

Premilking Udder Preparation

The primary objectives of good premilking udder preparation are to produce high quality milk and minimize mastitis. Procedures for udder preparation should ensure that teats are manually cleaned and thoroughly dried before machine attachment to minimize bacterial counts and sediment in milk. Effective udder preparation before milking also reduces the likelihood of bacteria entering the teat canal and udder during machine milking.

Udder wash sanitizers

Udder wash sanitizers have marginal benefit in reducing bacterial populations in milk. The small benefit is most consistent when sanitizers are used with water hose preparation procedures. Their limited benefit is likely due to low germicidal activity, method of application (inadequate dispensing of solution, and covering of teats), short contact time on the teat skin and the relatively greater effect from physical action that usually occurs during manual cleaning and drying. Therefore, udder wash sanitizers should not be used with the thought that they kill a major portion of bacteria on teat skin.

Importance of dry teats

Udder surfaces should be dry (even if dirty) and teats should be cleaned and dried before milking. Wetting any portion of the udder above the teats without thorough drying will result in dirty, bacteria-contaminated water draining into the top of the teat cup liner during milking. When water is applied to the entire udder surface, the time needed to dry the udder manually or to allow surfaces to drip dry may decrease cow throughput. However, dryness is possible and practical to achieve when wetting is confined to teat surfaces.

Satisfactory hygiene cannot be achieved by air drying of teats. The physical force of manual drying with an individual towel for at least 10 seconds can remove up to one-half of the bacterial population on teats and is therefore more effective. The choice of towel type (paper, cloth) and absorbency depends on the amount of water used and the initial cleanliness of the teats. Another advantage of drying teats is that teat cup liners are less likely to slip or fall off.

Dry prep procedures

To avoid potential problems from wet udders and teats and the extra time needed for drying, some dairymen either wipe teats with a dry hand or dry towel, or use no prep at all. While a poor job of washing and inadequate drying of teats and udders may be no better (and in some cases, worse) than no prep, the best results are achieved from a good job of cleaning and drying teats. Research at Cornell showed that even with cows whose teats were visibly clean, there were 3 to 16 times more bacteria in milk from either 'no prep' cows, 'wet udder' cows, or 'dry wipe' cows than from 'properly prepped' cows. The best preparations in these comparisons were using either :

- a hose and water with sanitizer directed on teats only, plus hand scrubbing or manipulation of the teats during washing followed by manual towel drying or;
- using a wet paper towel in cleaning the teats only followed by manual towel drying.

Manual drying may reduce cow throughput. However, this practice may not be required if the herd somatic cell count and the incidence of clinical mastitis are low, and milk quality is very good. If any one of these criteria are not within the desired range, and to minimize risk of future problems, manual drying will improve the overall effectiveness of udder preparation.

Predipping

Cornell work indicates that predipping teats, plus manual drying with a paper towel, is as effective as a good job of washing teats with water (hose or wet towel) plus manual drying. Recent research results from Cornell and Vermont show that predipping can reduce new mastitis infections 43-51% more than a good job of washing and drying teats. With predipping, manually drying all four teats with an individual towel is not only essential for reducing bacteria and sediment, but also to avoid a problem of disinfectant residue in milk. In other words, if manual drying is not done correctly, predipping should not be practised. If teats are contaminated with dirt or manure whereby predipping with

subsequent drying does not physically clean the teats, then teats should be washed prior to predipping.

For proper coverage and effectiveness from dipping or spraying, all teats must be completely covered. Too often, the teats on the opposite side from the milker are inadequately dipped or sprayed. A minimum of 15 to 20 seconds for skin contact time is needed for a predip teat disinfectant to effectively kill bacteria. When environmental mastitis pathogens are at a high level on the teats, a skin contact time of 30 seconds may be needed.

In practice, predipping takes 3-6 seconds per cow, manual drying 6-8 seconds, and forestripping 4-7 seconds. Even if predipping with manual drying takes longer than simple rinsing with a water hose, the benefit of reducing environmental mastitis by 50% may justify the practice, especially during wet muddy weather and if the cow's teats (and udder) are wet when entering the parlour.

Predipping with manual drying may not be sufficient for good milk letdown by lower producing cows. If this is the case, the automatic detachers may have to be overridden during early part of each cow milking. Forestripping may enhance milk letdown, if necessary. If forestripping is practised, it must be done prior to teat cleaning and drying.

Undiluted udder wash sanitizers should not be used as premilking disinfectant dips, since they are not formulated for this purpose and do not have the same germicidal activity level as formulated teat dips. If concentrated sanitizers are used as dips, teat tissue damage may result.

The following tables summarize results from individual trials which compared the effects of udder preparation methods on teat skin bacteria (table 1), on bacteria (tables 2-4), sediment (table 5) and iodine (tables 6-7) levels in milk and on intramammary infections (tables 8-9) :

Dry towel	Procedures on TEATS only			Manual drying	Teat skin bacteria before machine-on ^a	Primary factor
	Wet towel	Predip	Wash sanitizer		% Change	
x					-4	
	x				-40	Scrubbing
	x		x		-40	
	x			x	-77	Drying
	x		x	x	-85	
		x		x	-85	Drying

^aPercent change of bacteria on skin compared to no preparation

Table 1 : Bacterial counts on teat skin associated with various udder preparations.

Procedures on both UDDER and TEAT surfaces			Manual drying	Bacteria In Milk ^a	Primary factor
Water hose	Wash sanitizer			% Change	
X				+13	Water Drainage
X	X			-10	Sanitizer
X	X	X		-68	Manual drying

^aPercent change of bacteria in milk compared to no preparation

Table 2 : Bacterial counts in milk associated with the use of the water hose in wetting both the udder and teat surfaces.

- Wetting the udder surface and teats without adequate drying can increase bacteria in milk due to drainage from the udder surface.
- An udder wash sanitizer has relatively small benefit in reducing bacteria in milk because of its low germicidal concentration, method of application and short contact time on the skin.
- Manual drying reduces bacteria significantly, due to both physical action of wiping and drying.

Dry towel	Procedures on TEATS only				Manual drying	Bacteria in Milk ^a	Primary factor
	Water hose	Wet towel	Wash sanitizer	%Change			
x						-38 ^b	Physical effect
	x					-65	Drainage from udder surface
	x		x			-67	Drying
	x		x			-76	Drying plus sanitizer
	x		x	x		-88	No drainage from udder surface
		x				-71	Drying
		x	x			-62	Drying
		x		x		-79	Drying
		x	x	x		-78	Drying

^aPercent change of bacteria in milk compared to no preparation
^bResult depends on "dirtiness"

Table 3 : Bacterial counts in milk associated with cleaning teats only.

- Drying of teats prevents movement of bacteria in water.
- Dry wiping alone is never the best procedure.

Water hose	Procedures on TEATS only			Manual drying	Bacteria in milk ^a	Primary factor
	Wet towel	Predip	Wash sanitizer			
x					-4	No drying
x			x		-3	
x				x	-39	Drying
x			x	x	-49	
	x				-27	Liquid & scrubbing
	x		x		-30	No surface drainage
	x			x	-63	Liquid, scrubbing
	x		x	x	-68	& drying
		x			-34	Germicide
		x		x	-54	Germicide & drying

^aPercent change of bacteria in milk compared to no preparation.

Table 4 : Bacterial counts in milk associated with various udder preparations.

Dry towel	Procedures on TEATS only			Manual drying	Milk Sediment ^a	Primary factor
	Water hose	Wet towel	Pre-dip			
x					-38 ^b	Physical effect
	x				-29	Liquid
		x			-56	Scrubbing
		x		x	-57	Scrubbing & drying
			x		-4	Liquid
			x	x	-42	Drying

^aPercent change of milk sediment compared to no preparation (2.4 g/1)
^bResult depends on dirtiness

Table 5 : Milk sediment associated with udder preparations.

- Physical action (i.e., scrubbing with a liquid during washing or drying after disinfectant [liquid] application) is a significant factor in reducing sediment in milk.

Predip 1% Iodine	Wiping and drying of teats	Postdip 1% Iodine	Iodine in Milk	
			Increase ^a %	Content ^b ppm
+	+	-	29.4	0.328
+	+	+	56.5	0.485
+	-	-	349.8	1.067

^aIncrease compared to control period without iodine dips
^bWith no iodine teat dips (either pre- or postdip), milk iodine was 0.285 ppm due to iodine in feed

Table 6 : Iodine in milk for different premilking udder treatments.

- The 56% increase after postdip may be due to iodine absorption through the skin between milkings and teat surface contamination.
- Wiping after a predip in 1% iodine kept milk iodine levels in an acceptable range; not wiping resulted in a 350% increase and an unacceptable iodine content in milk.

Predip 0.1% Iodine	Wiping and drying of teats	Postdip 0.1% Iodine	Iodine in Milk	
			Increase ^a %	Content ^b ppm
-	-	+	13.6	.292
+	+	+	16.0	.294
1% Iodine		1% Iodine		
-	-	+	29.2	.336
+	+	+	39.6	.388

^aIncrease compared to control period without iodine dips
^bWith no iodine teat dips (either pre- or postdip), milk iodine was 0.260 ppm due to iodine in feed

Table 7 : Milk iodine residues in herds practicing iodophor premilking teat disinfection.

- Lower iodine concentration in a teat dip as well as thorough wiping and drying helps keep lower iodine residues in milk. Increased iodine levels in milk is a human health concern.

NONE	Udder Preparation				New intramammary infections		
	Wet towel	Predip 0.1% Iodine	Manual drying	Postdip 0.25% Iodine	Quarters %	vs NONE ---- % Reduction ----	vs Wet towel ----
X				X	26.8		
	X		X	X	15.2	43.3	
		X	X	X	8.9	66.3	41.0

Table 8 : Effects of udder preparation on the rate of new intramammary infections under experimental bacterial challenge conditions: teats were dipped in Strep uberis broth 3 hours before milking.

Treatment	Streptococcus			Quarters Infected	Reduction vs wet towel % -----
	species	Coliforms	Total		
	----- infected quarters -----				
Wet towel plus drying	31	41	72	13.0	
Predipping plus drying	18	21	39	6.3	51.5

Table 9 : Summary of new intramammary infections with environmental pathogens in predip studies on four commercial farms.

adapted and condensed from an article by: David M. Galton, Cornell University