



# EFFECT OF PARTIAL REPLACEMENT OF MILK FAT WITH SOY OIL ON THE QUALITY CHARACTERISTICS OF FILLED PANEER SPREAD

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## Abstract

*Paneer (an Indian soft cheese) is popular throughout India. It is being utilized as a base material during the preparation of various culinary dishes. In this study an attempt has been made to develop spradable product by using paneer and tried to replace milk fat fwith soy oil at 25, 50 and 75 per cent levels to assess the chemical and sensory characteristics. The increase in moisture from 63.15 to 64.11 per cent was observed. Whereas fat and protein content showed non-significant ( $P \leq 0.05$ ) difference. The per cent total solids decreased from 36.85 to 35.89 per cent and penetration valuse showed significant increase in the values from 165 to 231(mm/5s) were noticed. All the sensory attributes indicated significant improvement in the sensory scores but not flavor this could be due to decrease in the milk fat content in term loosing typical milk fat flavor in the product*

**Index terms: Paneer, spread, soy, sensory and flavor**

## 1. INTRODUCTION

Paneer may be considered as one of the semi soft varieties of cheese having high moisture content (50-60 per cent). It is generally consumed fresh, however, it may be held for periods of two weeks to two months before consumption. According to Food safety and standards authority of India (FSSAI) it shall not contain more than 60 per cent moisture and milk fat content shall not be less than 50 per cent of the dry matter. Further this paneer can be modified into spreadable product by grinding paneer with stabilizer and adjusting moisture level.

Filled paneer spread is prepared by partial replacement of milk fat or solids with vegetable oils or proteins. Vegetable oils such as soy, is much less costlier than milk fat. So milk fats can be partially replaced with these fats and filled milk can be used for paneer spread preparation. All these not only reduce the cost of paneer but also reduce the risk of cholesterol in milk fat. Manufacture of filled paneer spread enables the effective soy oil. Roy and Singh, (1999) observed beany flavour in paneer made from filled milk using soy oil even after frying and cooking, hence the product was unacceptable. They reported that this might be attributed to the flavour reversion phenomenon of soy oil. It has a strong tendency to revert when exposed to air or high temperature. Soy oil develops objectionable flavour through oxidation. Mild flavour reversion produces a slight beany flavour, which in more advanced stage, may become 'painty' or 'fishy'. Hence milk fat is only constituent of milk responsible for the unique flavor characteristics.

## II. MATERIALS AND METHODS

### Preparation of paneer.

Paneer was prepared as per the method suggested by Bhattacharya *et al.* (1971) with slight modifications. The standardized milk (4.5% fat and 8.5% MSNF) was heated to 90°C (No holding) in a stainless steel vessel followed by cooling to 70°C. Then hot solution (70°C) of one percent citric acid was added to the milk (70°C) with vigorous agitation initially and gentle stirring later till clear whey was separated out. Then the coagulum was allowed to settle down for 5 minutes. The whey was drained out through a muslin cloth and collected paneer curd was used for preparation of paneer-spread.

### Preparation of paneer spread.

The method suggested by Reddy *et al.* (2000) for the preparation of chhana butter spread was adopted for the preparation of paneer spread in the study with slight modifications. The final procedure is shown in the flow chart-1. About 0.25 kg of freshly prepared paneer curd was transferred to the mixer jar, various levels of common salt (NaCl) and tri sodium citrate was added to the paneer curd at the rate of 0.5 per cent. Then calculated amount of pasteurized potable water was added to adjust the moisture content of the product to 63.5 per cent (to facilitate proper grinding/mixing process). The jar contents were subjected grinding to obtain smooth spreadable product.

Milk fat was replaced with soy oil at 0, 25, 50 or 75 per cent levels to prepare four different lots of base mix for manufacture filled paneer spread. The base mix was subjected to two stage homogenization and the spread was manufactures as mentioned above.

**Analysis:** Moisture content of paneer spread was estimated as per IS: SP18 (Part XI) 1981 procedure. The protein content of paneer spread was determined as per the procedure mentioned in IS; SP18 (Part XI), 1981. Fat content of paneer spread was determined by Mojonnier fat extraction method as per the procedure of IS: SP18 (Part XI) 1981.

The penetration measurements were made using cone and test rod (probe) weighing 35g. The cone was allowed to penetrate the sample for a fixed time of 5 s. For the same sample, reading was recorded at different spots and the average value was recorded as mm/5 s of penetration.

## III. RESULTS AND DISCUSSION

### Effect of partial replacement of milk fat with soy oil on the composition, penetration value and sensory characteristics of filled paneer spread (FPS)

Effect of partial replacement of milk fat with soy oil on the composition and penetration value of filled paneer spread is presented in the Table-1. The treated spreads were made by partial replacement of milk fat with soy oil at 25, 50 and 75 per cent levels. The moisture per cent of treated soy filled paneer spread was significantly higher than that of control. But there was no significant difference in moisture per cent of treated spreads. Higher moisture levels in treated soy oil paneer spreads could due to more moisture retention in the curd that resulted due to homogenization of milk. Highest fat per cent was recorded for control (18.53) and lowest was recorded for soy filled spread sample SF1 (18.42). Among the filled spreads no significant fat per cent was recorded. The fat per cent of SF2 and SF3 was 18.48 and 18.49 respectively. Highest protein per cent was recorded for control (15.04) and lowest 14.82 per cent was recorded for SF1. The fat and protein per cent of Soy filled paneer spread showed no significant difference as compared to control. The results were in accordance with Peters (1964) and Michael, *et al.*, (1998), who observed that there was no significant difference between the protein per cent of the Mozzarella cheese prepared from homogenized and un-homogenized milk.

Control was recorded significantly higher total solid per cent of 36.85 and lowest was recorded for SF1 (35.78). There is significant difference between control and treated paneer spreads but no difference was observed between the per cent yield of all treated samples. The penetration values of treated spread were significantly higher than control, whereas, within the treatments, the penetration values increased significantly with increase in the replacement of milk fat with soy oil. This may be due to more softer and smoother body and texture of treated spreads than the control. The increase in the penetration values (softer product) of filled spreads may be associated

with higher unsaturated fatty acids (87 per cent) and low melting triglyceride contents contributed by soy oil than milk fat (35 per cent). Verma *et al.* (1996) stated that the poor spreadability of butter is mainly due to the presence of higher amounts of saturated fatty acids and high melting triglycerides of milk fat than vegetable oils.

Penetration value (mm/5 S): Highest penetration value of 231 was recorded for filled spread sample of SF3 and lowest recorded for control (165). The penetration value of SF1 and SF2 are 197 and 215 respectively. As the per cent level of replacement of milk fat with soy oil increased the penetration value of treated samples significantly increased.

### **Effect of partial replacement of milk fat with soy oil on sensory characteristics of filled paneer spread (FPS)**

The highest colour and appearance score was awarded to filled spread SF1 (23.10) and lowest of 22.11 was awarded to control (Table-1). The colour and appearance scores of all treated spreads were significantly higher than the control. Homogenization of soy filled milk for spread making, has been found beneficial in relation to whiteness, brightness and silky appearance of the product. Kosikowski (1960) reported similar findings in soft cheese prepared from homogenized milk.

Body and texture: The highest body and texture score was awarded to the SF3 (13.50) and lowest score was awarded to control (12.02). The body and texture scores of soy filled spreads were significantly higher than control spread. This was mainly because of homogenization process that improved the softness and smoothness of the product; hence judges awarded higher scores for body and texture. Highest flavour score was awarded for control (41.0) and lowest recorded SF3 (34.0). As the per cent level of replacement of milk fat with soy oil increased, the flavour scores of treated filled spreads There was no adverse effect on the flavour scores of treated spread prepared by replacing milk fat with soy oil at 25 per cent level and it was comparable with control. But, there was pronounced oily flavour noticed in the spread prepared by incorporating soy oil at 50 and 75 per cent levels. Hence, treated spreads SF2 and SF3 were awarded lower flavour scores than that of control and SF1. Paneer made from the soy oil filled milk was not acceptable could be due to oily flavour even after cooking and frying and might be attributed to flavour reversion phenomenon of soy oil. As the level of incorporation of soy oil increased the spreadability scores of treated spreads also increased significantly due to more softer, smoother and highly spreadable product than control. The similar findings were recorded by Verma *et al.* (1996).whereas; Shameena (2020) reported the importance of milk fat in dairy products. Milk fat enriches and mellows the ice cream, giving it a full rich, creamy flavor, fat also contributes the body and melting resistance of ice cream.

The maximum spreadability score was awarded to the filled spread sample SF3 (14.33) and lowest awarded to control (12.50). The spreadability score of control was significantly lower than those of all three treated spread samples. As the per cent level of replacement of milk fat with soy oil increased, the spreadability scores significantly increased.

The maximum overall acceptability score was awarded to SF1 (89.90), whereas SF3 was awarded lowest score of 84.83. There is significant difference between the overall acceptability scores of control (87.63) and other three treated samples. The overall acceptability score of treated spread SF1 (89.90) was significantly higher than control and other treated samples and may be due to better appearance, smooth body and texture, high spreadability and normal flavour scores of treated spread SF1 sample.

Table-1. Effect of partial replacement of milk fat with soy oil on the composition and penetration values of filled paneer spread

Parameters	Per cent level of replacement of milk fat with soy oil				
	0 Control	25 (SF1)	50 (SF2)	75 (SF3)	CD P<0.05%
Moisture (%)	63.15 <sup>a</sup>	64.22 <sup>b</sup>	64.18 <sup>b</sup>	64.11 <sup>b</sup>	0.49
Fat (%)	18.53 <sup>a</sup>	18.42 <sup>a</sup>	18.48 <sup>a</sup>	18.49 <sup>a</sup>	0.63
Protein (%)	15.04 <sup>a</sup>	14.82 <sup>a</sup>	14.86 <sup>a</sup>	14.87 <sup>a</sup>	0.24
Total solids (TS%)	36.85 <sup>a</sup>	35.78 <sup>b</sup>	35.82 <sup>b</sup>	35.89 <sup>b</sup>	0.60
Penetration Value (mm/5 S)	165 <sup>a</sup>	197 <sup>b</sup>	215 <sup>c</sup>	231 <sup>d</sup>	4.37

SF: Soy Filled

Figures with the same superscripts in a row indicates no significant difference at (P<0.05)

Table-2. Effect of partial replacement of milk fat with soy oil on the sensory characteristics of filled paneer spread

Sensory attributes	Per cent level of replacement of milk fat with soy oil				
	0 Control	25 (SF1)	50 (SF2)	75 (SF3)	CD P<0.05%
Colour and appearance (25)	22.11 <sup>a</sup>	23.10 <sup>b</sup>	23.06 <sup>b</sup>	23.00 <sup>b</sup>	0.41
Body and texture (15)	12.02 <sup>a</sup>	13.00 <sup>b</sup>	13.32 <sup>c</sup>	13.50 <sup>d</sup>	0.13
Flavour (45)	41.00 <sup>a</sup>	40.25 <sup>a</sup>	36.00 <sup>b</sup>	34.00 <sup>c</sup>	0.96
Spreadability (15)	12.50 <sup>a</sup>	13.55 <sup>b</sup>	13.86 <sup>c</sup>	14.33 <sup>d</sup>	0.22
Overall acceptability(100)	87.63 <sup>a</sup>	89.90 <sup>b</sup>	86.24 <sup>c</sup>	84.83 <sup>c</sup>	1.83

SF: Soy Filled

Figures with the same superscripts in a row indicates no significant difference at P<0.05%

#### IV. CONCLUSION

There is a great scope for the dairy sector to exploit this newly developed paneer based spreads (paneer spread) as a best alternative for cheese and butter spreads in the market with respect to its fat and spreadability characteristics.

Many developments have taken place in the area of dairy spreads all over the world. These products have always been a subject of research and development to accomplish the desires and requirements of ever growing consumers. The research efforts have been focused on reducing the cost of the products by using low cost soy oil and low cholesterol content.

## REFERENCES

- Bhattacharya, D.C., Mathur, O.N., Srinivasan, M.R., and Samlik, O.L., 1971, Studies on the method of production and shelf life of paneer. *J.Food Sci.Technol.*,**8**(5):117-20.
- IS: SP18, Part XI (1981), ISI handbook of food analysis, Dairy products, *Bureau of Indian standard*, New Delhi, India.
- Kosikowski, F.V., 1960, Italian soft cheese in New York. *J.Dairy Sci.*, **43**:714 - 716
- Michael, A., Rudan David, M., Barbano., Ming R. Guo, and Paul S., Kindest, 1998, Effect of the modification of fat particle size by homogenization on composition, proteolyses, functionality and appearance of reduced fat mozzarella cheese. *J. Dairy Sci* **81**:2065-2076.
- Peters, I.I., 1964, Homogenized milk in cheese making. *Dairy Sci Abstr.* **26**: 457-61
- Reddy, K.Y., Lakshminarayana, M., Sarma, K.S., Ranganadham, M., and Shiva Kumar 2000, Characteristics of low fat channa based butter spread. *J. Food Sci. Technol.*, **37**(1)45-47.
- Roy, S.K., and Singh, S., 1999, Optimization of the processing parameters for the manufacture of paneer from filled milk. *Indian J. Dairy Sci.*, **52** (6):
- Shameena Beegum, P.P., Manikantan,M.R., Pandiselvam,R., Hebbar,K.B. 2020. Indian coconut journal. Vol. XIII. No.1.p 9-11.
- Verma, R.B., Prajapati, P.S., Thaker, P.N., and Uupadhyay, K.G., 1996, Fat spread- A changing face. *Indian Food Industry*, **15**(3): 251-253

