

# Milk Management:

## Milking the Most from Your Milking Procedures

*Proper milking techniques* should be a top priority for all dairy managers. Milking procedures are important to milk quality, production level, incidence of mastitis, and udder injuries. Deficiencies in recommended milking practices can lower the total efficiency of the dairy operation.

Regardless of the type of milking facility, you should consider three important factors in developing a sound milking-management program:

- **premilking preparation**
- **milking practices**
- **postmilking procedures**

### Premilking Preparation

#### Cow Preparation

Proper preparation of the udder and teats before milking is vital to a sound milking program. However, preparation of the entire cow can also be incorporated into the milking-management program. Clean cows can increase milking efficiency by reducing the amount of time and labor required to clean and dry udders and teats. The cleaner the udder, flanks, and tail regions, the better.

Clean cows require less water, thus reducing the potential of new mastitis infections from milking wet udders. When water is necessary for cleaning, use the least amount possible to prepare cows in an effort to combat the spread of environmental mastitis organisms.

The goal for cleaner cows can be accomplished with some effort. The first step is to maintain an environment that is as clean as possible. The following practices should help you maintain a clean environment:

- Clean feed areas, free stalls, bedding areas, alleys, and traffic lanes.

- Avoid muddy areas around water troughs, shade trees/structures, loafing areas, etc.
- Restrict access to muddy stagnated ponds or other bodies of water.

Cows are easier to prepare for milking if long hair on the udder is removed by clipping or singeing. Other beneficial practices include clipping hair from the flanks and periodic trimming of the tail switch.

#### Cow Handling

Another management consideration is cow handling before, during, and after milking. Cows are creatures of habit. Therefore, the management program must include consistent milking times each day and the same basic milking procedure for all cows at all times. Even though cows are individuals and tend to differ slightly in response to a routine, a good milk technician recognizes these differences and provides the attention needed for maximum milk harvest from each cow.

It is important for cows to be calm and undisturbed in the barn so oxytocin (the milk "let-down" hormone) can work effectively. Be cautious not to subject cows to unnecessary stress. Any stress or pain experienced by the cow immediately before or during milking will cause adrenalin to be released, which interferes with the action of oxytocin. It is extremely important for milk technicians to understand this principle to avoid milk production losses. Additionally, any surroundings or activity during milking time that routinely causes stress to cows will increase incidence of mastitis infections – primarily due to an incomplete milk out.

#### Procedures

Because milking facilities have different designs (such as stanchion vs. pit, number of milking units, number of milk technicians, use of automatic take-off, etc.) not all farms use the exact same milking routine. Regardless of differences, the basic recommended procedures for a milking-management program will work well for all Mississippi dairies:

1. **Dry Wipe Teats.** Manually check udders and teats of all cows to remove foreign particles even if a lot washer system is used to



Maintaining a clean environment is important in keeping cows clean.

clean cows before they enter the barn. Dry wipe teats with your hand, preferably wearing smooth rubber gloves, to remove contaminants such as manure and soil particles. Be careful not to excessively scrub teat ends before sanitizing.



**Dry wipe teats to remove manure and soil particles.**

**2. Check Foremilk and Udder for Mastitis.** Mastitis can be detected by a physical examination of the udder. Check for hard quarters, swelling, and/or hot spots (fever). Check the condition of the milk by fore-stripping. This involves hand manipulation of the teat to strip four to five powerful squirts of milk from each quarter for visual inspection. Important functions of fore-stripping include the following:

- checks for abnormal milk (such as flakes, clots, stringiness, watery secretions) as an early detection of clinical mastitis
- removes high somatic cell count (SCC) or high bacterial count milk from the teat canal
- ensures that the teat canal is open for free flow of milk
- stimulates the release of oxytocin to enhance milk let down.



**Checking for mastitis using the California Mastitis Test (CMT)**

Use of a strip cup generally makes detection of abnormal milk easier. If care is taken to prevent contaminated fore-stripped milk from splashing onto cows' feet, legs, and udders – it is acceptable to fore-

strip onto the floor. Rinse milk stripped onto the floor into the drain with a gentle stream of water. **Milk should never be stripped into a technician's hand** because of a high risk of spreading infectious organisms.

Fore-stripping is probably the most effective procedure used to ensure milk quality, udder health, and a short "unit-on" time during milking. Yet, in many dairies, it is the most neglected step found during routine visits to evaluate milking procedures. Excuses for not fore-stripping include these:

- "Fore-stripping slows down the milking too much."
- "The workers will not do it correctly."
- "The workers do not recognize udder problems and milk abnormalities when they see them."

There is no excuse for not fore-stripping four to five streams of milk from each quarter of every cow at each milking. The "it takes too much time" argument does not hold any validity since milk-out times are actually decreased because milk flow is improved. Improved milk flow is prompted by the heightened flush of oxytocin stimulated by good teat manipulation. If milk technicians cannot correctly perform the fore-stripping procedure and identify abnormal udder and milk conditions, they do not need to be milking.

To ensure shipment of high quality milk, do not put any abnormal milk in the bulk tank. Mark any cows found with abnormal milk and/or udder problems and hold them for examination and mastitis treatment. Aseptically collected milk samples from each quarter can be cultured to determine the microorganism(s) responsible for the infection. For best results, collect samples for culturing before antibiotic treatment. To determine an effective mastitis treatment and prevention strategy, it is necessary to monitor milk culture results from bulk tank and individual cow samples.

**3. Sanitize Teats.** To avoid introducing mastitis-causing organisms into the udder, it is crucial for milking units to be placed only on clean, dry, sanitized teats. If a lot washer system is used, allow plenty of drip time for substantial drying of the udder and surrounding area before cows enter the parlor. Milking wet udders allows contaminated water into the inflations. Bacteria can then be forced directly into teat ends through the surging action of milk moving through the claw. Once bacteria are introduced into teat ends, a mastitis infection can occur. **Never place a milking machine on a wet udder.**



**Once the udder has been cleaned, use a pre-dip for disinfection. Use a post-dip to combat bacteria after milking.**

The most common practice for disinfecting teats in preparation for milking is pre-dipping. Dip at least two thirds of the teat with a germicidal teat dip product approved for use as a pre-dip. **A 30-second teat contact time** with a proven germicidal pre-dip product, followed by removal with a clean, single-service paper (or cloth) towel is necessary for maximum reduction of environmental organisms and stimulation of oxytocin release. Thorough drying action is needed for complete removal of the pre-dip to avoid milk adulteration (residue). Ensure that teat ends and the lower portion of teats are very clean before attaching milking units.



**Minimize introduction of air into the system during placement of the milking unit.**



**Dip at least two-thirds of the teat. An example of poor teatdip application above and proper application below.**



## Milking Practices

**1. Attach Milking Unit.** A consistent routine at each milking signals the cows that milking is about to begin. Place milking units on cows when teats are firm (indicating milk let-down) to take full advantage of the oxytocin response stimulated by good teat manipulation. Research has shown that maximum response time from oxytocin occurs 60 to 90 seconds after initial udder stimulation. Therefore, attach milking units within a minute to a minute and a half to ensure fast, complete milk outs. Most properly prepped cows milk out in 3 to 5 minutes.

Attach milking units in a way that minimizes the amount of vacuum lost through introduction of air into the system. To reduce air intake, attach units by keeping the inflation stem bent over the claw ferrule (nipple) until the teat cup slides onto the teat. Position the claw to avoid liner slippage (squawking) and ensure quick, even milk out of all four quarters. About 60 percent of milk is produced in the rear quarters and 40 percent in the fore. Therefore, positioning the claw for more downward pressure on the rear teats results in more uniform milk out. Liner slips allow air to move milk droplets at high rates of speed through the claw and can force mastitis-causing organisms into teat ends. If a teat cup starts squawking, adjust it immediately. If excessive liner slippage occurs (more than 5 percent of cows), consult the equipment dealer concerning liner (inflation) selection, vacuum pump capacity, milking system vacuum level, and vacuum regulator response.

A considerable amount of time is wasted “machine stripping” cows. This process involves applying slight downward pressure on the claw when cows are almost milked out, coupled with massaging each quarter in a gentle downward motion. It is not necessary for most cows. Most cows that have been properly stimulated for milk let-down will milk out completely without machine stripping. Avoid unnecessary machine stripping because cows become accustomed to the practice and will not milk out without it. Machine stripping should not be a routine procedure performed on all cows. It should only be used on



**Adjust squawking teat cups immediately. Liner slips can force mastitis-causing organisms into teat ends.**

“problem” cows (slow milkers caused by injury, poor udder shape, mastitis, or udder edema).

2. **Detach Milking Unit.** Do not squeeze the inflation milk tube to detect milk flow since this causes detrimental vacuum fluctuation within the claw impacting teat ends. When milking is complete, shut off the vacuum to the claw before removing the unit. **Vacuum must be broken before removing teat cups to avoid teat stress damage and mastitis problems resulting from air rushing into the claw.**

When individual quarters milk out early, leave the teat cup on if it is not slipping. **How** teat cups are removed is more important than **when** they are removed. Very little, if any, teat damage results from moderate over-milking. However, the risk of bacteria entering the udder through milk droplets impacting teat ends is greatest during over-milking. Removing liners one at a time as quarters milk out can increase the chances of teat injury from vacuum fluctuations. However, if a teat cup is squawking caused by milk out, remove it immediately by pinching off the short milk tube of the inflation. Once removed, twist the liner to close off the milk tube and lay it over the claw to keep air from being admitted. If liner plugs are used, wash and sanitize them thoroughly after each use.

## Postmilking Procedures

### Postdip Teats

Once the milking unit is detached, immediately dip teats with an approved germicidal teat dip that has been proven safe and effective. When units are removed, teats are covered with milk and the teat end sphincter muscles are fatigued. This muscle fatigue prevents proper closure of the streak canal until the muscles contract again. Because of the relaxed sphincter muscles, microorganisms on teats can easily enter the teat ends. Dipping teats with an effective product immediately after units are removed destroys most of the microorganisms present at that time.

Effective teat dips also provide residual germicidal activity to combat bacteria from making contact with teats soon after milking. If cows lie down in muddy areas or go into standing water shortly after milking, there is an increased chance of bacteria entering teat ends because of relaxed sphincter muscles. To prevent this, keep cows standing for up to an hour after milking, giving sphincter muscles time to contract and securely close teat ends. This can be done by directing cows to the feed bunk or grazing immediately after they leave the milking facility.

Also, keep exiting areas of the milking barn as clean as possible to avoid udder contamination if cows lie down. If unavoidable heavy mud conditions exist, consider using an approved barrier-type dip. Barrier teat dips generally contain germicides, skin conditioners, and ingredients that form a protective film that essentially “seals” the teat end to provide additional protection.

Good sanitation is very important in teat dipping. Use only clean, well washed/sanitized dippers in the milking barn. The preferred dipper is the “squeeze bottle” type that dispenses dip into an upper reservoir when squeezed. Fill the reservoir with fresh dip, being careful not to over-fill, or to back siphon contaminants into the container. Use freshly dispensed product in the reservoir to dip all four teats, discard the residual dip, refill the reservoir, and proceed to the next cow. Do not

leave residual teat dip in the reservoir between cows because the germicidal agent rapidly deactivates once contaminated. Do not use contaminated, deactivated teat dip since it can spread mastitis-causing bacteria from quarter to quarter and from cow to cow.

Teat spraying is an alternative to teat dipping. Results may be acceptable if done correctly with a suitable spray device that provides adequate coverage of each teat. A common problem with spraying is that only a portion of the teat is sprayed.

### Teat Dipping in Winter

Cold weather conditions are generally not a problem in most dairy production areas of Mississippi. However, when temperatures fall below freezing, take extra precautions with postdipping teats.

Exposure of freshly dipped teats to extremely cold air can result in damage from chapping and freezing. During the coldest periods of winter, it would be helpful to use a teat dip containing a skin conditioner (primarily lanolin or glycerin) to minimize chapping. When temperatures are at or below freezing, allow teat dip at least one minute contact time, then gently blot excess dip from teat ends with a single-service paper towel before allowing cows to leave the barn.

Efforts to block the wind from return alleys and/or loafing areas immediately outside the milking barn will reduce the ill-effects of low wind-chill temperatures. If temperatures fall below 10 °F, it is probably best to discontinue postdipping teats—if the area where cows will be confined does not have excessive mud and manure. With heavy mud/manure conditions, continue postdipping teats and allow extra time for drying before the cows leave the barn.

**Keep exiting areas of the milking barn as clean as possible to avoid udder contamination if cows lie down.**

### Teat Dips

The National Mastitis Council recognizes the use of Food and Drug Administration (FDA) approved teat dips immediately after milking as the single most effective practice for reducing mastitis infections. Use only products that are (1) listed with the FDA and (2) shown to effectively reduce infection rate by controlled research. The FDA regulates teat disinfectants as over-the-counter drugs. However, FDA does not require proof of effectiveness for labeling. Specific teat disinfectants have been studied in controlled research, but imitations are readily available and minor formulation changes often reduce effectiveness.

Dairy producers should request information from the manufacturer on compliance with FDA regulations and results of controlled research studies showing effectiveness. Another source of information concerning teat disinfectant effectiveness is the “Summary of Peer-Reviewed Publications on Efficacy of Premilking and Postmilking Teat Disinfectants” published since 1980, made available and updated annually by the National Mastitis Council. The summary of peer-reviewed publications is not exhaustive, and new findings may be reported between publications on the list.

Research has proven that dipping all teats with an effective teat dip after each milking reduces new udder infections by 50 to 90 percent. Therefore, it is highly advisable for at least the lower two-thirds of each teat to be dipped with an effective teat dip after each milking. Many teat dips contain skin conditioners to soothe skin to prevent

## Sick Cows

A good milking-management program is not complete without a clearly defined, understood, and executed procedure for milking cows treated with antibiotics for mastitis and/or other infections. The order in which cows are milked plays a major role in milk quality. Ideally, cows would be segregated and milked in the following order:

1. first calf heifers
2. second and later lactation cows with low SCC
3. fresh cows
4. high SCC cows
5. cows with clinical mastitis.

Since this scheme is unrealistic on many dairies, it is preferable that all fresh and treated cows be grouped together as a “sick herd” and milked last. After all other cows have been milked, prepare to milk the “sick herd” by removing the milk transfer pipe from the bulk tank and thoroughly sanitizing all milking units. Teat cups should have adequate time to air dry before use with the next milking. Milk all fresh cows first and then milk treated cows. Milking these cows last greatly reduces the probability of spreading mastitis-causing bacteria from cow to cow throughout the herd. Give special attention to cows with high SCC and/or known clinical mastitis during inspection of the udder and fore-stripped milk to determine appropriate treatment.

chapping and other types of irritation. A good teat disinfectant should have these qualities:

- Effective against the major mastitis pathogens
- Destroy microorganisms on teat and provide some residual external teat protection
- Prevent organisms from growing in the teat canal
- Eliminate existing teat canal infections
- Not irritate skin since cracks and/or lesions harbor bacteria
- Be economical and easy to apply

Without complete teat dip coverage, all bacteria on the teat surface will not be destroyed – cracks and lesions on teat skin make effective destruction of microorganisms even more difficult to achieve.

Teat dip products should be unadulterated when placed on teats. Milk technicians should know which jugs or drums contain teat dips. If other dairy-related chemicals (soaps, sanitizers, acids, etc.) are mistakenly applied, serious teat injury can result. If different products are used for predipping and postdipping, technicians should clearly understand which products are pre and post to avoid serious problems. Store teat dips according to manufacturer’s recommendations – usually in a dark, cool, dry, clean area. Hot temperatures (90 °F +) or freezing conditions can cause loss of germicidal agent potency and/or result in chemical separation of the dip, which may cause skin irritation and teat-end damage.

Never pour teat dip from dispensers back into the original storage container to avoid contamination and deactivation of the entire contents. Fill teat dippers so they will be practically empty at the end of the milking. After each milking, discard remaining teat dip from dippers, and wash them thoroughly in a vat of hot, soapy water. Soak/rinse completely in a strong sanitizing solution.

## Milking Equipment

The milking barn is the most important tool in the dairy operation. The milking system is used more hours per year than any other single piece of equipment, yet often receives the least amount of maintenance. Make sure all of the milking system equipment is checked on a routine basis by qualified service technicians to ensure proper operation.



Check milking equipment routinely to ensure proper operation.

## Labor

The person(s) milking the cows has the most important job on the dairy. What the technician(s) do during milking primarily determines if maximum economic returns are realized. Poor milking practices can deprive an operation of profits.

An important quality for a milk technician is a proper attitude. He/she must want to be in the barn applying proper milking procedures to every cow and be attentive to every detail of the milking operation. Without the proper attitude and commitment to perform acceptably, an employee does not need to be milking cows (nor will he/she be likely to fit effectively into any other position within this employ). Only dedicated technicians who enjoy milking and have a sincere interest in being “on the team” will be effective. A commitment to using recommended milking practices should be involved in the process of milking. One dedicated technician is better than a dozen who are lax.

Milk technicians must understand the importance of cleanliness in the milking area. Floors, walls, and equipment, as well as hands and clothing must be clean. It is advisable to refrain from the unsanitary use of chewing tobacco in the milking barn. It is crucial for technicians to keep their hands clean throughout the entire milking. Before milking, wash hands thoroughly with antibacterial soap and hot water. Then dry hands with clean, single-service paper towels. During milking, dip hands in a disinfectant solution between prepping each cow. Disinfectants can become contaminated and ineffective quickly. Therefore, change disinfectants frequently during milking. Clean, dry, healthy hands help to significantly reduce the spread of mastitis organisms.

Clean, smooth, disposable rubber gloves are highly recommended during milking. Keep gloves as clean as possible throughout the milking by dipping them in disinfectant solution between cows. Research has shown that the *Staph. aureus* bacteria are spread from cow to cow on technicians’ hands. For herds known to be infected with

*Staph. aureus*, the use of rubber gloves during milking is highly recommended.

## Paper Towels Versus Cloth Towels

Many dairies use single-service paper towels for premilking udder preparation. Cloth towels do have the advantage of being more absorbent than paper. When cloth towels are used, laundering is important in significantly reducing pathogen numbers. Research has shown that hot water, bleach, or hot-air drying needs to be incorporated in the laundering method. The incorporation of two of these practices would add some margin of safety to ensure that cloths are sufficiently disinfected. Whatever type of towel is used, use only one towel per cow.

## Summary

The ultimate goal of all dairy producers is to produce large volumes of high quality milk profitably. A successful milk-management program depends on several key points:

- Establish and maintain a smooth pre and postmilking routine that suits the milking barn design and personal labor capabilities of your operation.
- Proper cow handling and udder preparation will decrease the amount of time required for milk outs and ensure good udder health.

Ultimately, proper milking management can help a producer achieve maximum returns from breeding, feeding, and herd health practices.



[msucares.com](http://msucares.com)

By **Dr. Angelica Chapa**, Assistant Extension Specialist, Animal & Dairy Science, and Lamar Adams, County Director, Walthall County.

Mississippi State University does not discriminate on the basis of race, color, religion, national origin, sex, age, disability, or veteran status.

### Publication 2305

Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. JOE H. MCGILBERRY, Director

(800-09-02)