

Effect of fat levels of milk on the yield and quality of Paneer

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Abstract

The main object of this study was to find out the best level of fat in milk for the manufacturing of paneer for commercial scale. For the purpose buffalo milk was standardized to 3.5%, 4.5% and 5.5 % milk fat with an SNF level of 9.0 %. Paneer was prepared using approved technique. The yield, sensory quality, all parameters of chemical composition and recovery of solids in paneer were significantly (at 5% level) affected by the fat levels of milk studied. Yield, sensory quality, fat content and recovery of solids in paneer were increased with the increase in fat level of milk. On the other hand, moisture, protein, lactose, ash and acid contents were reduced on increasing the fat level of milk. Milk with 5.5% fat produced best sensory quality paneer which also satisfied all legal requirements. Simultaneously, the highest yield of paneer was also obtained at the same fat level of milk. Although milk with other fat levels also produced paneer of acceptable sensory quality but they failed to fulfil the legal standard regarding fat content in paneer. So, milk of 5.5% fat is being finally recommended for commercial production of paneer.

Keywords: Sensory quality, total solids, PFA, SNF, Fat on dry matter

Introduction

India became the world leader in milk production with a production volume of 84 million tones in 2001. Milk production in India during 2014-15 has reached 146.3 million tones and the estimated production during current year (2015-16) is 154.0 million tonnes. Our present per capita availability of milk in the country has reached to 322 gram per day. This represents sustained growth of availability of milk and milk products for our growing population (Srivastava, 2016). It is estimated that about 50-55 per cent of milk produced is diverted for production of indigenous dairy products using processes such as heat acid coagulation, heat desiccation and fermentation. (Bixapathi et al., 2016).

Paneer is an acid coagulated indigenous milk product. It is obtained by heating, acidulation followed by filtration and pressing. It is characterized by its acidic flavour with slight sweet taste, compact body and smooth texture. According to PFA rules (1984), it should not contain more than 70% moisture and milk fat content be not less than 50 per cent on dry matter basis. Milk solids may also be used in the preparation of this product.

The review of literature shows that fat content of milk used is one of the most important aspects for the manufacturing of any milk products which influence its yield, sensory and chemical quality. Simultaneously, it is important to know minimum fat content of milk to fulfil legal requirement of fat in paneer. There were variations in the observations reported by the various researchers in this aspect. Considering the above facts, the present investigation entitled "Effect of fat levels of milk on the yield and quality of paneer" was carried out in the dept. of AH & Dairying, RBS College, Bichpuri, Agra with the main object to find out the best level of fat in milk for the manufacturing of paneer on commercial scale with the following main objectives:

- (i) To judge the effect of fat content of milk on the recovery of solids and yield of paneer
- (ii) To know the effect fat content of milk on the sensory and chemical quality of paneer.
- (iii) To suggest the best level of fat of milk for paneer making.

Methodology

The manufacture of paneer was done according to the procedure adopted by Sachdeva and Singh

Table 1: Average yield, sensory and chemical quality of paneer

S.No.	Parameters of study	Fat levels of milk			F Cal. Value	CD at 5%
		3.5%	4.5%	5.5%		
1.	Yield (%)	19.71	21.00	22.75	56.22*	0.70
2.	Sensory Score 100 points	89.05	92.42	95.02	7.34*	3.82
3.	Moisture (%)	61.54	60.00	58.33	7.89*	1.98
4.	Fat (%)	16.53	19.93	22.50	232.14*	0.70
5.	Fat on Dry Matter (%)	43.02	49.85	53.96	—	—
6.	Protein (%)	15.81	15.00	14.00	40.57*	0.49
7.	Lactose (%)	2.97	2.27	2.05	431.74*	0.08
8.	Ash (%)	1.95	1.87	1.76	27.15*	0.06
9.	Acidity as Lactic acid (%)	0.32	0.32	0.30	14.95*	0.01
10.	Total Solids Recovery (%)	60.64	62.22	65.37	16.03*	2.08

* Significant at 5.0%

(1988) with some modifications following the usual procedures. 2.5 Kg buffalo milk standardized at 3.5%, 4.5% and 5.5% fat, and 9.0%SNF for each trial was used for the purpose. It was heated to 85 °C for 5 minutes. The milk was slowly stirred by stainless steel ladle to prevent the burning and skin formation during heating. The vessel with heated milk was then removed from the fire and the milk was cooled to required temperatures (80°C). The coagulant (2% lactic acid) was then added slowly to milk with constant stirring till complete coagulation was obtained and whey became yellowish green in colour. Then the coagulum was strained through a muslin cloth. During this period, the temperature of whey was not allowed to fall below 70°C. The coagulum thus collected was tied in the muslin cloth and then pressed for 30 minutes by applying a suitable pressure on the top.

First, the yield of Paneer was calculated on the basis of milk used for its preparation. The samples thus prepared were subjected for sensory evaluation (Flavour - 45, Body & texture – 35 and colour & appearance- 15) using 100 point scale as described by Patil and Gupta (1986) with certain modifications. The chemical analysis of samples was done in terms of moisture, fat, protein, lactose, ash and titratable acidity as described in BIS Handbook of Food Analysis, Part XI Dairy Products (1981). Thereafter, recovery of solids in paneer was calculated considering the solids of milk used. Investigation was replicated thrice.

Results and Discussion

The data thus obtained were subjected for statistical analysis using CRD and tested at 5% level

of significance. The average values of different parameters of paneer studied have been given in the following table.

It is evident from the study that fat levels of milk had a significant effect on all parameters of paneer studied. The yield of paneer was calculated on milk basis and represented as percent. It is mainly depends upon the composition of milk, processing, recovery of TS and amount of whey drained. Paneer yield was increased with the increase in fat content of milk used. Although the moisture content of paneer decreased with the increase in fat level of milk, nevertheless the yield of paneer increased mainly due to higher recovery of total solids. Similar trends in yield of paneer had also been reported by Chawla et al. (1987).

The average sensory score of paneer was also increased with the increase in fat content of milk used. Thus, it can be inferred that the level of fat in milk does increase overall acceptability of paneer. It was particularly due to improvement in flavour and body and texture of paneer with the increase in fat level of milk from which samples were prepared. Kumar (1993) also reported similar results in this regard.

The data presented in Table 1 indicated that average moisture content in paneer was decreased with the increase in fat content of milk used. Thus it is apparent from the results that there was a inverse relationship between moisture content in paneer and fat levels of milk. The reason could be hydrophobic nature of fat which reduces the moisture content of paneer made from milk with rather higher fat content.

All paneer samples confirmed the legal specification in this regard. Similar trends in moisture content of paneer had also been reported by Chawla et al. (1987).

The fat content in paneer was increased with the increase in fat level of milk used. All fat levels were differed significantly with one another regarding the fat content in paneer. Pal and Yadav (1992) also reported that the milk of higher fat level produced paneer with more fat content. Only 5.5 % fat level in milk fulfilled the legal requirement of fat in paneer. The average protein content in paneer was decreased with the increase in fat level of milk used. Pal and Yadav (1992) also reported lower protein content in paneer made from milk of higher fat content.

The average lactose content in paneer was decreased with the increase in fat content of milk used. It is well established fact that lactose, being water soluble, remain in the whey during the process of coagulation. So, paneer samples which retains higher amount of whey, contained higher lactose content. Pal et al. (1991) also reported a positively correlation between lactose and moisture content of paneer. The average ash content in paneer was also decreased with the increase in fat content of milk used. It is well established fact there is intimate association between protein and ash content in milk system. In other words the paneer samples higher in protein would also be higher in ash content and vice versa. The reduction in ash content in paneer with increasing fat levels was also noticed by Pal and Yadav (1992).

The average acid content in paneer was similar at 3.5% and 4.5% fat levels. Thereafter it was decreased with the increase in fat content of milk. The relatively higher acidity in low fat paneer might be due to its higher level of protein and greater retention of colloidal phosphate. Protein and phosphate contribute maximum to the titratable acidity of milk products (Chawla et al. 1987).

The recovery of total solids was mathematically calculated using the data on the TS content of milk

and finished product. The average recovery of total solids in paneer was increased with the increase in fat content of milk used. The hike in recovery of total solids with increasing fat levels in milk might be attributed to the increase in fat-protein complexes during heating of milk. Similar trends in recovery of solids in paneer had also been reported by Chawla et al. (1987).

References

- Bixapathi A, Johri V, Agarwal AK, Jayaraj Rao K, Magdaline F, Sinha Geetesh (2016). Reduction of quality as evidenced by texture profile analysis of pooled and frozen Rasogolla during low temperature storage. *Indian J. Dairy Sci.*, 69 (4):382.
- Chawla, A.K., Singh, S. and Kanawjia, S.K. (1987). Effect of fat levels, additives and process modifications on composition and quality of paneer and whey. *Asian Dairy Res.*, 6(2):87.
- Kumar and Dwivedi (1993). Technological studies on production and shelf life of paneer from Bhadawari buffalo milk. A PhD. Thesis submitted to CSA Uni. of Agri. & Tech. Kanpur.
- Pal, M.A.; Yadav, P.L. and Sanyal, M.K. (1991). Physical-chemical and sensory characteristics of low fat paneer from high heated milk. *Indian J. Dairy Sci.*, 44:7, 437.
- Pal, M.A. and Yadav, P.L. (1992). Effect of fat level on the quality of paneer from various blends of buffalo and cow milk. *Indian J. Dairy Sci.*, 45(10):554.
- Patil, G.R. and Gupta, S.K. (1986). Some aspect of sensory evolution of paneer. *Indian Dairy man* 38 (3): 135.
- Sachdeva, S. and Singh, S. (1988). Optimization of processing parameters in the manufacture of paneer. *J. Food Science Technology*. 25 (3) : 142.
- Srivastava AK (2016) 44th Dairy Industry Conference. *Indian Dairyman*, May, :22.