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MICROBIAL QUALITY TEST OF PASTEURIZED MILK DISTRIBUTED BY PVT. MILK PROCESSING UNIT IN NANDED. (M.S.)

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ABSTRACT

The study has been conducted in one of the reputed milk Processing plant, Nanded. Over the study period from June 2017 to May 2018. The quality of the milk samples checked for the difference in the microbial load in the pasteurized milk sample for different microbial load and finding out variations in methylene blue reduction time in MBRT test. The anticipating quality assessment and finding out contamination after pasteurization during morning distribution at cold storage temperature. The observation was the rate of reduction time in MBRT the colour variation of the pasteurized milk in the average range of 5.3 hrs. to 5.9 hrs. This study concluded that at the time of collection, post pasteurization MBRT result show good quality milk but with increasing time the microbial load increases at room temperature.

KEY WORDS

*Quality of milk, **Pasteurized** milk, MBRT, Cold storage temperature, shelf life*

INTRODUCTION:

Milk is the fresh lacteal secretion (practically free from colostrums) obtained by the complete milking of one or more healthy cows or buffaloes without the addition of any substances. It is necessary to test microbiological quality of milk at a number of points along the chain from producer to consumer for public health and economic considerations. In the dairy industry, thermal processing is accepted terminology to describe heat treatment given to eliminate/minimize chances of spoilage of milk and occurrence of food borne illness there-from. Pasteurization is one type of thermal processing designed for a specific pathogenic microorganism, but it does result in a shelf stable product without refrigeration. Milk is an excellent source of nutrients for humans, these nutrients for humans provide a most suitable medium for microbial growth and metabolism. Milk, in its natural state, is a highly perishable material, subject to microbial and chemical degradation. Pasteurization cannot guarantee the absence of microorganisms, when they are present in large numbers in raw milk or due to post-pasteurization contamination. The present study was aimed for assessing the probable quality of milk, for detecting post pasteurization contamination of the pasteurized milk. The factors that influence the keeping quality of pasteurized milk are raw milk quality, pasteurization conditions and contamination from environment. At the temperatures commonly used for pasteurization of milk, 72–75◦C, most pathogenic and gram-negative psychrotrophic bacteria are eliminated. These bacteria are the most important flora because spoilage of pasteurized milk distributed through a good cold chain is due to recontamination after the heat treatment with gram-negative psychrotrophic bacteria (Fredsted, 1996). It is known that tropical conditions which have a hot, humid climate for much of the year are ideal for quick milk deterioration so to pose particular problems because the temperature is ideal for growth and multiplication of many bacteria. (Godefay and Molla, 2000). Hence keeping in view, the

microbiological quality assurance of milk is of prime importance to arrive at decisions with respect to food safety and keeping quality. Methylene Blue (MB) dye has been employed to check for the overall microbial load and quality control of milk and other liquid foods (Impert et al., 2002). As consumers are looking for products with increased freshness and higher quality, the retail requires products with extended shelf life. (Rysstad and Kolstad, 2003)

Prajapati (1995) reported that the shelf life of pasteurized milk is not satisfactory in our country it requires a cold chain after processing, which is rather costly and difficult to maintain. MBRT ensures higher shelf life even at ambient temperature and increase convenience in selling. It is the key responsibility of both consumers and suppliers to adequately store milk at suitable temperatures in order to control the levels of microorganisms and to retard the rate of milk spoilage.

MATERIALS AND METHODS

Sample collection: Samples for each category were collected aseptically in sterile containers of quarter liter capacity. The sample from cold storage was collected by pooling milk from different sachets piled in four different corners of cold store. The temperature of milk was also recorded simultaneously. The milk samples were collected every morning during the period from June 2017 to May 2018 from "Shree Dhara Milk processing plant in Nanded, Maharashtra.

Recording of temperature:

The temperature of milk was recorded for all the samples using Centigrade Graduated Thermometer.

Estimation of total titratable acidity:

Total titratable acidity of milk samples was estimated in accordance with the procedure detailed in IS: 1479 (Part – I) 1960.The data obtained is statistically analyzed as per standard procedure.

Methylene blue reduction test:

Thoroughly mixed milk was poured aseptically in sterile test tube up to 10 ml mark and one ml of methylene blue was added to it. The time required for complete decolorization was noted in comparison with the control tube, as per the procedure detailed in IS: 1479 (Part – III) 1962. The methylene blue reduction test depends upon the ability of bacteria in milk to grow and to consume the dissolved oxygen, which reduces the oxidation reduction potentials in the medium Subsequent readings were made at hourly intervals. The reduction time was recorded in whole hours between last inversion and decolonization. Decolonization was considered complete when four-fifth of the color has disappeared.

Milk quality can be graded as follows, (Prasad, 2011)

Quality of milk	Reduction time	Approximate keeping Quality of milk	Approximate bacterial count per ml
Good	5 ½ hour or more	40 hours	Below 5,00,000
Fair	2 to 5 ½ hour	30 hours	5,00,000 to 40,00,000
Bad	20 minutes to 2 hours	10 hours	40,00,000 to 20,00,000
Very bad	20 minutes or less	less than 10 hours	Above 20,00,000

The time taken for color change from blue to white, which indicates reduction. Color changes was noticed within stipulated time. To know the Classification of milk quality according to MBR test.

RESULTS AND DISCUSSION

Table No.1. MBRT TEST AND ACIDITY TEST OF COLLECTED PASTEURIZED MILK SAMPLES AT MILK PROCESSING UNIT AT ROOM TEMPRETURE.

Season	Months	Mean values MBRT hrs.	Av. Titratable acidity (% L.A.)
Rainy	June	5.39	0.123
	July	5.48	0.123
	August	5.51	0.123
	September	5.59	0.124

Winter	October	6.1	0.124
	November	5.7	0.124
	December	6.0	0.125
	January	5.9	0.126
Summer	February	5.6	0.126
	March	5.3	0.126
	April	5.43	0.126
	May	5.23	0.126

Table 2 **Analysis of variance of microbial characteristics of pasteurized milk**

season	Mean values of MBRT in hrs.	Std. Dev.	SE(m) ±
Rainy	5.4925	0.0826	0.0413
winter	5.925	0.1708	0.0854
summer	5.39	0.1627	0.0813

Season	M.B.R.T in hrs.			Av Acidity % LA
	Max	Min	AV	
Rainy	5.59	5.39	5.4	0.123
Winter	6.1	5.7	5.9	0.124
Summer	5.6	5.23	5.3	0.126

Characteristics	sources of variation	Degrees of Freedom DF	Sum of Squares SS	Mean Square MS	F-Stat	P-Value
MBRT	*Between season*	*2*	*0.6451*	*0.3225*	*15.4895*	*0.0012*
	Within season	*9*	*0.1874*	*0.0208*		
	Total:	*11*	*0.8325*			

***f* –ratio value is 15.49, the p- value is 0.0012. The result is significant at p<0.05.**

In present study the mean values for cold stored milk from Nanded varied from 5.4, 5.9 and 5.3 hrs. for rainy, winter and summer seasons. The Titratable acidity (% L.A.) was found to be 0.123, 0.124 and 0.126 respectively. The present data was analyzed to find out S.D. and S.E. The experiment was tested by using student's t-test**.** The results of present study are depicted in table no.1. It is observed from table No.1. That there was significant differences among the mean values of MBRT obtained with the cold stored Pasteurized milk samples when analyzed for its quality. In quality winter milk was found to be excellent, rainy season milk good and summer season milk was fair in quality. It can be noted that there is seasonal impact on quality of milk. Pal and Sinha (1965) reported that season affected the bacterial count and reduction time markedly. Similar study Babu (2003) found at the milk temperature of 8.5 ^{o}C of cold store milk of morning distribution the mean values of MBRT were noted to be 5.88 hours. The results stated by While Patel et al., (1986) showed the application of MBR test for assessing the keeping quality of pasteurized milk. They reported that after heat treatment at 85 ^{o} C for 15 seconds, modified MBR times 40 minutes and MBR times of 4.3 hours corresponded to keeping quality of 40 hours at 15 ^{o}C. as per the results of. Suhren and Tolle (1980) showed that recontamination of pasteurized milk during packaging had equally important effect on its keeping quality as storage temperature in dairy factory increased storage life 6 days at 6^{o}C. The milk is very easily contaminated if collected unhygienically and handled carelessly leading to quick spoilage.

The amount of acid depends on the cleanliness of production and the temperature at which milk is kept. Hence, determination of acid in milk is an important factor in judging milk quality. Acidity affects taste as well. The percentage of lactic acid milk sample was tested the time of observation started at packaging morning hours is 0. 124.The percentage was measured at an interval of an hour and after 5 hours the lactic acid

develops slowly similar finding was observed by Meher et al, 2015.

CONCLUSION:

Properly processing milk at Shree Dhara Milk processing unit is suitable for human consumption. Methylene blue reduction test and acidity shows the freshness of milk. The rate of reduction time in MBRT the colour variation hours of pasteurized milk in the range of 5.3 hrs. to 5.9 hrs. Keeping quality of not more than 2 weeks have been observed in pasteurized milk at very low temperature. This study concluded that at the time of collection, pasteurization MBRT result show good quality milk but as time passes in milk, the microbial load increases at room temperature. MBRT ensures higher shelf life even at ambient temperature and increase convenience in selling. Microbiological quality requirements of pasteurized milk is considered satisfactory. Effective measures such as methylene blue reduction tests should be routinely performed on each batch of milk processed by dairy plants to ensure safe milk for human consumption.

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