

MASTITIS: MILKING PROCEDURES AND TEAT DISINFECTION



BASICS

Goals

- The end goals of premilking preparation and hygiene are:
 - Minimize the incidence of mastitis
 - Reduce the somatic cell count (SCC).
 - Maximize production of quality milk.
- The immediate goals are:
 - Thorough cleaning and sanitation of the teat skin before and after milking.
 - Provide adequate stimulation to the teats and udder to promote oxytocin release.

Importance of the premilking technique and hygiene

- Production of quality milk:
 - Necessary for the removal of bacteria and debris on the teat skin that can enter the bulk tank during milking.
 - This is monitored by the SPC and the PI Count of raw milk.
 - Cleanliness is one of the most important factors influencing the bacterial count of milk.
- Reduction of mastitis and the SCC:
 - The rate of new IMIs is related to the number of mastitis-causing pathogens on the teat skin.
 - Udder and teat preparation removes contagious and environmental mastitis pathogens that could colonize the teat end or enter the gland during milking.
 - Contagious mastitis pathogens (*Staphylococcus aureus*, *Streptococcus agalactia*) are transferred from cow to cow via bacteria remaining on the teat skin or on milking equipment following milking.
 - Environmental mastitis pathogens contaminate the teat skin during the period between milkings.
- Maintenance of teat skin and teat end health:
 - Prevents damage to the teat end by minimizing exposure of the teat end to excessive vacuum by encouraging timely milk letdown.
 - Promotes teat skin health by removal of bacteria and application of conditioners and emollients.
- Provides adequate stimulation to maximize release of oxytocin to achieve rapid and complete milk out.
- Promote parlor efficiency:
 - Parlor through-put is related to speed of milking, and efficiency of the milking preparation routine.
- Increase milk yield:
 - Thorough milk-out is required to maximize milk yields.
- Compliance with the PMO:
 - The PMO requires that the teats and udders must be sanitized prior to milking.

MILKING TECHNIQUE AND HYGEINE

General Principles:

- The overarching principle is to milk clean and dry teats, and have adequate stimulation to promote oxytocin release:
 - Teat cleaning and drying can decrease the bacterial population of the teat skin by 75%.
 - 10-20 seconds of manual stimulation is required for good milk let-down.
- Milkers should wear gloves:
 - Milkers' hands can serve as fomites.
 - Gloves should be regularly disinfected during milking.
- Periodic removal of hair from the udder by clipping or flaming will improve hygiene
- Lag time:
 - Lag time is measured from the start of preparation to the unit attachment.
 - Lag time should be 60-90 seconds in length to achieve adequate oxytocin release.
- The parlor routine should be standardized among all milkers:
 - Cows need a consistent milking routine for maximum milk yields.
- Parlor routines should be developed that allow for:
 - Maximum efficiency of labor.
 - Attachment of each milking unit at the optimal time to take advantage of peak oxytocin release.

Recommended Milking Procedures:

- Remove excess dirt and contaminants from the surface of the teats:
 - Purpose
 - Physical cleaning is necessary to allow adequate contact of the predip with the teat skin.
 - Technique
 - "Dry-wipe" the entire teat and teat end if the teats are grossly soiled.
- Foremilk:
 - Purpose
 - Stimulates milk letdown.
 - Necessary to achieve higher milk flow rates and shorter milk out times.
 - Check for abnormal milk.
 - Technique
 - Strip several streams of milk from each quarter into strip cup, black plate, or onto floor (rinse milk off floor if this is done).
 - Avoid stripping milk into milkers' hands. This can allow spread of organisms between quarters.
- Sanitize teats with an FDA-approved udder sanitizer or by predipping:
 - Purpose
 - Sanitize teat skin and teat end to reduce bacterial population.
 - Technique – Use of udder sanitizer
 - Wash teats with approved sanitizer.
 - Apply with hand-held hose or with single-service cloth.
 - Use minimal amount of water to avoid wetting udder.
 - Technique - Premilking teat disinfectant (predipping)
 - Use only FDA-approved products.
 - Minimizes wetting of the teats and udder.
 - Teats should be clean prior to application.
 - Apply to entire teat by dip or spray.

- Allow contact time of 30 seconds. This is critical.
- Thoroughly dry the teats:
 - Purpose
 - Removes debris, bacteria, and the disinfectant from the skin.
 - Important in stimulating oxytocin release.
 - Technique
 - Use single-service disposable towels, or terry cloth towels that are washed and dried between each use.
 - Care must be taken to carefully dry both the teat end and the barrel of the teat.
- Attach unit to the udder:
 - Purpose
 - Do in manner that minimizes the admission of air into the claw.
 - Technique
 - Unit should be attached 60-120 seconds after preparation began.
 - Bend the short milk tubes over the claw ferules to prevent air leakage into the claw.
 - When attaching the unit, straighten the liner stem as the claw is lifted towards the teats.
- Adjust the unit:
 - Purpose
 - Milking unit (claw) should hang squarely under the udder to allow free flow of milk away from the udder.
 - Technique
 - In herringbone parlors, the outlet of the claw should point forward.
 - In parallel parlors, the outlet of the claw should point rearward.
 - Units must be readjusted if liner slips occur during milking.
- Remove the unit when milk flow ceases:
 - Purpose
 - Incorrect removal results in a serious threat to teat end health.
 - Necessary to prevent liner slips and impacts.
 - Technique
 - Vacuum must be shut off before unit is detached.
 - Automatic take-off devices should be adjusted correctly.
 - Overmilking and undermilking should be avoided.
 - Approximately 250ml of milk should remain evenly divided between the four quarters.
- Apply post milking teat disinfectant (post dipping):
 - Purpose
 - Remove milk film that remains on teat skin following milking.
 - Eliminate bacteria that remain on teat.
 - Technique
 - Apply immediately after milking.
 - The disinfectant should contact all teat surfaces in contact with the inflation (approximately 75% of the lower teat).
 - Disinfectant can be applied as dip or as spray. Generally, more uniform coverage is given by dipping.

TEAT DISINFECTANTS

- Teat dips are germicides applied to the teat skin before or after milking.
- The germicides reduce bacterial populations through chemical or biological action.

- Effective use of teat disinfectants decreases teat skin colonization and contamination, and minimizes penetration of bacteria into the teat canal.
- Products should be FDA approved.
- Predipping
 - Purpose:
 - Reduce the number of pathogens on the teat skin prior to unit attachment.
 - Improve milk quality by eliminating bacteria in bulk tank milk.
 - Reduce new intramammary infections caused by environmental bacteria.
 - Reduce the amount of water needed for preparation. Wetting teats and udders allows less thorough drying of teats.
 - Technique:
 - Apply before or after forestripping by spray or dipping.
 - At a minimum, the surface of the teat that contacts the liner must be covered.
 - Comments:
 - More effective than udder washing in eliminating bacteria.
 - If iodophors are used, the teats must be thoroughly dried to prevent iodine residues in the milk.
 - To be effective, the excessive debris and manure must be removed from the teat prior to application of the predip.
- Postmilking teat dipping
 - Purpose:
 - Eliminate organisms that remain on skin after milking.
 - Primarily *S aureus* and *Strep agalactia*.
 - Prevent colonization of teat canal.
 - Technique:
 - Dipping is preferred for more consistent coverage.
 - Disinfectant should be applied immediately after removal of the unit.
 - At a minimum, apply to the surface of the teat that is in contact with the inflation.
 - Comments:
 - Can reduce the rate of new infections caused by contagious pathogen by 50% or more.



MISCELLANEOUS

ABBREVIATIONS

- FDA: food and drug administration
- IMIs: intramammary infections
- PI: preliminary incubation
- PMO: pasteurized milk ordinance
- SCC: Somatic cell count
- SPC: standard plate count

Suggested Reading

Current Concepts of Bovine Mastitis, 1996, 4th Edition, National Mastitis Council, P. O. Box 156, 605 Columbus Avenue South, New Prague, MN 56071 USA (currently out of print and under revision)

Recommended Milking Procedures, 2013, National Mastitis Council, P. O. Box 156, 605 Columbus Avenue South, New Prague, MN 56071 USA

Guidelines for Proper Storage and Handling of Teat Disinfectants, 2009, National Mastitis Council, P. O. Box 156, 605 Columbus Avenue South, New Prague, MN 56071 USA

Guidelines for On-Farm Transfer of Teat Disinfectants, 2002, National Mastitis Council, P. O. Box 156, 605 Columbus Avenue South, New Prague, MN 56071 USA

Author Richard W. Meiring

Consulting Editor Kaitlyn A. Lutz