kg; 106.9 lb, 95% CI: 46.2 – 51.1), Culture (48.6 kg; 106.9 lb, 95% CI: 46.2 – 51.1), and Algorithm (47.8 kg; 105.1 lb, 95% CI: 45.3 – 50.2).

## Significance

Using either SDCT strategy reduced ABX use by 55%, without causing negative effects on early lactation SCC, milk yield, and risk of CM and culling. SDCT may be an appropriate strategy to reduce ABX use on US dairy farms.