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# Effect of different pre-milking udder wash treatments of tap water, mustard oil, coconut oil and dry hand milking on total bacterial count in raw milk of cross-bred cows

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**Abstract**
The present experiment was conducted to evaluate the impact of various pre-milking treatments viz. $T_0$ (udder washed with tap water and wiped with a towel as control), $T_1$ (Udder lubricated prior to hand milking using coconut oil), $T_2$ (Udder lubricated prior to hand milking using mustard oil), $T_3$ (Udder wiped with clean duster prior to milking as dry hand milking) Raw milk bacteriological quality of cross-bred cow at SHUATS, dairy farm. The experiment was conducted on 12 randomly selected, apparently healthy crossbred cows, maintained in a tail-to-tail housing system under uniform management conditions at the SHUATS dairy farm. Representative milk samples collected were analyzed to determine SPC in milk. The present experiment was concluded with inference that the $T_3$ (dry hand milking) is the b zest pre- hand milking treatment to obtain lower bacterial count in milk followed by $T_2$ (use of mustard oil), $T_1$ (coconut oil) and $T_0$ (tap water). Use of pre-hand milking with dry hand milking was the best treatment to obtain lowest total bacterial count (SPCx$10^3$) per ml raw milk. Therefore, use of dry hand milking and application of mustard oil to the udder prior to milking can be suggested to dairy farmers as a practice for obtaining milk with a lower total bacterial count.

**Keywords:** Coconut oil, dry hand milking, mustard oil, pre-hand milking, standard plate count, tap water and mustard oil

## Introduction
In rural India, livestock plays a crucial role in supporting livelihoods, providing both employment opportunities and draft power for farming. India also accounts for about 11.6% of the world's total livestock population, making it one of the leading livestock holders globally (Islam *et al.*, 2016) [2]. The dairy sector provides employment to over 80 million rural households in India, with nearly 70% of them being small and marginal farmers. Despite owning only about one-third of the land, they possess around 80% of the livestock resources, which contribute nearly one-third of their total household income. Producing clean and safe milk is the primary goal of every dairy farmer. Mastitis is among the most expensive diseases in dairy herds, leading to economic losses that may reach €190 per case depending on severity, and around €60 per cow for an average producer. These losses arise from discarded milk, higher culling rates, expenses on antibiotic treatment, and declines in both milk quality and market value. Among the causative agents, *Staphylococcus aureus* is considered one of the most virulent pathogens, with lactating cows serving as an important reservoir. Its colonization on teat skin significantly increases the likelihood of intramammary infections (Myllys and Rautala, 1995) [6]. Teat cleaning routines are designed not only to lower the risk of mastitis but also to improve overall milk quality. Proper cleaning has been shown to reduce milk spore content by as much as 96%. Lowering the microbial load on teats before milking is a key measure in mastitis prevention. However, the effectiveness of this step largely depends on the type of disinfectant used for pre-dipping, as different products vary in their ability to reduce teat-surface microbes. Dairy farm management is important to get hygienic milk production from dairy animals.

There are different practices applying by dairy farmers to produce the higher milk yield and safe milk production for human consumption. The Foreign particles in milk including bacteria, fungus, and virus are not safe for human health. To produce the hygienic milk on dairy farm it is required to maintain the biosecurity and hygienic practices on dairy farm. In India, hand milking remains the most widely practiced method of extracting milk from dairy animals. As part of routine hygiene, farmers generally wash the udder and hindquarters of cows with water before milking. Moistening of teats and udder of dairy cows prior to hand milking is commonly practice by majority of dairy farmers in India for easy and convenient milking. They use either water or milk froth for it. However, some farmers used oil for moistening of teats. Therefore, the experiment was conducted to assess the effect of different pre-hand milking treatments on total bacterial count in raw milk of cross-bred cows maintained at SHUATS dairy farm, Prayagraj.

## Materials and Methods

**Experimental Animals:** From the crossbred herd at SHUATS dairy farm, Prayagraj, 12 clinically healthy cows free from mastitis, as confirmed by the California Mastitis Test (Schalm and Noorlander, 1957) [8] and showing no visible udder infections or injuries were randomly selected for the study. The animals were housed in a tail-to-tail barn specifically arranged for milking, and the dry full-hand milking method was employed. Milk samples were collected under four different pre-milking treatments: dry hand (control), washing with tap water, application of coconut oil, and application of mustard oil. Each treatment was replicated ten times. As part of routine hygiene, the initial two streams of milk from all quarters were discarded. The collected samples were then examined for total bacterial count per millilitre using the SPC technique.

**Collection of Samples:** Representative milk samples were collected following different pre-milking udder wash treatments, namely dry hand, tap water, coconut oil, and mustard oil. The samples were promptly transported to the laboratory for assessment of the bacterial quality of raw milk.

**Pre-hand milking Treatments (T)**

**To:** Udder and teats of cows cleaned with tap water, wiped off with clean duster soaked in tap water to moisten teats during milking as control.

- **$T_1$:** Teats of cows lubricated using coconut oil prior to hand-milking.
- **$T_2$:** Teats of cows lubricated with mustard oil prior to hand-milking.
- **$T_3$:** Udder and teats of cows wiped with clean duster prior to hand milking for dry hand milking.

**Statistical analysis of data**

The observations on bacterial parameters were compiled and analyzed using Analysis of Variance (ANOVA) in accordance with the statistical procedure proposed by Snedecor and Cochran (2004) [10].

## Results and Discussions

Information regarding Standard plate bacterial count (SPC x $10^3$) in raw milk in different treatment pre-milking treatments presented in Table 1 and Figure 1. In general, SPC ($10^3$) per ml in milk was observed within the range from 28 to 38. Irrespective of different pre-hand milking treatments using tap water, coconut oil, mustard oil and dry hand-milking, mean SPC ($10^3$) per ml in milk was observed within the range from 30.4 to 35. However, SPC ($10^3$) in milk pertaining to $T_0$, $T_1$, $T_2$, and $T_3$ ranged from 34 to 38, 32 to 34, 30 to 34 and 28 to 32, respectively. Mean SPC ($10^3$) n milk in To, $T_1$, $T_2$ and $T_3$ pre-hand milking treatments using tap water, coconut oil, mustard oil and dry hand milking was 35, 33, 31.4 and 30.4 respectively.

**Table 1:** Average SPC ($10^3$) per ml raw milk

| Replications | SPC ($10^3$) per ml raw milk | | | |
|---|---|---|---|---|
| | $T_0$ | $T_1$ | $T_2$ | $T_3$ |
| 1 | 34 | 32 | 30 | 28 |
| 2 | 38 | 32 | 32 | 32 |
| 3 | 34 | 32 | 30 | 32 |
| 4 | 36 | 34 | 30 | 28 |
| 5 | 34 | 32 | 32 | 30 |
| 6 | 36 | 32 | 34 | 32 |
| 7 | 36 | 34 | 30 | 28 |
| 8 | 34 | 34 | 32 | 32 |
| 9 | 34 | 34 | 32 | 30 |
| 10 | 34 | 34 | 32 | 32 |
| Mean | 35 | 33 | 31.4 | 30.4 |

The differences in SPC ($10^3$) in raw milk due to different pre-hand milking treatments using tap water, coconut oil, mustard oil and dry hand-milking were found significant. The differences in SPC ($10^3$) per ml in milk influenced by different pre-hand milking treatments using tap water, coconut oil, mustard oil and dry hand milking were found to be significant. From the perusal of data on SPC ($10^3$) per ml raw milk as influenced by different pre-hand milking treatments using tap water, coconut oil, mustard oil and dry-hand milking it was observed that lowest SPC ($10^3$) per ml in milk was recorded in $T_3$ (30.4) followed by $T_2$ (31.4), $T_1$ (33) and $T_0$ (35). The differences in these values were found statistically significant. However, the values of SPC ($10^3$) per ml milk $T_3$ and $T_2$ were found non-significant being at par and both of them were found significantly effective comparing to $T_1$ and $T_0$ to obtain lower total bacterial count (SPC x $10^3$ ) per ml in raw milk. The result showed that SPC ($10^3$) per ml of raw milk of $T_3$ was significantly lowest than remaining three treatments. Therefore, $T_3$, which recorded the lowest SPC ($10^3$) per ml of milk, proved to be the most effective pre-milking treatment compared to the other groups. The SPC values obtained are consistent with the observations reported by Pandey and Prasad (2001) [7].

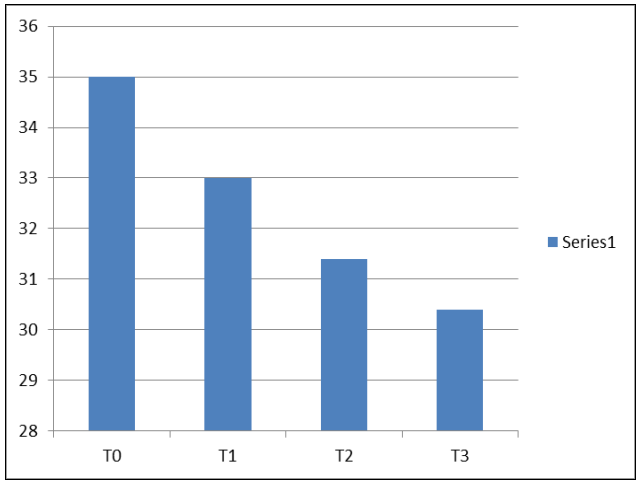


**Fig 1:** Graphical representation of pre-milking udder wash treatments of (SPC×$10^3$) per ml raw milk

## Conclusion

The present experiment was concluded with inference that the $T_3$ (dry hand) is the best hand milking treatment to obtain low bacterial count in milk followed by $T_2$ (use of mustard oil), $T_1$ (coconut oil) and $T_0$ (tap water). Use of clean dry hand milking is best treatment to obtain lower bacterial counts per ml raw milk in SPC ($10^3$) Therefore use of dry hand milking and application of mustard oil udder prior to hand milking may be advised as a suitable practice for dairy farmers as a practice to obtain milk with a lower bacterial count.

## Conflict of Interest

Not available

## Financial Support

Not available

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