



Research Paper

Effect of soy flour and soy oil on the composition and sensory characteristics of paneer spread

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Received 26 June, 2014; Accepted 07 July, 2014 © The author(s) 2014. Published with open access at www.questjournals.org

ABSTRACT:- Paneer (an Indian soft cheese) is one of the most popular heat and acid coagulated traditional dairy products in India. It is mainly used for the preparation of various culinary dishes. In this Investigation, soy flour was blended in paneer curd at 2, 5, 10, 15 per cent levels and found significant increase in the protein per cent of the paneer spread. The soy flour blended at 5% level was awarded better overall acceptability score of 89.37 compared to control 87.61 and Milk fat was replaced with soy oil at 25, 50 and 75 per cent levels. Among this, milk fat replaced with soy oil at 25 % level was obtained better sensory characteristics with a maximum overall acceptability sensory score of 89.90 compared to control (87.63)

KEYWORDS:- Paneer, spread, soy flour, soy oil, protein

I. INTRODUCTION

India is the largest milk producing country in the world with an out put of 132.4 million tones per annum [1]. There are mainly two types of spreads available in the domestic market, namely, butter and cheese spreads. Since Butter is a high fat, most of the consumer's particularly fat conscious group is hesitant to consume butterfat because of the possibility of coronary heart diseases. High cost of butter in addition to its high-saturated fatty acids, cholesterol contents, high calorific value and poor spreadability at room temperature below 15°C limits its consumption [2]

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 legal standards [3], it shall not contain more than 70 per cent moisture and milk fat content shall not be less than 50 per cent of the dry matter.

Soy is the major source of proteins and oil. It contains about 40% protein and 20% oil [4]. Filled paneer spread is prepared by partial replacement of milk fat or solids with vegetable oils or proteins. Soy flour, which is a rich source of good quality protein, can be used at lower levels in the manufacture of paneer spread. All these not only reduce the cost of paneer but also reduce the risk of cholesterol in milk fat. Vegetable oil such as soy is much less cheaper than milk fat. So milk fats can be partially replaced with these fats and filled milk can be used for paneer spread preparation.

II. MATERIALS AND METHODS

The fresh milk was procured from Students Experimental Dairy Plant (SEDP) of Dairy Science College, Bangalore. Paneer was prepared as per the method suggested by [5] 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 per cent citric acid was added to milk at 70°C with vigorous agitation initially and gentle stirring later till clear whey was separated out. The whey was drained out through a muslin cloth and collected paneer curd was used for preparation of paneer spread. The spread was prepared using tri sodium citrate and NaCl₂ followed by grinding and filling in cups.

Incorporation of soy flour and soy oil in paneer spread.

The paneer spread was prepared by incorporating soy flour at 2, 5, 10 or 15 per cent by weight of paneer curd and 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. Moisture, fat and protein content of paneer spread was estimated as per [6]. Fat content of milk was estimated by Gerber method as [7].

Equipments: Homogenizer, Lab model two-stage homogenizer 'Rannie' imported from Copenhagen was used for homogenization of filled milk base for spread preparation. Cone penetrometer supplied by Associated Instrument Manufacturers (I) Pvt. Ltd. (AIMIL) was used to measure the texture firmness of paneer spread samples.

Sensory characteristics: Samples were evaluated organoleptically by a panel of 5 members drawn from the department. The panelist was asked to evaluate for colour and appearance, body and texture, flavour and overall acceptability on 9-point hedonic scale.

III. RESULTS AND DISCUSSION

Effect of incorporation of soy flour on the quality of soy filled paneer spread.

Chemical quality: There was no significant effect on the moisture per cent of control (63.15) and treated paneer spread (62.61) prepared by incorporating soy flour at 2 per cent level. But, at higher levels (5, 10 and 15 per cent) of incorporation of soy flour significantly decreased the moisture per cent of filled spreads may be due to significant increase in the total solid per cent of spreads by the incorporation of flour. The filled spreads prepared by using upto 5 per cent level of incorporation of soy flour recorded no significant difference between the fat per cent of treated paneer spread and control. But, at higher levels of incorporation of soy flour (10, 15 per cent) showed significant decrease in the fat per cent. Table-1.

There was no significant difference between the protein per cent of treated paneer spread prepared by using 2 per cent soy flour (15.60) and control (15.04). But, incorporation of soy flour at 5, 10 and 15 per cent level led to significant increase in the protein and total solids was observed. Significant increase in the protein per cent of soy incorporation in gulab jamun due to added soy flour itself contains higher per of protein.[8] and increase in the protein content in biscuits as referee as [9].

The penetration values of filled spreads showed significantly lower penetration values than the control. This could be due to the more firmness of the product that resists the penetrometer cone This indicates the more firmness of the spreads, which may be due to increase in the total solids and decrease in the moisture per cent in treated paneer spreads. The present finding is in accordance with [10] who recorded high per cent of protein and low per cent of fat in chhana made from different blends of soymilk and cow milk. Hence, soy solids are good source for proteins.

Sensory characteristics of soy filled paneer spread: There was no significant effect on the colour and appearance scores of treated spreads with increasing proportion of incorporation of soy flour Table-2. The optimum body and texture and flavour score was awarded for the filled spread prepared by using 5 per cent flour due to its better body & texture and stable consistency without beany flavur as opined by judges. Whereas, at higher levels of flour incorporating product had hard, highly viscous and beany flavour. [11] pointed out that the presence of beany flavour in soy products due to the presence of oligosaccharides (soluble carbohydrate).

The spreadability score of filled spread with 5 per cent flour was significantly higher than the control due to its stable spreadability. The decrease in the spreadability scores of other filled spread with 10 per cent and 15 per cent flour incorporated product may be due to increase in the total solids content and lower retention of moisture per cent in the spread. Hence, soy solid can be incorporated in soy filled spread up to 5 per cent level without affecting its sensory characteristics. The observations of the present study is in agreement with [10] and reported that chhana-analogue obtained by coagulation of blended milk (soy milk plus cow milk) contains higher protein and lower fat per cent than pure cow milk chhana and similar findings were reported by [12] and [13]

Effect of partial replacement of milk fat with vegetable oils on the physicochemical and sensory characteristics of filled paneer spread

Chemical quality of filled paneer spread: 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 were due to more moisture retention in the curd that resulted due to homogenization of milk Table-3.

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 [14] and [15] observed that there was no significant difference between the protein per cent of the Mozzarella cheese prepared from homogenized and un-homogenized milk. Where as, the lower total solids per cent of soy filled paneer spreads was due to the retention of more moisture in the curds.

The penetration values of treated spread were significantly higher than control 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). 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 [16]

Sensory characteristics of soy filled paneer spread: Homogenization of soy filled milk for spread making has been found beneficial in relation to whiteness, brightness and silky appearance of the product. The similar findings in soft cheese prepared from homogenized mil were reported [17]. 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 and accepted Table-4. But, there was pronounced oily flavour noticed in the spread prepared by incorporating soy oil at 50 and 75 per cent levels. Paneer made from the soy oil filled milk was not acceptable due to beany flavour even after cooking and frying and this might be attributed to flavour reversion phenomenon of soy oil [18] and [16].

IV. CONCLUSION

There is a great scope for the organized dairy sector to exploit this newly developed paneer (soft cheese) based spreads as a best alternative for cheese and butter spreads in the dairy market. Further research could be extended to incorporation of various protein rich and low fat ingredients in the dairy spreads to improve not only functional properties but also to meet nutritional benefits to the consumer

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TABLE-1 Effect of different levels of incorporation of soy flour on the Composition and penetration values of paneer spread

Parameters	Per cent level of soy flour					CD P<0.05
	(0)Control	2(F1)	5(F2)	10(F3)	15(F4)	
Moisture (%)	63.15 ^a	62.61 ^{ab}	61.38 ^b	59.48 ^c	57.70 ^d	1.30
Fat (%)	8.53 ^a	18.42 ^a	18.05 ^{ab}	17.51 ^{bc}	16.98 ^c	0.59
Protein (%)	15.04 ^a	15.60 ^a	16.26 ^b	17.30 ^c	18.28 ^d	0.62
Total solids (%)	36.85 ^a	37.39 ^{ab}	38.62 ^b	40.52 ^c	42.30 ^d	0.80
Penetration value (mm/5 S)	165 ^a	153 ^b	127 ^c	112 ^d	95 ^e	9.30

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

TABLE-2. Effect of different levels of incorporation of soy flour on the sensory Characteristics of paneer spread

Sensory attributes	Per cent level of soy flour					C.D P<0.05
	(0) Control	2(F1)	5(F2)	10(F3)	15(F4)	
Colour and appearance (25)	22.11 ^a	22.08 ^a	21.85 ^a	21.81 ^a	21.78 ^a	0.43
Body and texture (15)	12.00 ^a	12.10 ^a	13.53 ^b	11.68 ^c	11.04 ^d	0.18
Flavour (45)	41.00 ^a	40.63 ^a	40.51 ^a	38.12 ^b	35.15 ^c	0.67
Spread ability (15)	12.50 ^a	12.53 ^a	13.48 ^b	11.20 ^c	09.47 ^d	0.16
Overall acceptability (100)	87.61 ^a	87.34 ^a	89.37 ^b	82.81 ^c	77.44 ^d	1.21

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

TABLE-3 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 ^a	64.22 ^b	64.18 ^b	64.11 ^b	0.49
Fat (%)	18.53 ^a	18.42 ^a	18.48 ^a	18.49 ^a	0.63
Protein (%)	15.04 ^a	14.82 ^a	14.86 ^a	14.87 ^a	0.24
Total solids (TS%)	36.85 ^a	35.78 ^b	35.82 ^b	35.89 ^b	0.60
Penetration Value (mm/5 S)	165 ^a	197 ^b	215 ^c	231 ^d	4.37

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

TABLE-4. 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 ^a	23.10 ^b	23.06 ^b	23.00 ^b	0.41
Body and texture (15)	12.02 ^a	13.00 ^b	13.32 ^c	13.50 ^d	0.13
Flavour (45)	41.00 ^a	40.25 ^a	36.00 ^b	34.00 ^c	0.96
Spreadability (15)	12.50 ^a	13.55 ^b	13.86 ^c	14.33 ^d	0.22
Overall acceptability(100)	87.63 ^a	89.90 ^b	86.24 ^c	84.83 ^c	1.83

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