

Effect of storage on chemical attributes of paneer spread

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Paneer prepared from standardised buffalo milk (6% fat and 9% MSNF) using 1% citric acid at 80°C coagulation temperature was used for making paneer spread by blending it with 10% whey and varying concentrations of salt (1.0, 1.5 and 2.0%) and preservatives (0.2% sodium benzoate or pot. metabisulphite). The product was assessed for chemical attributes when fresh (0 day) and on 5, 10 and 20 days. The total solids (TS) content increased with increase in levels of salt added in fresh product (0 day). The preservatives had little effect on TS content. As the period of storage elapsed, the TS content increased in the product. However, the fat and protein contents decreased with increase in levels of added salt. With advancement in storage period, both fat and protein increased in the product, being highest on 20 days of storage. Preservatives had little effect. Contrarily, the ash content increased with increase in levels of added salt. During storage, the ash content increased consistently. The acidity of paneer spread was only slightly affected by added salt and preservatives. However, it increased, as the storage period advanced.

Key Words: chemical attributes, salts, preservatives, storage

Introduction

Mentioned in the Vedas, dating as far back as 6000 BC of India Subcontinent, paneer is a fresh cheese frequently used in South Asian cuisine similar to quesoblanco. Dairy products constitute a family of natural functional foods due to their established health related benefits. Nutritive value of paneer is very high, as it contains almost all the proteins and fats present in milk besides being a rich source of minerals, especially calcium and phosphorus and vitamins. Variety of culinary dishes and snacks are made from paneer, besides its direct consumption.

A spread has also been developed from paneer, which has a pleasant taste and preferred to other spreads due to its nutty flavour. Currently, two types of spread are mainly available in the market namely butter and cheese spread, which are used along with bread in the breakfast. Butter is avoided by obese persons or those suffering from coronary heart diseases due to its very high fat content. Cheese spread is suitable for consumers of all age groups but it is highly expensive. Contrarily, paneer spread is cheaper and equally nutritious. The authors have already reported methods of manufacture of paneer spread

from buffalo milk (Dwivedi *et al.*, 2010b) and its sensory quality (Dwivedi *et al.*, 2014). The present story communicates changes in chemical quality of paneer spread during storage at refrigeration temperature.

Materials and Methods

Preparation of paneer spread: The paneer prepared from standardised buffalo milk containing 6% fat and 9% MSNF using citric acid (1%) as coagulant at 80° C coagulation temperature was adjudged as the best quality paneer from stand-point of sensory attributes and chemical and microbiological qualities (Dwivedi *et al.*, 2009; Dwivedi *et al.*; 2010a). Hence, paneer made as above was only used for preparation of paneer spread.

The paneer blocks were sliced into small pieces and blended with 10% of whey water. Salt (1.0, 1.5, 2.0%) and preservative (sodium benzoate or potassium metabisulphite, 0.2% each) were added to the paneer mass and blended thoroughly to get a smooth paste like consistency. The product was packaged in polystyrene cups and stored at 5°C.

Chemical analysis of paneer spread: The total solids, fat, protein and ash content of paneer spread were determined by BIS methods (1961, 1964) while titratable acidity was estimated according to Rajorhia *et al.* (1984). Changes in chemical attributes were monitored on 0,5,10 and 20 days of storage of the product.

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Results and Discussion

Effect of storage period on changes in chemical quality of paneer spread was studied at predetermined intervals as delineated above.

Effect on total solids content

The results (Table 1) indicated that the total solids content increased with increase in levels of salt added in fresh paneer spread (0 day). The preservative added, sodium benzoate or pot. Metabisulphite had little effect on total solids content of the product. The highest increase was noted in paneer spread after 20 days of storage. Further, the highest total solids were found in products containing 3% salt and lowest in 1% salt added. The level of salt added and period of storage had significant ($p < 0.01$) effect on increase in total solids content.

Table 1: XYZ mean for total solids of paneer spread

		Z ₁	Z ₂	Z ₃	Z ₄
X ₁	Y ₁	38.20	39.50	41.10	42.70
	Y ₂	38.30	39.50	41.20	42.90
X ₂	Y ₁	39.30	40.60	42.20	43.80
	Y ₂	39.40	40.60	42.30	43.80
X ₃	Y ₁	40.30	41.40	43.10	44.50
	Y ₂	40.20	41.40	43.10	44.60

X₁, X₂ and X₃ - 1, 2, and 3% salt; Y₁ - sodium benzoate, Y₂ - pot. metabisulphite; Z₁, Z₂, Z₃ and Z₄, - 0, 5, 10 and 20 days of Storage.

Changes in fat content

The fat content of paneer spread decreased with increase in the levels of added salt in the product (Table 2). Fat content was maximum in products containing 1% salt and minimum in samples with 3% added salt. As the period of storage advanced, fat content increased in the product and consequently it was highest on 20 days of storage period (x₃, y₂, z₄). The preservative added had only little effect. The levels of added salt and period of storage had significant ($p < 0.01$) effect on the fat content, while preservatives had insignificant effect.

Table 2: XYZ mean for fat of paneer spread

		Z ₁	Z ₂	Z ₃	Z ₄
X ₁	Y ₁	21.20	21.80	22.50	23.10
	Y ₂	21.30	21.80	22.60	23.20
X ₂	Y ₁	20.90	21.50	22.20	22.80
	Y ₂	21.00	21.50	22.30	22.90
X ₃	Y ₁	20.60	21.20	21.80	22.40
	Y ₂	20.70	21.10	22.00	22.50

X₁, X₂ and X₃ - 1, 2, and 3% salt; Y₁ - sodium benzoate, Y₂ - pot. metabisulphite; Z₁, Z₂, Z₃ and Z₄, - 0, 5, 10 and 20 days of Storage.

Effect on protein content

The protein content of paneer spread also decreased as the level of added salt increased in the sample (Table 3). Added preservatives had no effect on protein content. With advancement in storage period, the protein content of paneer spread increased, attaining its highest values on 20th day of storage period. The levels of salt added and storage period had significant ($p < 0.01$) effect on protein content

Table 3: XYZ mean for protein of paneer spread

		Z ₁	Z ₂	Z ₃	Z ₄
X ₁	Y ₁	12.40	13.10	13.80	14.50
	Y ₂	12.40	13.10	13.80	14.50
X ₂	Y ₁	12.10	12.80	13.50	14.20
	Y ₂	12.10	12.80	13.50	14.20
X ₃	Y ₁	11.80	12.50	13.20	13.90
	Y ₂	11.80	12.50	13.20	13.90

X₁, X₂ and X₃ - 1, 2, and 3% salt; Y₁ - sodium benzoate, Y₂ - pot. metabisulphite; Z₁, Z₂, Z₃ and Z₄, - 0, 5, 10 and 20 days of Storage.

Changes in ash content

The total mineral (ash) content in the product increased with concentration of added salt. Preservatives had negligible effect. With increase in storage period (Table 4), the ash content increased but the magnitude of increase was much lower as compared to increase in total solids, fat and protein contents.

Table 4: XYZ mean for ash content of paneer spread

		Z ₁	Z ₂	Z ₃	Z ₄
X ₁	Y ₁	2.62	2.70	2.75	2.80
	Y ₂	2.70	2.62	2.75	2.80
X ₂	Y ₁	3.32	3.40	3.45	3.50
	Y ₂	3.32	3.40	3.45	3.50
X ₃	Y ₁	3.75	3.80	3.85	3.90
	Y ₂	3.75	3.80	3.85	3.90

X₁, X₂ and X₃ - 1, 2, and 3% salt; Y₁ - sodium benzoate, Y₂ - pot. metabisulphite; Z₁, Z₂, Z₃ and Z₄, - 0, 5, 10 and 20 days of Storage.

Changes in acidity of paneer spread

Acidity was only slightly affected by levels of added salt in the product (Table 5). It had slight depressing effect. Added preservative, sodium benzoate or pot. metabisulphite had negligible effect. However, as the period of storage elapsed, increase in acidity was noticeable in the product. The highest increase was recorded on 20th day of storage.

The results of present study on total solids, fat, protein and ash contents are in near agreement with

Table 5: XYZ mean for acidity of paneer spread

		Z ₁	Z ₂	Z ₃	Z ₄
X ₁	Y ₁	0.48	0.52	0.60	0.71
	Y ₂	0.46	0.51	0.59	0.70
X ₂	Y ₁	0.45	0.51	0.58	0.69
	Y ₂	0.45	0.50	0.57	0.68
X ₃	Y ₁	0.43	0.49	0.56	0.67
	Y ₂	0.43	0.48	0.55	0.67

X₁, X₂ and X₃ - 1, 2, and 3% salt; Y₁ - sodium benzoate, Y₂ - pot. metabisulphite; Z₁, Z₂, Z₃ and Z₄, - 0, 5, 10 and 20 days of Storage.

those repeated by Tewari and Sachdeva (1991). However storage related data are lacking to affirm the results of present study. As the period of storage advanced, there was consistent loss of moisture in the product which caused an increase in the total solids, fat protein and ash content, the percent increase being lowest in the ash content. The acidity of product also followed a similar trend, but magnitude of increase was inhibited by added preservatives in the product. Preservatives had little effect on chemical constituents, though it extended the shelf life of product (Dwivedi *et al.*, 2014)

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