

Recommended Milking Procedures for Maximum Milk Quality

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When it comes to minimizing mastitis and lowering somatic cell counts, the area where you have the most control is your milking procedures. Understanding and following proper milking procedures is a critical step to maintaining maximum milk quality. The milking process should be consistent, and cows should be milked at the same time every day. The primary goals of the milking process should be to harvest large quantities of a high-quality end-product for consumers, minimize mastitis infections, milk **clean, dry** teats, and minimize stress on both cows and workers within the parlor. The first step to establishing a good milking procedure is understanding the milking process so that you can determine what procedures best fit your individual dairy operation. Write these procedures down and post them where everyone involved in the milking process can see them (Figure 1). These standard operating procedures should be communicated to employees and periodically evaluated. Following are recommended best practices to consider applying in your milking procedure.



Figure 2. Cows should be calmly brought into the milking parlor in an effort to minimize stress.

the cow's brain. Oxytocin is the hormone that is naturally released in the cow's body to signal milk letdown. Without normal, timely milk letdown, the amount of milk you harvest may be reduced. In addition, cows that are stressed are more likely to slip, fall, or defecate while entering the parlor.

Wear Gloves

Contagious mastitis-causing bacteria such as *Staphylococcus aureus* may live on your hands and be transmitted between cows during milking. At minimum, hands should be thoroughly washed with soap and water before milking. Ideally, because bacteria are less likely to adhere to gloves than rough, calloused skin, nitrile or latex gloves should be worn during milking. Gloves minimize the spread of contagious mastitis between cows during milking and help protect the milker's skin. Gloves are also easier to disinfect than bare hands. Whether gloves are worn or not, hands should be washed periodically throughout the milking process.

Minimize Stress

The milking process actually begins as cows enter the milking area or parlor. Time in the holding pen should be minimized to less than two hours total per day. Cows should be brought into the parlor calmly and gently (Figure 2). Hitting or yelling at cows will cause them to become excited and stressed. When cows are stressed, a hormone, adrenaline, is released into the bloodstream and interferes with the release of oxytocin from



Figure 1. Posting written milking procedures, in the native language of your employees, helps ensure that desired milking procedures are understood and followed.



Figure 3. Nitrile or latex gloves should be worn during milking to minimize transmission of mastitis-causing organisms.

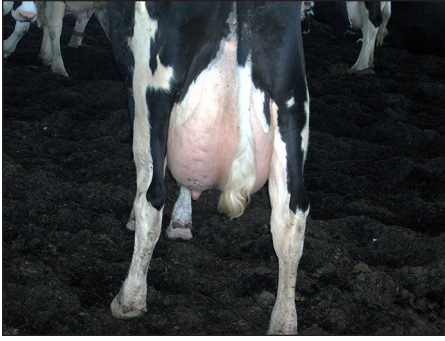


Figure 4. Cows that are clean before they enter the parlor are less likely to have mastitis.



Clean Cows

You should strive to keep cows as clean as possible before they ever enter the milking area. Clean cows are exposed to fewer environmental mastitis pathogens, and they are easier to clean prior to milking (Figure 4). If you feel the need to wash a high percentage of your cows, you may want to reconsider how your pastures or barns are managed to improve the cow cleanliness. Dirt, manure, or debris can often be removed by hand or with a towel without the use of water. When cows are excessively dirty, some use of water may be necessary to clean the teats; however, this practice should be the exception and not the rule. Water use in the milking process should be kept to a minimum (Figure 5). If water is used, be sure to only wet the teats and not the entire udder. It is nearly impossible to dry the udder, and this water ends up being drawn into the



Figure 5. Water should not be used to clean cows on a regular basis.

inflations during the milking process. Generally, the use of water in the parlor results in increased mastitis and higher bacteria levels in milk.

Forestrip

Once the cow is in position, the first step in the milking process is generally forestripping. Forestripping involves manually removing a few streams (or

strips) of milk from each teat (Figure 6). This process allows the milker to examine the milk for any signs of mastitis, including clotty, stringy, or watery milk. Also, forestripping helps to stimulate the teats and udder and encourage milk letdown. Effective stimulation helps to increase milk flow rate and reduce milking unit on time. Ideally, forestripping is accomplished using a strip cup. Milk may also be stripped onto the floor and hosed from the floor immediately. Milk should not be stripped into the hand or towel because this would encourage the spread of mastitis between teats and between cows. Forestripping can be accomplished before or after predipping but absolutely must occur before drying. Often, forestripping and predipping are accomplished in the same task within a routine to save time. To allow for adequate stimulation, this task should take about 10 to 20 seconds per cow.

Pre-dip

Teats should be predipped with a sanitizing solution. Predipping eliminates bacteria on teat ends prior to milking and helps to control mastitis caused by environmental mastitis pathogens. When pre-dipping, at least three quarters of the teat should be covered with a goal of covering the entire teat (Figure 7). A non-return teat dip cup should be used to prevent teat dip contamination. The predip should remain on the teats for at least 30 seconds before drying.



Figure 6. Forestripping helps stimulate the teats and provides the opportunity to examine milk for signs of mastitis.



Figure 7. Teats should be pre-dipped prior to milking with a goal of covering at least three quarters of the teat.



Figure 8. Teats should be thoroughly dried with single-service paper or cloth towels with particular attention paid to cleaning the teat end.

Dry

Next, the teats should be thoroughly dried with a single service, absorbent cloth or paper towel. Never use the same towel on two cows. All debris, manure, and predip residue on the teats should be removed while drying by using a gentle, twisting motion. During the drying process, particular emphasis should be placed on getting the teat ends clean and dry. If teats are not adequately dried, water containing mastitis-causing bacteria may end up in the teat cups during the milking process and expose the open teat ends to these bacteria. Ultimately, poorly dried teats result in increased incidence of mastitis. When using cloth towels, research has demonstrated that at least two of the following must occur during laundering:

- Washing with detergent and sanitizer
- Using hot water above 140° F
- Using a heated drying cycle



Figure 9. Milkers should be attached within 60 to 120 seconds after first contact with the cow's teats.

Attach Milking Units

The timing of milking unit attachment is the next critical step in a good milking procedure. Oxytocin, which causes milk letdown, reaches peak levels at 60 seconds after stimulation. Therefore, milkers should be attached within 1 to 2 minutes after teat stimulation (Figure 9). Coordinating attachment with milk letdown helps ensure that the milkers are attached during the timeframe when milk flow is highest. Attaching milkers too soon or too late can result in excessive milking time or reduced milk yield. The actual attachment of the milker should be performed with the goal of minimizing excessive air into the milking system. Adjust the milking unit to hang squarely beneath the cow's udder and arrange the milking unit and hoses to avoid any twisting. The milking unit should be checked and adjusted to prevent liner slips throughout the milking process.



Figure 10. The milking unit should be hung squarely beneath the cow's udder.

When the milking unit is not aligned properly, too much milk will remain in the udder after milking and teat cups may slip or squawk during milking. When the teat cup liner slips, small droplets of milk may be forced back toward the end of the teat. If these droplets of milk contain mastitis-causing organisms, they may enter the udder and result in a new infection.

Remove the Milking Unit

The milking unit may be removed manually or with automatic take-offs or detachers. With either process, care should be taken to avoid overmilking, which can increase the incidence of liner slips and lead to teat end damage. When automatic take-offs are used, the unit settings should be adjusted to ensure they do not stay on too long. In addition, it is important to resist the temptation to override the automatic detachment by putting the milker back on. When teat cups are removed manually, be sure to shut the vacuum off before removal. Removing teat cups while under vacuum can lead to increased infections and tissue damage. The process of machine stripping, or holding down on individual teat cups or milking clusters, should be avoided. Properly stimulated cows milked with correctly functioning and attached milking units should not have excessive residual milk left in the udder. The potential teat end damage from machine stripping far outweighs any potential benefits.



Figure 11. Milking units may be removed manually or with automatic take-offs.

Post-dip

As soon as possible after the milking units are removed, teats should be dipped with a post-dip, which has been demonstrated to be an effective germicide through independent research. As with pre-dipping, the goal should be to cover at least three quarters of the teat (Figure 12). An effective post-dip kills organisms on

teats, prevents organisms from colonizing in the teat canal, and reduces the rate of new infections from contagious mastitis pathogens. Teat dip cups should be kept clean. A non-return teat dip cup should be used to prevent teat dip contamination. Contaminated teat dip should be discarded. Some dairy producers choose to spray teats rather than dip. While it is possible to adequately cover teats with a

spray bottle, full coverage is often inadequate when spraying teats. A good way to test the effectiveness of post-dipping is to wrap a paper towel around the teat just after dipping. The goal is to see a continuous streak of teat dip on the paper towel, indicating the entire teat was covered. With spraying, you will often find broken streaks of teat dip because the opposite side of the teat is often not covered.



Figure 12. All cows should be post-dipped after milkers are removed.

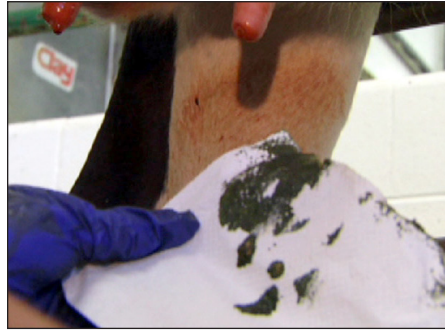


Figure 13. Test the effectiveness of post-dipping by wrapping a paper towel around the teat just after dipping. With spraying (left) you will often see broken streaks of teat dip; with dipping, you are more likely to see a continuous streak of teat dip (right), indicating that the entire teat was covered.

Key Steps in the Milking Process



Step 1. Forestrip: check for abnormal milk.



Step 2. Pre-dip with goals of covering $> \frac{3}{4}$ of teat and contact time > 30 seconds.



Step 3. Thoroughly dry each teat with single service towel with particular emphasis on cleaning the teat end.



Step 4. Attach milking units within 1 to 2 minutes after teat stimulation.



Step 5. Remove the milker when milkout is complete without overmilking or machine stripping.



Step 6. Post-dip as soon as possible after unit removal with a goal of covering at least $\frac{3}{4}$ of the teat.