Effect of Hygienic Practices on Microbial Quality of Milk at Kolazhy Grama Panchayat in Thrissur District of Kerala

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Abstract

This study was conducted to determine the effect of hygienic practices on the microbial quality of milk in kolazhy gramapanchayat of thrissur district. A sample size consisting of 6 dairy farms(farm 1, farm 2, farm 3, farm 4,farm 5,farm 6) were selected from 3 dairy cooperatives(Kottekkad, Thiroor ,Attore) of kolazhy grama panchayat for the study and a total of about 84 samples were aspectically taken and tested for microbial analysis for a study period of about 50 days.On analysis, it was revealed that hygienic practices had an impact on the microbial quality of the milk. It was found that about 50% of the farms (farm 1,farm 2,farm 6) adopted the hygienic practices whereas 33% of the farms(farm 3,farm 4) didn't adopt the hygienic practices and 17% of the farms partially adopted the hygienic practices.It was also found that farms which adopted and partially adopted the hygienic practices had their microbial counts "after" significantly lower than their "before" counts whereas non adoptive farms had their after counts greater than their before counts.Hence, adoption of hygienic practices in dairy farms also have an impact on the microbial quality of milk produced in the dairy farm.

Keywords: Milk, Quality, Hygiene and Udder

Introduction

Kolazhy Grama Panchayat is a part of ollukara block, in Thrissur taluk, of Thrissur district.It is located 6.8 kilometres (4.2 min) north of Thrissur city.Kolazhy gramapanchayat has 3 dairy cooperatives(Kottekkad, Thiroor ,Attore).Each dairy cooperatives have about 30-60 dairy farmers as pouring members.Farmers with more than 5 cows were purposefully selected for the study.Milk is a sterile liquid when secreted from udder.However, after secretion microbial contamination occurs from dirty udder and teats, milker's hands, milking can and air.This contamination may occur at the farm level, during collection and storage of milk Therefore milk needs to be produced and handled in a hygienic way right from farm till it reaches the consumers table.The quality and safety of raw milk is essential for the quality and safety of milk and milk products.This study was carried out to determine the impact of application of some hygienic practices prior to milking on microbial quality of milk .Clean milk is generally defined as "milk drawn from the udder of healthy animals, which is collected in clean dry milking pails and free from extraneous matters like dust and dirt, it has a normal composition, possesses a natural milk flavor with low bacterial count and is safe for human consumption". The possible

sources of milk contamination are dirty udder and teats, milkers' hands and milking utensils and air, and the contamination may occur at the farm level, during collection and storage and in processing centers. Milking management aims to minimize microbiological, chemical and physical contamination, and this practice covers all aspects of the process of obtaining milk from cows quickly and effectively while assuring the health of the cow and the quality of the milk.Dairy cattle are known reservoirs of bacteria, and milk and milk products have been implicated in outbreaks of food borne illnesses. These products are generally caused by improper pasteurized milk or postpasteurization contamination or by raw milk and milk products.

Materials and Methods

Sampling Procedure

Kolazhy grama panchayat of thrissur was selected for the study. It has 3 dairy cooperatives(Kottekkad, Thiroor,Attore).Each dairy cooperatives have about 30-60 dairy farmers as pouring members.Farms with more than 5 cows were purposefully selected for the study.3,7 and 10 dairy farmers were found to rear more than 5 cows in Kottekkad dairy cooperative, Thiroor dairy cooperative and Attore dairy cooperative respectively.Using proportionality sampling technique, dairy farms were selected in the proportion of 1:2:3 from these 3 societies respectively.Therefore ,sample size consisted of 6 dairy farms from Kolazhy grama panchayat. One cow was selected randomly from each of these 6 dairy farms.

Sample Collection and Analysis

Milk sample from a randomly selected cow in the herd and surface swabs from the cow's udder, milk collection bucket and milker's hand were collected early in the morning before milking.The milk was analysed for its microbial quality by Total Plate Count(TPC), Coliform Count and Yeast and Mold Count. Swab samples were analysed for its microbial quality by TPC. Subsequently, after 50 days the milk samples and surface swabs were taken and analysed for its microbial quality.The results were noted down and analysed statistically.

Adoption levels

An awareness class was conducted at farmer's premises the next day after the 1st milk collection on hygienic milk production techniques.From the selected 7 hygienic factors ,the adoption levels were measured for each of its parameters for the 0th day ,30thday and 50thday,the adoption levels were measured by putting ✓ for adoption and ✗ for non adoption.Based on it,the 6 selected farms were classified into adoption, non adoption and partial adoption categories.

Statistical analysis

The microbial counts were plotted for each of the 6 selected dairy farms.The statistical analysis was based on both parametric and non parametric tests.The paired t- test which is a parametric test was used to compare the mean before and after microbial counts for each of 6 farms. A descriptive statistics consisting of minimum, maximum, range, mean, standard deviation, variance, skewness and kurtosis was calculated separately for both before and after microbial counts of the farms.The multiple comparison tests such as post hoc test was conducted for both farms and microbial counts for the multiple comparisons of different farms and different microbial counts.Non-parametric tests such as Wilcoxon Signed Rank test and Mann-Whitney U test was also conducted to compare the mean before and after microbial

counts for each of 6 farms. The results were noted down and analysed.

Results and discussion

The results obtained from the present investigation as well as relevant discussion have been summarized by the following tables:

Table 1: The 6 farms along with their number of cows are shown below:

FARM	1ST	2ND	3RD	4TH	5TH	6TH
NUMBER OF COWS	6	7	8	7	6	6

Table 2: The Microbial counts of different farms at 0 th day and 50 th day are shown below

MICROBIAL COUNTS	FARM 1		FARM 2		FARM 3		FARM 4		FARM 5		FARM 6	
	BEFORE (0^{th} day)	AFTER (50^{th} day)	BEFORE (0^{th} day)	AFTER (50^{th} day)	BEFORE (0^{th} day)	AFTER (50^{th} day)	BEFORE (0^{th} day)	AFTER (50^{th} day)	BEFORE (0^{th} day)	AFTER (50^{th} day)	BEFORE (0^{th} day)	AFTER (50th day)
	CFU/ML		CFU/ML		CFU/ML		CFU/ML		CFU/ML		CFU/ML	
TPC (NA)	27000	3300	160000	13100	7500	9900	5400	6000	12000	8000	15300	4000
COLIFORM (VRBA)	1350	260	14500	350	370	450	330	380	770	270	1870	680
YEAST AND MOULD(PDA)	1500	340	2200	290	270	300	400	380	920	290	1640	250
AIR QUALITY (NA-15MINS)	64000	32000	56000	38000	48000	52000	60000	63000	98000	79000	83000	76000
SWAB												
MILKER'S HAND (NA)	7800	400	10500	8800	9800	10500	9200	9900	7000	2500	20500	7500
MILKING CAN (NA)	56000	4800	16000	5500	8900	7800	10000	11800	11200	8000	18400	14000
UDDER+TEAT SURFACE (NA)	63000	17000	10400	2500	3100	3300	13800	17000	19800	15000	15400	11600

Table 3 : The adoption levels of different Hygienic parameters in different farms are shown below:

ADOPTION LEVEL																				
Sl no	HYGIENE FACTORS	PARAMETERS ANALYSED	FARM 1			FARM 2			FARM 3			FARM 4			FARM 5			FARM 6		
			0TH DAY	30TH DAY	50TH DAY	0TH DAY	30TH DAY	50TH DAY	0TH DAY	30TH DAY	50TH DAY	0TH DAY	30TH DAY	50TH DAY	0TH DAY	30TH DAY	50TH DAY	0TH DAY	30TH DAY	50TH DAY
1	MILKING AREA	CLEAN THE SHED 15 MINS BEFORE MILKING	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		FLY CONTROL	×	✓	✓	✓	✓	✓	×	×	×	×	×	×	×	✓	×	×	✓	✓
2	CARE OF MILKING ANIMAL	CLIP HAIRS AROUND UDDER	×	✓	×	×	✓	✓	×	×	×	×	×	×	×	✓	×	×	✓	✓
3	UDDER MANAGEMENT	WIPING USING DRY CLOTH	×	✓	✓	✓	✓	✓	×	×	×	×	×	×	×	✓	×	×	✓	✓
		MAINTAINING SEPARATE DRY CLOTH IN WIPING	×	✓	✓	×	✓	✓	×	×	×	✓	✓	✓	✓	✓	×	✓	✓	✓
		USE OF TEAT DIP	×	✓	×	×	✓	✓	×	×	×	×	×	×	×	×	✓	×	✓	✓
4	MILKING CAN	USE OF STAINLESS STEEL	×	✓	✓	×	✓	✓	×	×	×	✓	✓	✓	✓	✓	×	×	×	×
		USE OF DOME SHAPED MILKING CAN	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
5	MILKER	HAND WASHING FOR 20 SEC	×	✓	✓	×	✓	✓	✓	✓	✓	×	✓	×	×	×	✓	×	✓	✓
		USE OF HAND SANITIZERS	×	✓	✓	×	✓	✓	×	×	×	×	×	×	×	✓	×	×	✓	×
6	MILKING TECHNIQUES	FULL HAND MILKING	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		STRIPPING	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		KNUCKLING	×	×	×	✓	✓	✓	×	×	×	✓	✓	✓	×	×	×	✓	✓	✓
7	POST MILKING CARE	STRAINING OF MILK AFTER MILKING	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WHETHER ADOPTION/PARTIAL ADOPTION/NON ADOPTION			ADOPTION			ADOPTION			NON ADOPTION			NON ADOPTION			PARTIAL ADOPTION			ADOPTION		

On analysis of table 2,it was found that farm 1 ,farm 2, farm 5 and farm 6 had their microbial after counts lower than that of their before counts and also farm 3 & farm 4 had their microbial after counts higher than that of their before counts.

On analysis of table 3, it was found in all the farms cleaning of the milk shed 15 min before milking and straining of milk after milking was done.Despite our class and advice the farmers to sanitize the hands before milking,the farmers still continue to milk without it.it was found that farm1,farm2 and farm6 adopted most of the hygienic parameters and were placed in the adopter categories.farm5 partially adopted some of the practices for some time and then they stopped the practice saying that it was labourious and expensive.farm3 and farm 4 didn't follow any of the hygienic practices even after our class.

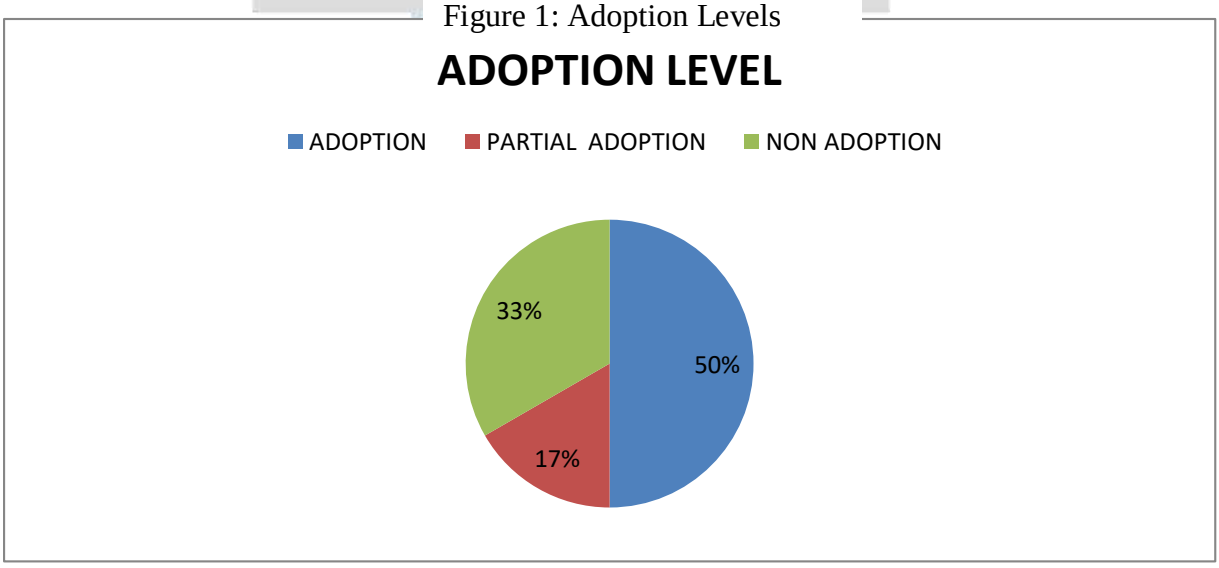
WHERE, LAST 2 COLUMNS OF EACH PARAMETER OF EACH FARM REPRESENTS THE FOLLOWING

✓✓	ADOPTION
×✓	PARTIAL ADOPTION
✓×	NON ADOPTION
××	NON ADOPTION

Table 4: Percentage level of different adoption categories are given below:

ADOPTION CATEGORIES	NO OF FARMS COMING UNDER	% LEVEL
ADOPTION	3	50%
PARTIAL ADOPTION	1	17%
NON ADOPTION	2	33%

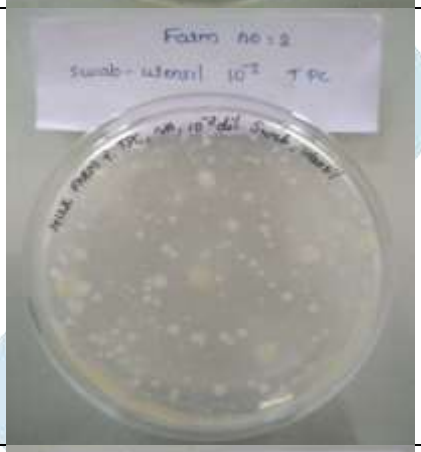
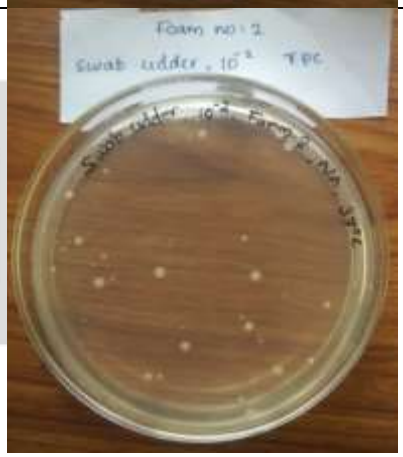
Figure 1: Adoption Levels



It was found from the pie chart that 50% of the farms adopted hygienic practices whereas 33% of the farmers didn't adopt the hygienic practices and 17% of the farmers partially adopted the hygienic practices.

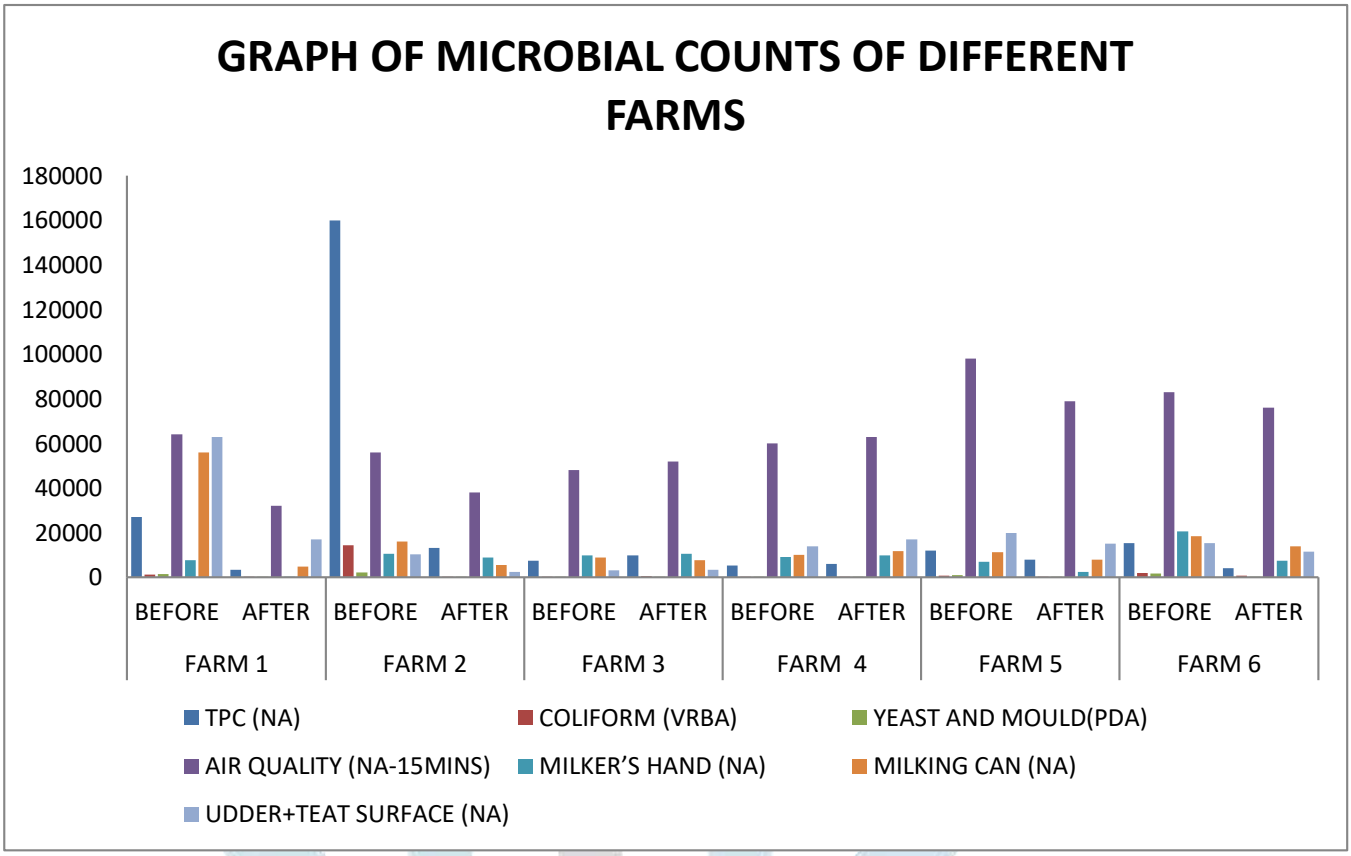
Table 5: Petri plates showing the results of microbial count before and after of farm 2 are shown:

FARM 2		
COUNT	**BEFORE**	**AFTER**
TPC (NA)		
COLIFORM (VRBA)		
YEAST AND MOULD(PDA)		
AIR QUALITY (NA-15MINS)		

HAND SWAB (NA)		
UTENSIL SWAB (NA)		
UDDER SWAB (NA)		

Statistical results

Figure 2: Microbial Counts



One tailed Paired -T test

In this test, 1% was taken as the significance level.The null hypothesis was taken as both the microbial counts before and after are equal (μ0: μ1= μ2).The alternative hypothesis (H1: μ1 > μ2) becomes true,when t value lies in the critical region (t> tα).On analysis of table 6 ,it was found that in all the adoptor farms the t value lies in the critical region which implies that in all the cases the null hypothesis was rejected and the alternative hypothesis was taken.Therefore, the microbial after counts of the adopter farms are significantly lower than their before counts.

Table 6 :The t and tα values of the microbial counts of adoptor farms are shown below:

ADOPTOR FARMS	t value	tα value	INTERPRETATION
Farm 1	2.948	1.440	Reject the null hypothesis. Microbial after counts are significantly lower than their before counts
Farm 2	1.449	1.440	
Farm 6	3.418	1.440	

Conclusion

Milk being an easily perishable product, needs to be produced and handled in a hygienic way right from farm till it reaches to the consumers table.Milker's hand,milking can,cows udder and air quality are the potential sources of contamination in raw milk. On analysis, it was revealed that hygienic practices had an impact on the microbial quality of the milk. It was found out that about 50% of the farms (farm 1,farm 2,farm 6) adopted the hygienic practices whereas 33% of

the farms(farm 3,farm 4) didn't adopt the hygienic practices and 17% of the farms partially adopted the hygienic practices.It was also found out that farms which adopted and partially adopted the hygienic practices had their microbial counts "after" significantly lower than their "before" counts whereas non adoptive farms had their after counts greater than their before counts.Hence, adoption of hygienic practices in dairy farms also have an impact on the microbial quality of milk produced in the farm.

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