

Dairy Goat Milking Procedures: The How and Why

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Most current standard operating procedures used on goat dairies are based on standard operating procedures from dairy cattle operations. Proper milking procedures are important for all dairies to reduce the risk of mastitis, ensure proper milk letdown and reduce bacterial populations in milk. Using a variety of resources, this publication highlights proper milking procedures and why they are necessary.

Before You Begin

Having a low-stress environment for your dairy goats before milking is very important for the hormonal components of milk letdown. Stressors such as yelling, loud noises, whistling and herding dogs can increase adrenaline in your does. Adrenaline blocks the production of oxytocin, which is the hormone needed for milk letdown^[1]. Without proper milk letdown from oxytocin, your herd is at greater risk of bimodal milking, teat calluses and mastitis. Bimodal milking is an interruption in milk flow following cistern milk removal but before the alveolar (secretory tissue in the udder) milk reaches the gland cistern^[2]. This results in vacuum pressure on a teat that has no milk available to be collected and can impact teat health and structure over time, increasing the risk of mastitis. A routine, calm milking environment with trained, responsible workers can increase milk yield and decrease the risk of mastitis^[3].



Figure 1: Put on clean gloves before milking.

necrotic lesions and inflammation of the udder. Gloves should be worn from the very beginning of milking until you have put away all milking supplies to ensure that bacteria from your hands are not spread to milking supplies, equipment and udders. If gloves become soiled or contaminated, gloves can be rinsed or changed before continuing milking.

Step 2: Strip each teat six times

Stripping the teat stimulates oxytocin release for milk letdown. Attaching the milking unit before oxytocin release can strain teat tissue and cause teat damage, increasing the does chances of inflammation and mastitis^[7]. Stripping the recommended three to six times allows you to empty the teat cistern and look for possible mastitis signs and other abnormalities in the milk while inducing oxytocin release^[3, 4]. Stripping foremilk from the teat cistern also allows you to remove the milk which has the highest bacterial count^[8, 9]. Stripping can be done into a strip cup or onto the floor to assess the milk. Signs of clinical mastitis can include discoloration, clumps and a red tinge^[3]. If you notice mastitis, mark this doe so that it can be managed according to your farm's mastitis procedures. If you suspect subclinical mastitis, a California Mastitis Test (CMT) can be done to detect if a doe has an infection. To reduce pathogen spread, does with subclinical or clinical mastitis infections should be milked last. This helps ensure that milk from infected does will not be transferred to does without an infection.

Step 1: Glove up!

The first step is putting on fresh, clean gloves. Disposable gloves are recommended to prevent the spread of bacteria from goat to goat and from your hands to the teat end^[4]. Some mastitis pathogens are contagious and are primarily spread during milking, such as *Staphylococcus aureus* (Staph. A.), or *Streptococcus agalactiae* (Strep. Ag.). Staph. A. and Strep. Ag. can survive on the human hand and be passed directly to does during milking or pass from an infected doe to a non-infected doe. These pathogens also can survive in milking machine liners or teat skin^[5, 6]. Staph. A. is difficult to treat with antibiotics and can cause serious issues, such as udder rot, a bacterial infection causing swelling,

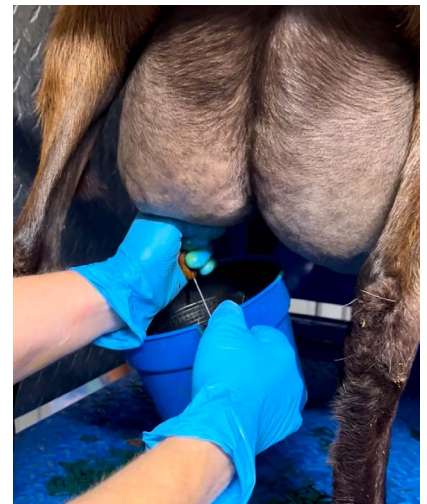


Figure 2: Stripping each teat to look for abnormalities.

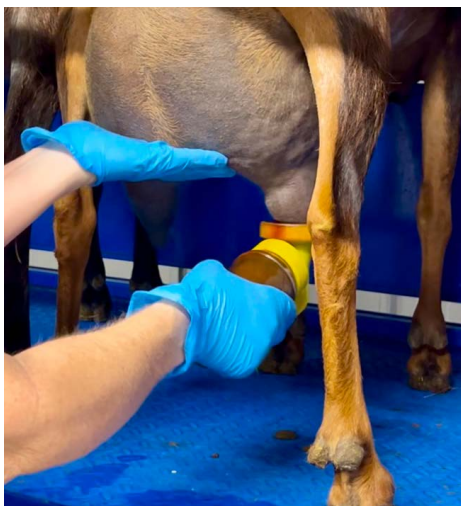


Figure 3: *Applying pre-dip to each teat.*

and udder damage ^[3]. Leaving pre-dip on the teat can leave residue in the milk ^[10]. Each goat should have an individual cloth or paper towel to prevent bacteria from spreading between animals. If cloth towels are used, do not use them on more than one animal (i.e. flip it over and use the other side). Bacteria will travel to the other side of the towel and potentially infect the other doe. Cloth towels should be washed in hot water. If drying towels, use a dryer on a high heat setting. If you air dry, towels should be washed in hot water with bleach and detergent ^[15]. Once the pre-dip has been removed from the teat, avoid touching the teat again with your hands, even if gloved, to prevent spreading bacteria ^[10, 13].

Step 3: Pre-dip each teat and wait 30 seconds

Pre-dipping each teat should be done using a germicidal product labeled for pre-dipping and shown to be effective at preventing mastitis ^[10]. Some common pre-dip active ingredients include iodine, chlorhexidine, hydrogen peroxide, and chlorine dioxide ^[11]. Applying pre-dip to at least three quarters of each teat and leaving it on for 30 seconds allows the product to kill bacteria that may be present on the teat ^[3, 4, 10, 12-14]. Think of this like washing your hands; you want to ensure the soap has enough contact time with your skin to kill any pathogens, roughly 30 seconds. Even the most expensive pre-dip will not work in your herd if you immediately wipe it off and do not allow it enough time to kill pathogens.

Step 4: Fully dry each teat

Each teat must be fully dried and pre-dip removed before attaching the milking unit. Leaving teats wet causes the milking machine to slip from the teat during milking, increasing the risk of mastitis, udder health issues

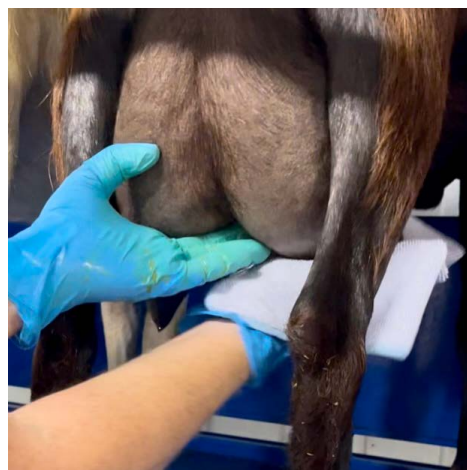


Figure 4: *Drying each teat*



Figure 5: *Attaching the milking unit.*

Step 5: Start milking!

The milking unit should be attached between 60 to 120 seconds of initial stimulation of the teat to ensure you are getting peak milk letdown ^[3, 4, 7, 13]. Shorter than 60 seconds from initial touch, oxytocin may not have enough time to reach the milk secretory tissue. Longer than 120 seconds, oxytocin has stimulated milk letdown already, but the initial surge has passed. When this happens, oxytocin must be re-released to continue milk letdown, resulting in bi-modal milking which constitutes a greater risk of overmilking and developing mastitis ^[7, 16]. When attaching the unit, listen for “squawking” sounds, as this could indicate liner slippage. If these sounds are noticeable, adjustments to the positioning of the milking unit should be made. Having the milking unit improperly placed on the teat can introduce environmental air and bacteria, causing damage to the teat wall and canal ^[3, 4, 10, 13].

Step 6: Shut off vacuum and remove unit

Monitor milk flow to remove the unit. When milking is complete, the milk flow should nearly stop, though a small flow should continue. Be sure not to overmilk or undermilk, as these can lead to udder health problems such as mastitis and poor teat ends ^[4]. A small amount of milk, about a quarter to a half a cup, should be left in each udder half after milking. If no milk flows when the unit is removed, this is a sign of overmilking. If you are unsure whether full milking has occurred, you can palpate the udder to check for firmness. If the udder feels hot and hard, this could be signs of clinical mastitis. Before removing the milking unit, make sure the vacuum suction of the unit is turned off. Removing the milking unit with vacuum on can damage the udder and teats ^[3, 4].



Figure 6: *Removing the milking unit.*



Figure 7: Applying post-dip to each teat.

Step 7: Post-dip and done!

Post-dip should be applied after milking unit removal and before releasing the doe. Post-dip serves as a barrier between the teat end opening and environmental pathogens ^[17]. Post dip should cover at least three quarters of the teat and should not be removed. The product should be labeled as post-dip and shown to be effective at preventing new intramammary infections ^[13]. Using a product labeled as post-dip is important because post-dips often include conditioners and surfactants to prevent teat end calluses, where pre-dips do not. Farms should choose a post dip based on farm goals and doe needs. Some examples of post-dip active ingredients include iodine and chlorine dioxide ^[11].

Hand Milking

If hand milking does, these steps still apply. Wear gloves, strip each teat, pre-dip and fully dry each teat before beginning milking. Gloves should be worn throughout the milking process to protect your does from contagious pathogens. Milk flow should be monitored, and the udder can be palpated to check for over-milking or undermilking. Before releasing your doe, post-dip should be applied to protect from environmental pathogens. The only non-applicable steps would be attaching and detaching a milking unit.

Additional Methods to Promote Mammary Health

Udder Cleanliness

Maintaining udder cleanliness is a top priority to prevent bacterial growth and maintain udder health. Sanitary clippings should be done 1 to 2 weeks prior to kidding to remove hair from the udder, tail, rear legs and flanks. This will help keep manure or mud from adhering to the udder, reducing bacterial exposure. An udder singer may be used to remove excess hair as well. Make sure to follow manufacturer instructions to avoid burns if using this method. Water use should be limited to prevent bacteria on the teat end. If any water is used to clean the udder, ensure it is completely dry before applying a pre-dip. Parlor areas should be cleaned and dried completely before milking to prevent water splashing onto the teat and udder ^[12].

Environmental Cleanliness

Cleanliness in the parlor and barn are important to overall doe and udder health. Proper equipment cleaning should be done immediately after each milking to prolong the life of your equipment, maintain a clean working environment and reduce bacterial contamination and growth. Cleaning equipment includes both the internal and external surfaces of milking equipment. The steps of properly cleaning equipment include pre-rinsing, washing, rinsing, acid rinsing and sanitizing ^[18]. If



Figure 8: Example of a clean udder and teats.

using recirculating dip cups, discard the teat disinfectant and wash the dip container after each milking ^[12]. Along with equipment cleaning, make sure the parlor, goat housing, and walkways also are kept clean and dry. Keeping bedding and laneways clean reduces the introduction of dirt and bacteria to the teat and udder ^[17].

Replacing Machine Liners

Milking machine liners should be replaced according to the manufacturer's recommended maintenance schedule ^[19]. Liner life is typically referred to in terms of the number of milkings. If your liner is rated for 2,000 milkings and you milk six goats across three milking units with 24 goats in your herd, each milking shift your liners will be used eight times and will last through 250 milkings. If you milk once a day, liners will last 250 days. If you milk twice a day, this will last 125 days. Liners that are past replacement are prone to cracking and slipping. Damaged or worn liners cause teat damage, leading to mastitis and leaving a place for bacteria to survive ^[19].

Conclusion

Standard operating procedures are an important factor for maintaining order during milking. Maintaining a calm and clean environment during milking can improve milking efficiency and decrease the spread of bacteria and mastitis risk. The beginning steps of milking, including wearing gloves, stripping each teat, pre-dipping with time for killing of bacteria and fully drying each teat, are very important to reduce bacterial spread, check udder health and get you ready for the next steps of milking. Prepping for milking is not the only important piece, though, as monitoring milking, shutting off the vacuum for unit removal and post-dipping are all equally important to maintaining udder health. Milk is where the money is. Take the necessary steps towards protecting your herd and getting higher milk quality and higher milk yield.

For more information about milking and managing dairy animals, please contact your local Extension agent on the UT Extension website at utextension.tennessee.edu/office-locations-departments-centers/ or Elizabeth Eckelkamp at 865-974-8167, or eeckelka@utk.edu.

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