

Investigation of the relationship between udder towel hygiene, udder towel management and intramammary infection in late lactation dairy cows: Interim findings

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Introduction

Pre-milking cleaning and teat disinfection is a common practice on US dairy farms. Studies have shown that towel laundering practices can influence levels of bacteria in towels that are used in teat preparation (Fox, 1997, Las et al, 2008). Consequently, some laboratories offer towel culture services, which are used by practitioners to evaluate the effectiveness of towel laundering systems. However, the impact of poor towel hygiene on udder health is not well understood, and few surveys have been conducted to describe towel hygiene, or management strategies to improve towel hygiene, on US dairy farms.

The objectives of this cross-sectional study are to: 1) describe the levels of bacteria in udder towels on US dairy farms, 2) describe associations between towel total bacteria count (TBC) and intramammary infection (IMI) prevalence for individual pathogens and specific pathogen groups in late lactation cows, 3) identify laundering-related risk factors for high towel bacteria count, and 4) identify critical levels of bacteria in towels, that might be used as cut-points to guide practitioners when interpreting towel culture reports. This study is ongoing, with results currently being assembled. In this abstract we report preliminary results.

Materials and Methods

Dairy herds (N=80) were recruited from 10 dairy states with assistance from Zoetis Quality Milk Specialists, as part of a cross-sectional study of bedding management. A convenience sample of 2 recently laundered udder towels and aseptic quarter milk samples from 20 late lactation cows were collected from each farm between December 2017 and March 2018. A questionnaire was used to collect information about pre-milking teat disinfection and towel management practices which, among others, included the use of on- or off-site laundry services, water temperature, use of sanitizers during washing, and drying practices.

Total bacteria count (TBC) and density (cfu/in²) of coliform bacteria, non-coliform bacteria, *Bacillus* spp, *Streptococcus* spp, and *Staphylococcus* spp, was determined for each pair of towel samples. Quarter milk samples were

cultured on Columbia CNA and MacConkey agar and isolates were identified using standard laboratory procedures, including the use of MALDI-TOF. Associations between towel management practices and log-transformed towel TBC will be determined using mixed linear models. Associations between towel log TBC and IMI risk will be determined using mixed multivariable logistic regression models.

Results

The median number of milking cows was 1820 (235 to 9650) and the average daily milk production was 84 (51 to 106) lb (38 [23 to 48] kg). The questionnaire found that all farms practiced pre-milking teat disinfection, mostly using cloth udder towels (n=67) as well as semi-automated teat scrubbers (n=10) or single use paper towels (n=2). Of the farms using cloth udder towels, 55 (82%) laundered towels on-site, while 12 (18%) herds used an off-site professional laundry service.

Interim descriptive results are available for the 40 herds that have been tested so far. Overall, the mean (\pm SE) towel bacteria counts (log₁₀ cfu/in²) were as follows: TBC (2.61 \pm 0.11), coliform bacteria (0.21 \pm 0.09), non-coliform bacteria (0.60 \pm 0.15), *Bacillus* spp (2.34 \pm 0.12), *Streptococcus* spp (1.12 \pm 0.16), and *Staphylococcus* spp (0.91 \pm 0.13). The mean (\pm SE) towel TBC for herds using on-site and professional laundering services were 2.65 (\pm 0.13) and 2.52 (\pm 0.30), respectively. For herds laundering towels on-site, the mean towel TBC for those washing with cold, warm and hot water were 2.64 (\pm 0.51), 2.39 (\pm 0.20), and 2.78 (\pm 0.16), respectively. Those using sanitizer in addition to detergent had lower towel TBC (3.21 \pm 0.40 vs 2.57 \pm 0.23).

Significance

In this study, we were able to successfully enroll and sample a broad cross-section of US dairy farms. Once the winter 2017 results are available and final analysis completed, the results from this study may provide important new insights into udder towel management and its association with IMI.