Technote 8

Practicing good hygiene during milking

In this technote:

1. Wear gloves and maintain a clean milking environment
2. Cleaning hands, gloves and clusters between cows
3. Segregate and milk infected cows last

The routine used to milk cows, especially those with clinical mastitis, provides important clues about how well farmers or milkers understand and follow hygienic principles and procedures.

Bacteria in milk from infected quarters can spread to other quarters by splashes and aerosols of milk during stripping, by milkers' hands, by teat cup liners, and by cross flow of milk between teat cups.

The risk of infection spreading through a herd is markedly reduced if cows with mastitis are milked last. This includes clinical cases and can include cows that have subclinical mastitis infections (i.e. high SCC) when dealing with a grading or problem situation.

➜ **Technote 5** describes contagious mastitis and good milking technique.

1 Wear gloves and maintain a clean milking environment

The risk of transferring contaminated milk or bacteria from cow to cow is greatly reduced if hands and the milking area under the cows are kept as free as possible from dirt and contaminated milk. Wearing of gloves during milking provides an easier surface to decontaminate after stripping cows and protects milkers' hands from the drying effects of repeated exposure to dirt, water and manure.

Low pressure, high volume washing water should be used to sluice away manure. High pressure hoses should be avoided directly beneath or around cows, as these can form aerosols of bacteria-laden droplets that settle onto the cows.

When disinfecting hands or gloves in the farm dairy, ensure that the product is acceptable for use in the farm dairy. A practical solution is a small amount of dilute teat spray.

Hand contamination during milking

In the 1960s, studies at the National Institute for Research in Dairying in England showed that 50% of milkers' hands were contaminated with mastitis bacteria before milking, and 100% of hands were contaminated after milking (Dodd *et al* 1966). Washing hands with disinfectants reduced contamination (although there were still 30% positive swabs) whereas washing without disinfectant left 90% of hands contaminated (Neave *et al* 1962).

Effective hand hygiene during milking is nearly impossible. Rather than attempting bare-handed milking with frequent hand disinfection, it is better to advise farmers to wear gloves and maintain excellent milking technique to minimise contamination risk.

Glove use during milking

Gloves should always be used when searching for, or dealing with, clinical cases of mastitis, and ideally, for all milking activities.

A study in Holland (Olde Riekerink *et al* 2008) across 27 farms found that use of gloves reduced bacterial contamination of hands by 75% compared to bare hands. Although disinfecting hands with a teat wipe reduced bacterial counts by 85%, gloved hands were easier to disinfect and had a bacterial count that was 98% lower than bare hands. In another study, farmers operating in a clean and precise manner had lower bulk milk SCC levels and less clinical mastitis cases than farmers who operated in a 'less careful' manner (Barkema *et al* 1999).

Wearing gloves begins with an attitudinal change to milk harvesting. If milking is viewed as harvesting a fresh, pure food, then keeping operators' hands clean becomes just as important as keeping cows' teats clean. In a practical sense, it is difficult for a dairy farmer to achieve very clean hands in the course of a normal day. Use of disposable or reusable rubber or latex gloves is a simple way to improve the quality of the contact surface, while also improving skin condition of the operator's hands, particularly in winter.

In human medicine, gloves have been found to be superior to most handwashing attempts, and in all cases, gloves are superior to no handwashing (Lynch *et al* 1987).

Types of gloves available

There is a wide range of gloves now available from agricultural suppliers for milking purposes. Some are meant for a single task or milking, others are reuseable. Options include:

- **Nitrile** (rubber) gloves – these tend to be the most comfortable, moulding to the shape of a milker's hands in less than 10 minutes. Nitrile is more durable, more elastic and stronger than other, thinner glove materials.
- **Latex** gloves do not mould to the hands but can be thinner and more flexible than rubber gloves. A small number of people may experience adverse skin reactions (allergies) so powder-free and hypoallergenic types are available. They are available in different thicknesses, depending on need for durability.

With all gloves it is worthwhile wearing elasticised cuffed plastic sleeves to prevent water draining from the arms into the gloves during milking. In this way it is easy to keep clean during milking and still maintain operator comfort.

② Cleaning hands, gloves and clusters between cows

To clean gloves, rinsing with running water for about 30 seconds provides a physical wash but is only as good as the microbiological quality of the water. Dipping in a disinfectant solution, such as a small amount of teat disinfectant, provides a sanitising effect.

> Hands or clusters should always be rinsed before being dipped in disinfectant to avoid a 'soup' of bacteria in the bucket.

Cluster flushing

The liner is a common source of pathogens for dairy cows. One infected cow (clinical case or subclinical case with high bacterial numbers) has the potential to infect the next 5-6 cows milked on that cluster (Phillips 1982).

Cluster flushing systems, whereby a small volume of water (usually containing a sanitiser) is flushed back through the liners after milking each cow, has been promoted to reduce the spread of contagious mastitis. Commercial systems that provide delivery of post-milking teat disinfection immediately after milking also enable flushing of the liner with a sanitiser before attachment to the next cow (Galton *et al* 2004).

Under artificial conditions, a flushing system reduced bacterial contamination of the liner by 99.9% (Hogewerf *et al* 2008). When compared against manual teat dipping, the system achieved similar coverage and iodine residue levels in milk (Hogewerf *et al* 2008), and dramatically reduced milking times in 4 of the 5 herds (Ohnstad *et al* 2012).

Under field conditions in the UK, installation of an auto teat dipping and flushing systems had beneficial effects on bulk milk SCC and proportion of cows with elevated SCC compared with herds that continued with dipping or spraying methods to apply teat disinfectant (Olde Riekerink *et al* 2012). It is unproven whether use of a flushing system associated with an automated teat dipping system reduces the incidence of new mastitis cases under NZ conditions.

③ Segregate and milk infected cows last

Clinical cases

Low bulk milk cell counts have been associated with herds that milk clinical mastitis cases last (Hutton *et al* 1991). Since many infections are spread during milking in the dairy, uninfected cows should be milked prior to, and independently of, all cows suspected to have mastitis. This principle can be extended to include cows with chronic infections i.e., those with multiple high individual cow cell counts.

Cows with newly detected clinical mastitis should be drafted out and milked last, after the milking herd has been milked. Cows under treatment with antibiotics should also be milked last, in a separate mastitis herd, once the milkline has been disconnected from the vat. The whole milking machine should then be washed with a full hot water wash to remove any residues of milk contaminated with bacteria or antibiotics.

If it is not possible to run a separate herd, treated cows should be well marked and drafted out before being milked, then held back until the end of milking, and milked once the delivery line has been removed from the vat. Running them in the milking herd and milking them on test buckets is no longer accepted by dairy companies.

➜ The DairyNZ's **Healthy Udder Guide** provides useful tips on applying MRS T for managing cows during antibiotic treatment.

High SCC cows

Segregating cows that are more likely to be infected and milking them last, or after a 'clean' herd can be an effective tool for reducing spread of infection, especially when dealing with a mastitis outbreak. This can apply to mastitis due to environmental pathogens (Lacy-Hulbert *et al* 2012) as well as contagious or cow-associated pathogens (Wilson *et al* 1995; Middleton *et al* 2001).

Wilson *et al* (1995) found that for herds with a high prevalence of *Staph. aureus* infection, segregating bacteriologically positive cows, either by milking them last or by milking them with separate milking units, reduced the prevalence of infection with this pathogen from 29.5% to 16% of cows, over a 6 to 24 month interval, and observed almost a 50% reduction in bulk milk SCC. Herds that did not segregate such cows maintained a similar prevalence of infection and had a bulk milk SCC that remained higher than herds that segregated infected cows.

The viability of running a separate mastitis herd as a control option depends on the number of mastitis cases, the farm layout (laneways and paddocks etc.), and the calving pattern in the herd. Electronic identification systems may allow automatic drafting so that the cows can be managed as a single herd, yet still milked separately.

➜ **Technote 4.5** discusses MRS T and the importance of separating out infected cows before commencing treatment for mastitis.

Acknowledgements

DairyNZ acknowledges the valuable input of veterinarians, milk quality advisers, and industry stakeholders who contributed to the development and review of these resources. Most are representatives of the National Milk-Quality Advisory Committee (NMAC) and have given generously of their time and expertise for the technical review.

Disclaimer

©DairyNZ Limited. This Technote reflects current knowledge at the date of release, but all information is of a general nature only and is not intended as advice. Users should exercise their own professional judgment, or seek professional advice, about specific situations. The Technote may be updated from time to time, so please check back for any updates. Please see **DairyNZ's Website Terms of Use** for full terms and conditions of use.

Key papers

Barkema HW, Van der Ploeg JD, Schukken YH, Lam TJ, Benedictus G, Brand A. Management style and its association with bulk milk somatic cell count and incidence rate of clinical mastitis. *J. Dairy Sci.*, 1999; 82:1655-63.

Dodd FH, Neave FK, Kingwill RG, Thiel CC, Westgarth DR. *International Dairy Congress 17*, Munich, 1966; 333.

Galton D. Effects of an automatic postmilking teat dipping system on new intramammary infections and iodine in milk. *J. Dairy Sci.*, 2004; 87:225-231.

Hutton CT, Fox LK, Hancock DD. Risk factors associated with herd-group milk somatic cell count and prevalence of coagulase-positive staphylococcal intramammary infections. *Prev. Vet. Med.* 1991; 11: 25-35.

Hogewerf PH, Ipema AH, de Koning CJAM, Schuiling HJ, Slaghuis BA, Tancin V, Ohnstad I, Barkema HW. Impact of an automatic teat dipping and cluster flushing system on iodine residuals, milking characteristics and teat coverage. *Mastitis control - from Science to Practice.* Ed. by: T.J.G.M. Lam, 2008; 349-356.

Lacy-Hulbert J, Williamson J, Kolver E, Doohan H, Shelgren J. Is coliform mastitis an emerging issue? *Proc. NZ Milk Quality Conference.* Pub: NZVA, 2012; 7.06.1 - 7.06.7

Lynch P, Jackson MM, Cummings JM, Stamm WE. Rethinking the role of isolation practices in the prevention of nosocomial infections. *Ann. Intern. Med.* 1987; 107: 243-246.

Middleton, JR, Fox LK, Smith TH. Management strategies to decrease the prevalence of mastitis caused by one strain of *Staphylococcus aureus* in a dairy herd. *J. Am. Vet. Med. Assoc.*, 2001; 218:1615-1618.

Neave FK, Dodd FH, Kingwill RG. Report to the National Institute for Research in Dairying, United Kingdom, 1962.

Ohnstad I, Olde Riekerink RGM, Hogewerf P, de Koning CAJM, Barkema HW. Short communication: Effect of automatic postmilking teat disinfection and cluster flushing on the milking work routine. *J. Dairy Sci.*, 2012; 95:2567-2570.

Olde Riekerink RGM, Ohnstad I, van Santen B, Barkema HW. Effect of an automated dipping and backflushing system on somatic cell counts. *J. Dairy Sci.*, 2012; 95:4931-4938.

Olde Riekerink RGM, Sampimon OC, Eerland VJ, Swarts MJ, Lam TJGM. Comparing bacterial counts on bare hands with gloved hands during milking. *Mastitis control – from Science to Practice. Proc. International Conf. on Mastitis Control.*, 2008; 77-82.

Phillips DSM. Reduction of pathogen transfer within the milking cluster. *Dairy Production from Pasture, NZ and Aust. Societies of Animal Production*, Ruakura, New Zealand, 1982: 81-82.

Wilson DJ, Gonzalez RN, Sears PM. Segregation or use of separate milking units for cows infected with *Staphylococcus aureus*: Effects on prevalence of infection and bulk tank somatic cell count. *J. Dairy Sci.*, 1995; 78:2083-2085.