

Effect of Fat Levels of Milk on the Quality of Paneer Made From Bhadawari Buffalo Milk

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Abstract

In the study, there were four fat levels i.e. 4.5 %, 5.0% , 5.5% and 6.0% maintained in the Bhadawari buffalo milk to prepare paneer. The paneer samples prepared were subject for sensory evaluation and chemical analysis in terms of moisture, fat, protein, lactose, ash and titratable acidity . Investigation was replicated thrice. The data thus obtained were subjected for statistical analysis using factorial CRD and tested at 5% level of significance. Fat levels in milk had a significant effect on all above characteristics of study. This study was concluded as Bhadawari buffalo milk must contain at least 5.0% fat for getting a well accepted quality paneer and to meet the legal standards.

Key Words: Acidulation, ash, legal standards, sensory evaluation, SNF

Introduction

Paneer is an important acid coagulated indigenous dairy product obtained by heating and acidulation of milk followed by filtration and pressing. It contained almost all the fat, casein complexed with denatured whey proteins and a portion of salts and lactose as reviewed by Kumar et. al. 2014. 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. It has also particular value for those who possess the problem of lactose intolerance.

Need and Objective

Buffalo milk is preferred over cow milk for the production of paneer because it provides better body and texture as well as higher recovery of all the nutrients and greater nutritive value. Among the various breeds of buffaloes in UP, Bhadawari buffalo is the most important. Its native place is Bhadawari state of Agra district and adjoining area of Gwalior and Etawah. Animals are also found scattered in the surroundings of Yamuna and Chambal river. Bhadawari buffalo milk known for high fat content (recorded as high as 13 %) is not suitable as such for the manufacture of paneer due to its high fat content. It has been reported that desirable body and texture in paneer is not obtained if it is prepared from milk highly rich in fat. Bhattacharya et. al. (1971) reported that the higher fat level in milk, the higher losses in paneer whey. The cost of production of paneer is also higher which is a major hurdle in popularization of paneer in the middle and lower class of society. On the other hand, awareness of high milk intake has become apparent due to coronary complications. Without standardization of milk, uniformity in the composition of the finished product can not be obtained. Under the circumstances, a reduction in fat content of milk to the extent to achieve the legal standards in paneer, offers great promise to solve aforesaid problems.

Materials and Methods

Bhadawari buffalo milk was received from the source aseptically, tested and standardized to 4.5%, 5.0%, 5.5% and 6.% milk fat with a SNF level of 9.5 percent by adding fresh Bhadawari buffalo skim milk. The additional requirement of SNF content was made up through spray dried skim milk powder. The paneer was prepared by the method suggested by Sachdeva and Singh (1987) and Aneja (1997). Paneer samples were taken 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). Moisture 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, lactose content by Fehling's solution method, ash content by procedure given in SP18 Part XI (1981), BIS and titratable acidity by procedure adopted by Rajorhia et.al. (1984). 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 that fat levels of milk had a significant effect on every quality characteristic of paneer in the study.

Table: Effect of fat levels of milk on the quality of paneer

Characteristics	Fat Levels				Effect	SE (Diff)	CD at 5%
	4.5%	5.0%	5.5%	6.0%			
Overall sensory score out of 100	81.76	83.14	83.95	84.90	Significant	0.43	0.85
Moisture (%)	51.78	50.55	49.11	48.62	Significant	0.20	0.39
*Fat (%)	23.95 (49.67)	25.48 (51.53)	27.30 (53.65)	28.34 (55.16)	Significant	0.14	0.27
Protein (%)	19.02	18.69	18.43	18.01	Significant	0.08	0.15
Lactose (%)	2.60	2.54	2.46	2.40	Significant	0.01	0.02
Ash (%)	2.38	2.34	2.32	2.27	Significant	0.01	0.02
Titratable acidity (lactic acid %)	0.375	0.374	0.362	0.361	Significant	0.002	0.005

The overall sensory score of paneer samples increased with the increase in fat levels of milk. It is particularly due to improvement in flavour, and body and texture of paneer with increase in fat level of milk. The corresponding values for 5.0 and 5.5 percent milk were statistically at par. Moisture content in paneer samples was significantly reduced with the increase in each level of fat in milk. The reason could be the hydrophobic nature of fat which reduces the moisture content of paneer at higher fat levels. Similar trend was also reported by Roy and Singh (1994). All paneer samples confirmed the legal requirement of moisture in paneer samples which is maximum 70%. The fat content of paneer samples increased significantly with increase in each level of fat. Pal and Yadav (1992) also reported that milk with greater fat content produced paneer with more fat. A perusal of data shows that there must be at least 5.0% fat in Bhadawari buffalo milk to get paneer of corresponding legal standard which is 50 % fat on dry matter basis.

The protein content of paneer samples decreased significantly with increase in each level of fat. Chawla et.al. (1987) also reported an inverse relationship between protein content of paneer and fat level of milk. The lactose content of paneer was significantly reduced with increase in each level of fat. It is a well established fact that lactose, being water soluble and having no association with any other constituents, remains in the whey. So, paneer samples which retain a higher amount of whey, contained higher lactose. This view gets support from the results of Pal et.al. (1991). The ash content of paneer was significantly decreased with increase in each level of fat. There is an intimate association between protein and ash content in the milk system. So, paneer samples lower in protein would also be lower in ash content and vice versa. Pal and Yadav (1992) also reported similar results in this regard. The titratable acidity of paneer samples progressively decreased with the increase in fat levels of milk. The corresponding values at 4.5% and 5.0 %, and 5.5% and 6.0% were statistically at par. 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 acidity of milk products as reported by Chawla et.al. (1987).

Conclusion

Finally, it is concluded that 5.0 % fat in Bhadawari milk can produce paneer of well accepted quality conforming legal standard with lower cost, and may be recommended for commercial production of paneer.

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