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Premilking teat disinfection: Is it worthwhile in pasture-grazed dairy herds?

John M. Morton,*[1] John F. Penry,†[2] Jakob Malmo,‡ and Graeme A. Mein§
*Jemora Pty Ltd., PO Box 2277, Geelong, Victoria 3220, Australia
†Primary Logic Pty Ltd., PO Box 312, Camperdown, Victoria 3260, Australia
‡PO Box 630, Maffra, Victoria 3860, Australia
§20 K Rd, Werribee South, Victoria 3030, Australia

ABSTRACT

A controlled trial was conducted in 5 pasture-grazed commercial dairy herds in Australia in 2012 to determine whether premilking teat disinfection and drying of teats reduces clinical mastitis incidence during early lactation by at least 50%. A 50% reduction was estimated to be the minimum required to justify additional costs of labor, disinfectants, and other resources if premilking teat disinfection was implemented in a 500-cow herd averaging 8 clinical cases per 100 cow-months. A secondary aim was to determine whether this premilking teat disinfection routine reduces incidence of new udder infections. Treatment was applied in each herd for approximately 60 d (range of 59.5 to 61 d), commencing in each herd soon after the start of the herd's main or only calving period. Within each herd, cows were allocated to either the treatment (premilking disinfection) or the control (no premilking disinfection) group based on their herd identity number. During the trial period, any cow having a new case of clinical mastitis or an individual cow cell count greater than 250,000 cells/mL of milk (when preceded by individual cow cell counts of 250,000 cells/mL of milk or below) was deemed to have had a new infection. Overall, neither clinical mastitis incidence nor new infection rate differed significantly between treatment and control groups. Over the whole study period, 98 of the 1,029 cows in the premilking disinfection group and 97 of the 1,025 cows in the control group had clinical mastitis. Total cow-days at risk of clinical mastitis were similar in each group. However, clinical incidence rates were markedly lower in treatment cows in one herd (herd 3; incidence rate ratio = 0.34) and there was some evidence that new infection incidence rates were lower in treated cows in this herd (incidence rate ratio = 0.42). Rainfall during the study period was below long-term district average in all 5 study herds. Cows' teats were less dirty than in previous, wetter years for the 4 herds where no significant clinical mastitis response was detected but some teat soiling was observed in herd 3 during the study period. Routine application of premilking teat disinfection in pasture-grazed herds is unlikely to produce a worthwhile (economic) reduction in the number of clinical mastitis cases when teats are relatively clean and dry and the clinical mastitis incidence is low. However, premilking disinfection might be worthwhile during periods when teats are heavily soiled and the incidence of clinical mastitis due to environmental pathogens is high.
Key words: milking management, clinical mastitis, new infection rate

INTRODUCTION

During the past 15 yr, *Streptococcus uberis* has become the dominant pathogen isolated from clinical mastitis cases in southeastern Australian dairy herds (Charman et al., 2012). This organism is primarily an environmental pathogen; it can replicate in the environment and is found in paddocks, laneways, feeding areas, and tracks. During the past 20 to 30 yr, premilking teat preparation in typical Australian dairy herds has changed; teats are no longer washed and dried routinely before teatcups are applied. Where teats are not routinely washed before milking, mud and manure are often present on cows' teats when teatcups are applied. Because teat ends are likely to be bathed in milk contaminated with such material, this could result in udder infection with *Strep. uberis* (or other environmental pathogens).

Premilking teat disinfection has reduced clinical mastitis incidence; estimated reductions varied between 26 and 43% in studies conducted in the United States (Oliver et. al., 1993a, 2001). In other trials conducted in the northern hemisphere, clinical mastitis incidences were 57 (Blowey and Collis, 1992), 33 (Hillerton et. al., 1993), 26 (Oliver et. al., 1993b), 28 (Oliver et. al., 1994), 30 (Sérieys and Poutrel, 1996), and 23% (Ruegg and Dohoo, 1997) lower and 20% higher (Hillerton et. al., 1993) among treated cows; none of these differences

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[1]Corresponding author: john.morton@optusnet.com.au
[2]Current address: Department of Dairy Science, University of Wisconsin, Madison 53706.

were statistically significant. Premilking teat disinfection has also reduced new infection rates. Rates of infection by major pathogens were estimated as declining by 57 (Pankey et. al., 1987), 34 (Oliver et. al., 1993a), 49 (Oliver et. al., 1993b), and 31% (Oliver et. al., 2001); for major and minor pathogens combined, declines were estimated as 40 (Hillerton et. al., 1993), 29 (Oliver et. al., 1993a), 27 (Oliver et. al., 1993b), 37 (Oliver et. al., 1994), 23 (Sérieys and Poutrel, 1996), and 38 to 41% (Oliver et. al., 2001). Rates of new infections by *Strep. uberis* were estimated as declining by 60 to 70% (Sérieys and Poutrel, 1996; Oliver et. al., 2001); estimated declines for esculin-positive streptococci were 48 to 66% (Pankey et. al., 1987; Galton et. al., 1988). In contrast, no substantial positive effects of premilking teat spraying on clinical mastitis incidence and new infection rates were evident in a small study in 3 pasture-grazed herds in New Zealand (Williamson and Lacy-Hulbert, 2013). These herds had low clinical mastitis incidences and low new infection rates during the study. In a study in 12 pasture-grazed herds in Western Australia (Depiazzi and Bell, 2002), clinical mastitis incidence was lower later in the trial in herds that used premilking teat disinfection, but not early in the trial; no statistical analyses were published. In summary, although beneficial effects of premilking teat disinfection have been demonstrated in northern hemisphere dairy herds, presumably where study cows were housed, effects in pasture-grazed herds are unclear.

The primary research objective of the current study was to assess whether, in pasture-grazed commercial dairy herds, premilking teat disinfection and drying of teats reduces the incidence of clinical mastitis in early lactation by at least 50%, relative to no premilking udder preparation. A 50% reduction was estimated to be the minimum required to justify additional costs of labor, disinfectants, and other resources if premilking disinfection were implemented. Where the purpose of premilking teat disinfection is to reduce clinical incidence, the break-even efficacy of premilking teat disinfection depends primarily on the average cost of each clinical case, the clinical mastitis incidence before implementation, and herd size. For example, at current input costs, the breakeven point for a 500-cow herd with an average of 8 cases/100 cow-months is about a 50% reduction. This assumes an average cost of $277 for each clinical mastitis case (J. F. Penry, Countdown Downunder, Melbourne, Victoria, Australia, personal communication). At 14 cases/100 cow-months, only a 30% reduction would be required to break even, whereas at incidences of less than 8 cases, reductions greater than 50% are required to break even. Eight cases/100 cow-months is markedly higher than the Australian targets of less than 5 cases per 100 cows per month for the first month of lactation and 2 cases per 100 cows in each subsequent month (Brightling et al., 1998). A secondary research objective was to determine whether, in pasture-grazed commercial dairy herds, this premilking teat disinfection routine reduces the incidence of new udder infections in cows in early lactation relative to no routine premilking teat disinfection or drying.

MATERIALS AND METHODS

Study Overview

A controlled trial was conducted in 2012, with cows within each of 5 pasture-based dairy herds allocated to premilking teat disinfection or no premilking teat disinfection or drying. Treatment continued in each herd for approximately 60 d (range of 59.5 to 61 d), commencing in each herd soon after the start of the herd's main or only calving period. Cows were monitored for clinical mastitis and new infections. This treatment period was selected to ensure that the trial was conducted in cows in early lactation, a period when clinical mastitis incidence was expected to be higher than later in lactation.

Herds, Cows, and Feeding Management

Herds were selected from those meeting all of the following criteria:

(1) client of 1 of 3 veterinary practices: Maffra Veterinary Centre (Maffra, Victoria, Australia), The Veterinary Group (Timboon/Allansford, Victoria, Australia), or The University of Sydney Livestock Veterinary Teaching and Research Unit (Camden, Australia);
(2) seasonal or split calving (all calvings occur within, respectively, 1 or 2 restricted time periods in each 12-mo period);
(3) milked in a rotary parlor;
(4) herd manager considered to be likely to fully implement the study protocol, and prepared to employ an additional 3 people for the study period and to have 2 of these people working in the parlor at all milkings throughout the study period;
(5) herd manager prepared to allow some modification of the parlor: specifically, addition of Ambic Mastitis Detectors and installation of an Ambic PeraSpray unit (Ambic Equipment Ltd., Parkside, Witney, UK), a second teat-spraying unit at the cups-on position, and, where necessary, alteration of systems for hanging cups between cows to facilitate the implementation of special liner disinfection procedures before milking each treatment cow.