

Effect of Types of Milk on The Recovery of Milk Solids in Paneer

Paper Submission: 12/09/2021, Date of Acceptance: 21/09/2021, Date of Publication:24/09/2021

Abstract

Buffalo milk, cow milk and goat milk were used in this investigation. The product was prepared following the usual procedure. The samples prepared were subjected for sensory evaluation (Flavour, Body and texture and color & appearance) using a 100 point scale. The chemical analysis of samples was done in terms of total solids, fat, protein, lactose and ash by using the standard procedure. Thereafter, data were converted into its recovery in paneer. The yield of paneer samples was also reported. Investigation was replicated thrice. The data thus obtained were subjected for statistical analysis using CRD and tested at 5% level of significance. Types of milk had a significant effect on all above characteristics of study. This study concluded as buffalo milk resulted best for paneer making, followed by cow milk. Goat milk failed to produce a suitable quality paneer.

Key words: Acidulation, Proximate, Sensory Evaluation, Solids Not Fat, Total Solids.

Introduction

Paneer is an important acid coagulated indigenous dairy product obtained by heating and acidulation of milk followed by filtration and pressing. Paneer is used in the preparation of various dishes. Paneer is an ideal food for expectant mothers, infants, growing children, adolescents and adults. Being a rich source of animal protein, it is a good source of all essential amino acids to the vegetarians. Its fat content renders the fat soluble vitamins A and D and all essential fatty acids and energy. With its high protein and low sugar content, it is recommended to the diabetic patients. Paneer has also particular value for those who possess the problem of lactose intolerance.

Review of Literature

Paneer contains almost all the fat, casein complexed with denatured whey proteins and a portion of salts and lactose as reviewed by Kumar et. al. 2014. Proximate composition of paneer is as moisture 57.4±0.64%, fat 22.5±0.31%, protein 17.1±0.38%, lactose 2.4±0.04% and ash 1.6±0.02% (Malodia and Beniwal 2019). It is a good source of calcium and phosphorus much needed for bone formation and other functions. Paneer contains an average of 0.79% calcium and phosphorus 0.52% (Srivastav and Singh 2020).

Need and Objective of the Study

In Agra city, paneer is one of the most popular milk product and a significant portion of milk is being utilized for paneer making in this city. The review of literature shows that the type of milk used is one of the most important aspects of paneer manufacturing. There is a lack of information regarding the recovery of various constituents in paneer prepared from various types of milk and variation in the observations reported by the various researchers. Considering the above facts in mind, the present investigation entitled "Effect of types of milk on the recovery of milk solids in paneer" was carried out in the department of A.H. & Dairying, R.B.S. College, Bichpuri, Agra, with the main objective to know the effect of types of milk on the recovery of various milk constituents in paneer.

Materials and Methods

Buffalo, cow and goat milk were received from the source and tested for the total solids, fat, protein, lactose and ash. The average composition (%) of buffalo, cow and goat milk used was as fat -7.8%, 4.5% and 4.5%, protein- 3.8%, 3.4% and 3.1%, lactose- 5.2%, 4.8% and 4.5%, ash- 0.8%, 0.7% and 0.7%, total solids- 17.7%, 13.5% and 12.9%, and solids not fat – 9.9%, 9.0% and 8.4%, respectively. The paneer was prepared by the method used by Aneja (1997) and Gadekar et. al.(2019). The yield (%) of paneer was reported on the basis of the same milk used for the purpose. Paneer samples were taken for the analysis as per procedure described in SP18 Part XI (1981). Sensory evaluation was done on a 100 point scale as given by Patil and Gupta (1986). Total solids content was determined by gravimetric method adopted by Roy and Singh (1994), fat content by Gerber's method present in IS-1224 (II) 1977, protein content by Kjeldhal method (AOAC 2000), lactose content by the method given by Patel and Mistry (1997). and ash content by procedure given in (AOAC 2000). This study was replicated thrice and data thus obtained were analyzed by CRD and tested at 5% level of significance.

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Results and Discussion

It is evident from the data depicted in the table:1 that types of milk had a significant effect on the yield, sensory score and recovery of solids not fat and total solids in paneer.

Table: 1 Effect of types of milk on the yield, sensory score, recovery of SNF and total solids in paneer

Types of Milk	Yield (%)			Sensory Score (100 points)			Recovery of SNF (%)			Recovery of TS (%)		
	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.
Buffalo Milk	22.45	24.81	24.02	93.15	96.95	95.02	45.37	49.98	48.05	63.26	66.98	65.25
Cow Milk	16.17	17.62	17.05	82.93	89.27	85.42	40.95	42.48	41.95	56.27	59.79	58.32
Goat Milk	15.27	17.64	16.25	69.25	74.86	72.05	38.28	42.11	39.62	48.84	53.42	51.05
Effect	Significant			Significant			Significant			Significant		
CD at 5.0 %	2.02			3.33			4.22			4.72		

These average yield (24.02%) and sensory score (95.02) of paneer was obtained with the buffalo milk, followed by the cow and goat milk. The corresponding values of cow milk paneer was 17.05 % and 85.42, respectively. Goat milk produced the lowest quantity of paneer (16.25 %) which was statistically at par with the yield of paneer made from cow milk although goat milk paneer was not suitable from the sensory point of view. Its average sensory score was 72.05 on a 100 point scale. It might be attributed to the role of fat in the development of acceptable flavour, body and texture as well as the appearance of paneer is unquestionable. A reduction in fat content of cow milk paneer resulted in its lower acceptability (Mamata Chaudhary et.al. 2021).

The buffalo milk paneer had higher recovery of solids not fat (48.05%) and total solids (65.25%) followed by cow and goat milk paneer. The corresponding values for cow and goat milk paneer were 41.95 % and 58.32%, and 39.62% and 51.05%. The cow and goat milk was statistically similar in relation to recovery of solids not fat and total solids in paneer. The higher recovery of solids in buffalo milk paneer might be attributed to high fat content in buffalo milk and increase in the formation of fat - protein complexes during heating milk.

Table: 2 Effect of types of milk on the recovery of fat, protein, lactose and ash in paneer

Types of Milk	Recovery of fat (%)			Recovery of protein (%)			Recovery of lactose (%)			Recovery of ash (%)		
	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.
Buffalo Milk	85.7	89.6	88.25	89.03	94.91	91.77	10.64	14.27	12.25	60.75	64.49	62.70
Cow Milk	88.5	94.3	90.90	87.40	91.34	89.25	6.24	8.39	7.09	50.32	54.07	52.35
Goat Milk	73.15	77.7	75.25	76.11	80.27	78.05	9.4	13.15	10.70	46.95	51.62	49.26
Effect	Significant			Significant			Significant			Significant		
CD at 5.0 %	6.62			6.55			4.83			5.68		

The data presented in table:2 showed that paneer prepared from cow milk recovered the highest amount of fat (90.90%) followed by the samples made from buffalo milk (88.25%) and goat milk (75.25%). Buffalo and cow milk were statistically at par but differed significantly from goat milk with respect to recovery of fat content in paneer. De (1997) also supported results in this respect, who cited lower recovery of fat (85.00%) in buffalo milk paneer as compared to that prepared from cow milk (90.00%). The higher the fat level in buffalo milk, the higher the fat loss in buffalo milk paneer whey. This explains the reason for the lower recovery of fat in paneer from buffalo milk. Goat milk failed to give properly coagulated mass resulting in heavy fat loss in the paneer whey. The recovery of protein content in

the paneer sample prepared from buffalo milk was the highest (91.77%) followed by cow milk (89.25%) and goat milk (78.05%) paneer samples. The difference between the recovery of protein content in buffalo milk paneer and cow milk paneer was non significant but both differed significantly from that in goat milk paneer. The greater recovery of protein in buffalo milk paneer might be attributed to protein-fat interaction during paneer making. De(1997) also supported our results in this respect, who cited higher recovery of protein (91.00%) in buffalo milk paneer as compared to that prepared from cow milk (89.00%).

The highest recovery of lactose content (12.25%) was reported in paneer samples prepared from buffalo milk followed by the samples made from goat milk (7.09%) and cow milk (10.70%). Buffalo milk differed significantly from cow milk but at par with goat milk in relation to recovery of lactose content in paneer. Lactose was found in proportion to moisture retained. De (1997) also supported our results in this respect, who cited 12.00 % recovery of lactose in chhana made from buffalo milk and 7.00 % in cow milk chhana. The highest recovery of ash content (62.70%) was reported in paneer samples prepared from buffalo milk followed by cow milk paneer (52.35%) and goat milk paneer (49.26%) samples. The difference between the recovery of ash content in cow milk paneer and goat milk paneer was non significant but both the type of paneer samples differed significantly from buffalo milk paneer in this regard. It is well known that a greater portion of minerals is combined with protein. This is the reason behind the highest recovery of mineral salts in paneer made from buffalo milk. De(1997) also supported our results in this respect, who cited higher recovery of ash (60.00%) in buffalo milk paneer as compared to that prepared from cow milk (48.00%).

Conclusion

On the basis of yield, sensory quality and recovery of various solids in paneer, a fact was drawn that buffalo milk resulted best for paneer making, followed by cow milk. Goat milk is not suitable for paneer making. So, buffalo milk is highly recommended for paneer making. Alternatively, cow milk may be used for the same purpose.

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