

## EFFECT OF STORAGE ON MICROBIAL QUALITY OF DIFFERENT TYPES OF MILK BLEND PANEER AT ROOM TEMPERATURE WITHOUT AND WITH PACKAGING MATERIAL

Jadhav B. A.

Research Scholar, Shri Jagdish Prasad Jhabarmal Tibrewala University,  
Jhunjhunu, Rajasthan, India.

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### ABSTRACT

Today very much on commercial production of paneer has been started by popular dairy brands in India. However, there is a short shelf life problem and which is one of the most serious problem faced in marketing and distribution of paneer to the restaurants and fast food centers, which consume a huge quantity of this product as a base material in various dishes. In the present investigation the paneer was prepared by using different milk blends viz buffalo -cow milk (BM50+CM50), buffalo -goat milk (BM75+GM25), buffalo -skim milk (BM75+SM25) and buffalo -soymilk (BM75+SOYM25) .The paneer prepared from different milk blends were stored at room temperature without and with packaging material for microbial quality with respect to SPC, Yeast and Mould and Coliform. With the enhancement of storage period SPC and Yeast and mould increased steadily and gradually at every storage interval and temperature. Coliform was found to be absent throughout the storage . The Paneer becomes mouldy after 3 days and 6 days of storage at room temperature without packaging and with packaging material respectively.

**Keywords:** Paneer, microbial, buffalo, blend, milk and storage

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## INTRODUCTION

India is one of the leading producers of milk in the world. From the world's total milk production India contributes near about 16 percent. Throughout the world India has considered the biggest consumer of the milk. Milk is an almost ideal and complete food and has high nutritional importance. It provides body building proteins, bone forming minerals and health giving vitamins and supplies energy giving lactose and fat. Also it supplies certain essential fatty acids, it contains the above nutrients in an easily digestible and absorbed form. Hence milk is a significant food for pregnant mothers, growing children, adolescents, adults, invalids, convalescents and patients too. The major quantity of milk is procured from scattered areas of villages and about 50 percent of total milk produce is utilized as market milk, 35 percent for the preparation of indigenous milk products and 15 percent for fermented dairy products. Out of this 5 percent of milk is utilized for preparation of *paneer*, but today in India near about 70% population is vegetarian and *paneer* is the substitute to meat for them therefore presently *paneer* consumption is increased by health conscious consumers. Keeping in view regarding the extending demand of *paneer*, development of production technology is needed. Particularly in *paneer* the heavy bacterial and fungal contamination seen and predominantly *Staphylococcus spp.* and fecal coliforms can be considered for poor hygienic conditions during *paneer* making, handling and storage. The study presents there is a need for stricter preventive and control

Measures to prevent pre and post process contamination in milk food products. Particularly the shelf-life of indigenous milk products is less and due to this their transportation to remote long distance places is very difficult. Hence, efforts should be taken to enhance the keeping quality of these products by putting *paneer* in newer packaging materials prepared by new techniques such as modified atmosphere packaging, active packaging etc., (Chopra, 1998). Use of packaging material extends the shelf life of *paneer*. Low density polyethylene (LDPE) is widely used to package in small scale industries. For the small scale manufacturer of *paneer* the extension of storage period of fresh *paneer* found to be very helpful. And, therefore experiment a study on effect of storage on microbial quality of different types of milk blends *paneer* has been under taken.

## MATERIAL AND METHODS

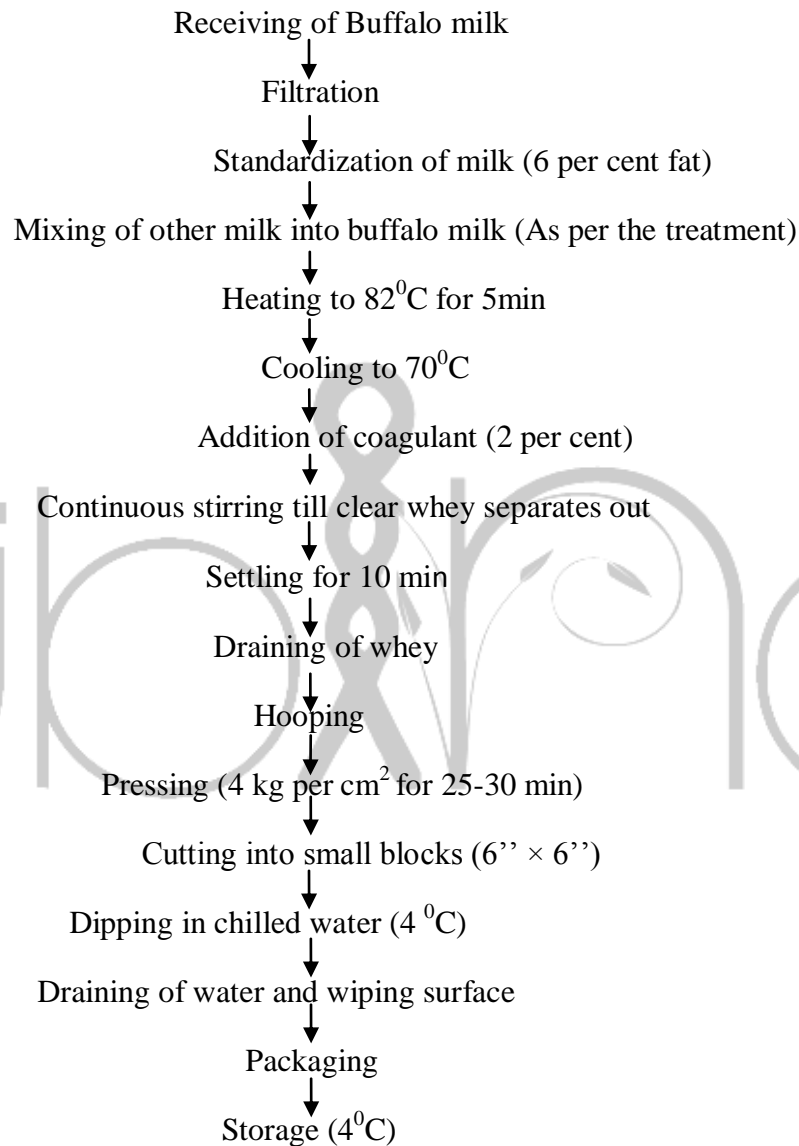
The present investigation, "A study on effect of storage on microbial quality of different types of milk blends *paneer*" was carried out at Shri Venkatesh Food Laboratory, Approved by Agmark, Ministry of Agriculture Department Agriculture and Co-operation, Nanded. The whole, fresh clean buffalo milk, cow milk, goat milk was purchased from milk dairy center in the local market of Nanded. Skim powder, soybean, citric acid, ascorbic acid, tartaric acid and lactic acid were obtained from the local market of Nanded.

### Preparation of paneer

Paneer was prepared as per the method described by Kumar et al. (2011) with slight modifications

#### Standardization of buffalo milk

Fresh buffalo milk, cow milk and goat milk was standardized to 6%, 4% and 4% fat by Pearson's square method



**Figure: 1** Flow sheet for the preparation of paneer

#### Preparation of soymilk

Soybean was cleaned by removing under size wrinkled and damaged bean. Then cleaned soybean soaked in tap water in

the proportion of (1:3 W/V) i.e. Soybean: water ratio for near about 8 to 10 hrs. at

ambient temperature. After soaking time over the soaked water was removed outer hull of the soybean were separated by hand i.e. dehulling. Then the dehulled soybean was boiled for 40 to 45 min and after boiling soybean was grounded

in grinder for 3-5 minutes using bean to water ratio of 1:8. With continuous stirring slurry of grounded soybean was heated (85 to 95°C), and then heated slurry was filtered through double layer muslin cloth to get soymilk. The again filtrate was boiled for 10 min, Biradar et al. (2012)

### **Microbial quality**

The microbial analysis of paneer was carried out according to Ranganna (1986). One ml of each of the sample was taken and to this 9ml of 0.5% saline was added and then further diluted to four folds. 1 ml of each from appropriate dilution was plated in required medium and then incubation was carried out. In each count, after incubation, the average count of colonies present on Petri plates were multiplied by dilution factor and expressed as cfu (colony forming unit)/ml of sample.

### **Total Plate Count**

The total plate count was taken according to the method described in Raganna (1986). Appropriate dilutions of each of the samples were transferred aseptically to sterile petriplates. Pour plating was done using nutrient agar (Hi media Laboratories Pvt.Ltd, Mumbai). Plates were then incubated at 37°C for 24-48 hours respectively.

### **Yeast and Mold Count**

Appropriate dilution of sample were pour plated in Potato Dextrose Agar (Hi Media Laboratories Pvt Ltd Mumbai) for 3-5 days at 30°C

### **Coliform Count**

Appropriate dilution of samples were made and transferred to sterile petriplates, pour plating was done using Mac conkey agar, pH 7.4 (Hi Media Laboratories, Pvt Ltd, Mumbai) Plates were incubated at 37°C for 48hours.

### **Results and discussion**

During the present investigation the paneer obtained from different blend and stored at room temperature without and with packaging material were studied.

#### **Storage buffalo-cow (50:50) milk blend paneer at room temperature without and with packaging material**

The microbial quality (cfu/ml) with respect to SPC, Yeast and Mould and Coliform was carried out using standard procedure and the paneer were stored at room temperature without and with packaging material and the average count of SPC, Yeast and Mould and Coliform was tabulated in table 1. The SPC (cfu/ml) was found to be 32.5, Yeast and Mould 33.5 and Coliform not detected in the fresh sample of paneer stored at room temperature. It is observed from the table 1 the microbial quality (cfu/ml) with respect to SPC and Yeast and Mould were found to be increased during the storage period in both the paneer samples without and with packaging material. The SPC was carried out using pour plate method to determine

the number of microorganisms in the paneer samples using agar as media, Yeast and Mould count was carried out using PDA agar where as coliform was carried out using Mac conkey agar. In all microbial quality the serial dilution was kept  $10^{-3}$  and accordingly the count were expressed .It was observed 615 on 4<sup>th</sup> day and 610 on 7<sup>th</sup> day of storage of paneer sample without and with packaging material respectively. Whereas Yeast and Mould count recorded 240 on 7<sup>th</sup> day of storage without and with packaging material respectively.The SPC and Yeast

and Mould count on 4<sup>th</sup> and 7<sup>th</sup> day of storage without and with packaging material were found to be within the limit given by BIS. The values given by BIS for SPC $5 \times 10^{-5}$  and Yeast and Mould less than 250. The variation in the SPC and Yeast and Mould count of paneer stored at room temperature might be due to the packaging material used .Because the packaging material protect the contamination and growth of the SPC, number of microorganism and Yeast and Mould. These results are more or less similar to Singh *et al.*, (2014)

**Table 1: Effect of storage on microbial quality of buffalo-cow (50:50) milk blend paneer at room temperature (28 ± 2° C ) without and with packaging material**

Sr.No	Storage treatment	Storage days	Microbial quality (cfu/ml)		
			SPC	Yeast and Mould	Coliform
1	Without packaging material	Fresh	32.5	33.5	ND
		2	241	143	ND
		3	356	210	ND
		4	615	257	ND
2	With packaging material	Fresh	32.5	33.5	ND
		2	92	82	ND
		4	110	105	ND
		6	345	179	ND
		7	610	240	ND

### **Storage of buffalo- goat (75:25) milk blend paneer at room temperature without and with packaging material**

The effect of storage on microbial quality of selected buffalo- goat (75:25) milk blend paneer at room temperature without and with packaging material related to SPC(cfu/ml) Yeast and Mould and coliform is tabulated in table 2.The SPC (cfu/ml) was found to be 30.5, Yeast and Mould 32.55 and Coliform not detected in

the fresh sample of paneer.It was noted that the microbial quality (cfu/ml) related to SPC and Yeast and Mould were found to be increased during the storage period in both the paneer samples without and with packaging material.It was observed 610on 4<sup>th</sup> day and 608 on 7<sup>th</sup> day of storage of paneer sample without and with packaging material respectively. Whereas Yeast and Mould count recorded 243 on 4<sup>th</sup> day and 235 on 7<sup>th</sup> day of storage without and with packaging material

respectively. The SPC and Yeast and Mould count on 4<sup>th</sup> and 7<sup>th</sup> day of storage without and with packaging material were found to be within the limit given by BIS. The variation in the SPC and Yeast and Mould

count of paneer stored at room temperature might be due to the packaging material used. These results are more or less in lined with Singh *et al.*, (2014) and Shashikumar and Puranik (2011)

**Table 2: Effect of storage on microbial quality of buffalo- goat (75:25) milk blend paneer at room temperature (28 ± 2° C ) without and with packaging material**

Sr.No	Storage treatment	Storage days	Microbial quality (cfu/ml)		
			SPC	Yeast and Mould	Coliform
1	Without packaging material	Fresh	30.5	32.5	ND
		2	230	136	ND
		3	342	205	ND
		4	610	243	ND
2	With packaging material	Fresh	30.5	32.5	ND
		2	90	80	ND
		4	105	101	ND
		6	335	176	ND
		7	608	235	ND

#### **Storage of buffalo- skim (75:25) milk blend paneer at room temperature without and with packaging material.**

The microbial quality (cfu/ml) with respect to SPC, Yeast and Mould and Coliform was carried out using standard procedure and the paneer were stored at room temperature without and with packaging material and the average count of SPC, Yeast and Mould and Coliform was tabulated in table 3. The SPC (cfu/ml) was found to be 30.5, Yeast and Mould 31.5 and Coliform not detected in the fresh sample of paneer stored at room temperature. Table 48 indicates that the microbial quality (cfu/ml) with respect to SPC and Yeast and Mould were found to be increased during the storage period

in both the paneer samples without and with packaging material. It was observed 609 on 4<sup>th</sup> day and 607 on 7<sup>th</sup> day of storage of paneer sample without and with packaging material respectively. Whereas Yeast and Mould count recorded 242 on 4<sup>th</sup> day and 240 on 7<sup>th</sup> of storage without and with packaging material respectively. The SPC and Yeast and Mould count on 4<sup>th</sup> and 7<sup>th</sup> day of storage without and with packaging material were found to be within the limit given by BIS. The variation in the SPC and Yeast and Mould count of paneer stored at room temperature might be due to the packaging material used. These results are in specified with Dhankhar (2014); Yadav *et al.*, (2009).



**Table 4: Effect of storage on microbial quality of selected buffalo- skim (75:25) milk blend paneer at room temperature (28 ± 2° C ) without and with packaging material.**

Sr.No	Storage treatment	Storage days	Microbial quality (cfu/ml)		
			SPC	Yeast and Mould	Coliform
1	Without packaging material	Fresh	30.5	31.5	ND
		2	228	134	ND
		3	340	203	ND
		4	609	242	ND
2	With packaging material	Fresh	30.5	31.5	ND
		2	89	79	ND
		4	104	100	ND
		6	333	174	ND
		7	607	240	ND

#### Storage of buffalo- soy (75:25) milk blend paneer at room temperature without and with packaging material.

The results on standard plate count (SPC), yeast and mould count and coliform count are presented in Table 5. The data obtained from the microbial quality (cfu/ml) of the paneer samples prepared during the study indicated that the SPC (cfu/ml) was found to be 33.5, Yeast and Mould 34.5 and Coliform not detected in the fresh sample of paneer stored at room temperature without packaging material. As the storage days goes on increasing i.e. up to 4<sup>th</sup> day the standard plate count (SPC), yeast and mould count indicated

increase in their number 626 and 239 and coliform count not detected in without packaging material respectively. Paneer samples stored at room temperature with packaging material indicated that slower growth than the paneer samples stored at room temperature without packaging material with respect to standard plate count (SPC), yeast and mould count. The SPC and Yeast and Mould count on 4<sup>th</sup> and 7<sup>th</sup> day of storage without and with packaging material were found to be within the limit given by BIS. These results are more or less similar to Singh *et al.*, (2014) and Shashikumar and Puranik (2011)

**Table 5: Effect of storage on microbial quality of buffalo- soy (75:25) milk blend paneer at room temperature (28 ± 2° C ) without and with packaging material.**

Sr.No	Storage treatment	Storage days	Microbial quality (cfu/ml)		
			SPC	Yeast and Mould	Coliform
1	Without packaging material	Fresh	33.5	34.5	ND
		2	245	145	ND
		3	359	215	ND
		4	626	239	ND
2	With packaging material	Fresh	33.5	34.5	ND
		2	94	84	ND
		4	112	107	ND
		6	347	185	ND
		7	618	236	ND

## Conclusion

It was concluded that with the enhancement of storage period SPC and Yeast and mould increased steadily and gradually at every storage interval and temperature. Coliform was found to be absent due to paneer could be produced under hygienically condition. The Paneer could be stored up to 6 days at room temperature with using LDPE packaging material.

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