International Journal of Veterinary Sciences and Animal Husbandry

ISSN: 2456-2912
VET 2024; SP-9(4): 61-63

www.veterinarypaper.com
Received: 05-04-2024
Accepted: 12-05-2024

Rajendra Kumar Soni
M.Sc. Scholar, Department of Animal Husbandry and Dairy Science, Raja Balwant Singh College, Bichpuri, Agra, Afflited with, Dr. Bhimrao Ambedkar University, Agra, Uttar Pradesh, India

Rajkumar Soni
M.Sc. Scholar, Department of Animal Husbandry and Dairy Science, Raja Balwant Singh College, Bichpuri, Agra, Afflited with, Dr. Bhimrao Ambedkar University, Agra, Uttar Pradesh, India

Meetha Lal Meena
Research Scholar, Department of Animal Husbandry and Dairy Science, Raja Balwant Singh College, Bichpuri, Agra, Afflited with, Dr. Bhimrao Ambedkar University, Agra, Uttar Pradesh, India

Rajeev Kumar
Professor, Department of Animal Husbandry and Dairy Science, Raja Balwant Singh College, Bichpuri, Agra, Afflited with, Dr. Bhimrao Ambedkar University, Agra, Uttar, Pradesh India

Jeetendar Kumar
M.Sc. Scholar, Department of Animal Husbandry and Dairy Science, Raja Balwant Singh College, Bichpuri, Agra, Afflited with, Dr. Bhimrao Ambedkar University, Agra, Uttar Pradesh, India

Dharvendra Singh
Subject Matter Specialist [AH & D], KVK, Raja Balwant Singh College, Bichpuri, Agra, Uttar, Pradesh, India

Anupam Kumar Azad
Research Scholar, Department of Livestock Production and Management, G. B. Pant University of Agriculture and Technology, Pantnagar Udham Singh Nagar, Uttarakhand, India

Jagpal Jogi
Research Scholar, Southern Regional Station, ICAR-National Dairy Research Institute, Bengaluru, Karnataka, India

Corresponding Author:
Meetha Lal Meena
Research Scholar, Department of Animal Husbandry and Dairy Science, Raja Balwant Singh College, Bichpuri, Agra, Afflited with, Dr. Bhimrao Ambedkar University, Agra, Uttar Pradesh, India

Evaluating the influence of varying milk fat levels on paneer production efficiency

Rajendra Kumar Soni, Rajkumar Soni, Meetha Lal Meena, Rajeev Kumar, Jeetendar Kumar, Dharvendra Singh, Anupam Kumar Azad and Jagpal Jogi

DOI: https://doi.org/10.22271/veterinary.2024.v9.i4Sb.1541

Abstract
The present investigation entitled "Study on the effect of fat levels on the quality of paneer" was carried out in the department of Animal Husbandry & Dairying, R.B.S. College, Bichpuri, Agra. The variables involved in this study *viz*. Fat levels (%) of Milk 3.0**,** 4.5 and 6.0), thus in all 9 sample were compared in Compleat Randomised Design (C.R.D.) with 3 replications. There were the following conclusions drawn from the study Milk with 6.0% fat produced best sensory quality paneer which also satisfied all legal requirements regarding chemical composition. Simultaneously, the highest yield of paneer was also obtained at the same fat content of milk. Although milk with other fat levels also produced paneer of acceptable sensory quality but they failed to fulfill the legal standard regarding fat content in paneer. So, milk of 6.0% fat is being finally recommended for commercial production of paneer.

Keywords: Fat, milk, paneer, lactose content and sensory evaluation

Introduction
Paneer is a coagulate indigenous milk product obtained by heating acidulation followed by filtration and pressing. It is similar to unripened cheese because both products contain same milk solids. Good quality paneer is characterized by its acidic flavour with slight sweet taste form and compact body and smooth texture. According to F.O.A., India's milk production has increased from 17 million tones in 1950–51 to around 230.58 million tonnes in 2022-23 registered a growth of 22.81%. The per capita availability of milk has reached to 444 gm / day in year 2021-22. A large quantity of milk produced in country amounting around 50 percent is being converted into various milk products such as khoa, chhena, paneer, dahi, ghee, shrikhand etc. West Bangal produces maximum quantity of chhana and paneer followed by Uttar Pradesh and Maharastra. (Verma *et al.* 2022) [11]

Among all the processes of preservation of milk solids possible under out climatic condition. Paneer provides one of the best method of conserving and preserving milk solids in highly concentrated form for about 2-3 days. Paneer contains entire milk casein, some part of denatured whey proteins, almost all fat and colloidal salts and lactose in proportion to the moisture retained in the product. About 90% per cent of fat and protein, 50% of ash and 10 per cent of lactose of milk are retained into paneer. The sugar content of paneer is low as most of it is drained with the whey. The general composition of paneer is as moisture 52-54 percent, fat 24-28 percent, protein 16-19 percent, lactose 2.0-2.2 percent and ash 2.0-2.3 percent. (Vishwesjwaraiah, *et al.* 1985) [12]

Paneer is an ideal food for mothers, infants, growing children, young and adults. It is highly nutritious and whole some product. It is an excellent source of all the essential amino acids to the vegetarian. The presence of paneer in diet provides fat soluble Vitamins 'A' and 'D', essential fatty acids (linolnic and archidonic) and energy with its high protein and low lactose content. It gives about 400 calories/ 100 gm energy and is both palatable and highly digestible. It is highly recommended to diabetic patients. It also has particular value for those who possess the problem of lactose intolerance but not suitable for the persons who suffer from heart disease or hypertension or renal problem because it is rich in fat and protein. Paneer is

mainly used for preparation of some very popular vegetable dished *viz*. paneer, Karahi Paneer, palak paneer, paneer pakora, Sahi paneer etc. (Chandan, *et al.* 1987) [3]

Materials and Methods

The present investigation entitled "Study on the effect of fat levels on the quality of paneer" was carried out in the department of Animal Husbandry & Dairying, R.B.S. College, Bichpuri, Agra. The variables involved in this study *viz*. Fat levels (%) of Milk 3.0**,** 4.5 and 6.0), thus in all 9 sample were compared in Compleat Randomised Design (C.R.D.) with 3 replications. Parameters to be recorded Yield, Recovery of Total Solids and Sensory evaluation (Flavour, Body & Texture, Colour and Appearance and Overall acceptability) For the sake of convenience the experimental technique has been divided as under: Collection of milk, Standardization of milk, Preparation of Paneer and Analysis of Paneer. Analysis of Samples: The prepared samples of paneer in the laboratory were analyzed for different constituents. The details of which are given below Yield: The yield of Paneer was calculated on the basis of milk used for its preparation.

Recovery of Total Solids: First**,** TS content present in used quantity of milk was calculated. Then TS content present in paneer made was mathematically computed. Second value was divided by previous one and multiplied by 100. Sensory Evaluation: The sensory quality of paneer samples was evaluated by a panel of judges drawn from the department of A.H. & Dairying to provide specific comments in both desirable and undesirable organoleptic properties quantitatively on 100 points arbitrary scale as described by Patil and Gupta (1986) [9] with certain modifications. The following attributes of quality were considered in sensory evaluation. Flavour (45 Texture and consistency (35), Colours and appearance (15) and Overall acceptability (100)

Collection of Milk

Fresh and good quality milk of cow and buffalo milk was collected from a particular farmer of Laramda village and mixed in the ratio of 50:50 for the purpose of paneer making.

Analysis and standardization of milk

First, the analysis of milk was done as per procedures applied for the analysis of paneer with modifications necessary for the purpose. Then, milk was standardized to 3.0, 4.5 and 6.0% milk fat with an SNF level of 9.0% by adding fresh potable water. The additional requirement of SNF content was made up through spray dried skim milk powder.

Results and Discussion

The paneer samples prepared in the laboratory of Department of A.H. & Dairying R.B.S. College, Bichpuri, Agra during the investigation entitled **"**Study on the effect of fat levels on the quality of paneer". were subjected for sensory evaluation and chemical analysis. Thereafter, data were converted into recovery of total solids in paneer. The yield (%) was also reported. The data thus obtained were statistically analysed using CRD and tested at 5% level of significance.

Preparation of Paneer

The manufacture of paneer was done according to the procedure adopted by Sachdeva (1985) [10] with some modifications. 2.5 Kg of milk was heated to 85 ^{0}C for 5 minutes. The milk was slowly stirred by stainless steel 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^{0}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^{0}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.

Yield (%) of paneer

The yield of paneer was calculated on milk basis and represented as percent. It is mainly depends upon the composition of milk, processing parameters, recovery of TS and amount of whey drained. The data presented in the table 1 indicated that the average yield percent was increased with the increase in fat content of milk used. The highest average yield (22.86%) was observed in case of paneer samples prepared from milk having 6.0% fat. The samples prepared from milk testing 3.0% fat obtained on an average 18.34% (lowest) yield. Similar trends in yield of paneer had also been reported by Chauhan *et al*. (2017) [4].

Table 1: Yield (%), Recovery of Total Solids (%) and Sensory evaluation of paneer samples

S. No.	Fat Levels of milk	Min.	Max.	Average
Yield (%) of paneer samples				
1.	3.0	17.65	19.10	18.34
2.	4.5	19.59	21.25	20.38
3.	6.0	21.97	23.86	22.86
Recovery of Total Solids (%) of Paneer				
1.	3.0	59.01	60.88	59.91
2.	4.5	60.51	62.54	61.49
3.	6.0	63.50	65.76	64.60
Sensory score (100 points scale) of paneer samples				
1.	3.0	89.96	91.01	90.13
2.	4.5	91.75	93.01	92.62
3.	6.0	93.40	95.00	94.26

Recovery of Total Solids (%) of Paneer

It was mathematically calculated using the data on the TS content of milk and finished product. The data presented in the table-1 indicated that average recovery of total solids in paneer was increased with the increase in fat content of milk used. The highest average recovery of total solid (64.60%) was observed in case of paneer samples prepared from milk having 6.0% fat. The samples prepared from milk testing 3.0% fat exhibited on an average 59.91% (lowest) recovery of total solid in paneer. Similar trends in recovery of solids in paneer had also been reported by Chawla *et al.* (1985) [5]. 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

Sensory score (100 points scale) of paneer samples

The laboratory prepared samples of paneer were examined by a panel of judges drawn from the department of A.H. & Dairying, R.B.S. College, Bichpuri, Agra using 100 points arbitrary scale. It was assessed on the basis of total score obtained by flavour, body and texture, and colour and appearance. The data presented in the table-1 indicated that average sensory score was increased with the increase in fat content of milk used. The highest average sensory score

(94.26) was observed in case of paneer samples prepared from milk having 6.0% fat. The samples prepared from milk testing 3.0% fat obtained on an average 90.13 (lowest) points. 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 in milk from which samples were prepared. Kumar (2021) [7] and Chauhan *et al*. (2017) [4] also reported similar results in this regard.

Moisture content (%) of Paneer

The data presented in the table 4A indicated that average moisture content in paneer was decreased with the increase in fat content of milk used. The highest average moisture content (60.79%) was observed in case of paneer samples prepared from milk having 3.0% fat. The samples prepared from milk testing 6.0% fat exhibited on an average 57.62% (lowest) moisture in paneer. Similar trends in moisture content of paneer had also been reported by Chawla *et al*. (1987) [6]. Thus it is apparent from the results that there was a inverse relationship between moisture content of paneer and fat levels in 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 had conformed the legal specification in this regard. Values in the parenthesis are fat on dry matter basis (Chauhan, *et al*.2017) [4]

Table 2: Moisture content (%), Fat content (%) and Protein content (%) of Paneer

Moisture content (%) of Paneer				
S. No.	**Fat Levels of milk**	**Min.**	**Max.**	**Average**
1.	3.0	59.88	61.76	60.79
2.	4.5	58.31	60.27	59.26
3.	6.0	56.64	58.66	57.62
Fat content (%) of Paneer				
1.	3.0	16.20 (40.38)	16.70 (43.67)	16.43 (41.90)
2.	4.5	19.60 (47.01)	20.30 (51.09)	19.93 (48.92)
3.	6.0	22.20 (51.20)	23.00 (55.64)	22.60 (53.33)
Protein content (%) of Paneer				
1.	3.0	15.48	15.97	15.72
2.	4.5	14.63	15.14	14.88
3.	6.0	13.73	14.22	13.97

Fat content (%) of Paneer

The data exhibited in the table 5A indicated that average fat content in paneer was increased with the increase in fat content of milk used. The highest average fat content (22.60%) was observed in case of paneer samples prepared from milk having 6.0% fat. The samples prepared from milk testing 3.0% fat exhibited on an average 16.43% fat in paneer. All fat levels were differed significantly with one another regarding the fat content in paneer. Bhadekar *et al*. (2008) [2] also reported that the milk of greater percentage of fat produced paneer with more fat content. Only 6.0% fat level in milk fulfilled the legal requirement of fat in paneer.

Protein content (%) of Paneer

The data exhibited in the table 6A indicated that average protein content in paneer was decreased with the increase in fat content of milk used. The highest average protein content (15.72%) was observed in case of paneer samples prepared from milk having 3.0% fat. The samples prepared from milk testing 6.0% fat exhibited the lowest protein content i.e. on an average 13.97% in paneer. All fat levels were differed significantly with one another regarding the protein content in paneer. (Bandopadhaya, 1987) [1]. also reported lower protein content in paneer made from milk of higher fat content.

Conflict of Interest
Not available

Financial Support
Not available

References

1. Bandopadhaya AK. Indian Milk Production compendium. Dairy India; c1987. p. 212.
2. Bhadekar SV, Deshmukh BR, Baswade SV, Mule RS, Gatchearle PL. Sensory evaluation and overall acceptability of paneer from buffalo milk added with sago powder. J Dairying Foods H S. 2008;27(2):99-103.
3. Chandan RC, Marin H, Nakrani KR, Zehmer MD. Production and consumer acceptance of Latin American white cheese. J Dairy Sci. 1979;62:691-696.
4. Chauhan SK, Kumar R, Singh VP, Singh KP. Effect of fat levels of milk on yield and quality of paneer. J Rural Agric Res. 2017;17(1):62-64.
5. Chawla AK, Singh S, Kanawjia SK. Effect of fat levels, additives, and process modification on composition and quality of paneer and whey. Asian J Dairy Res. 1985;6(2):87-92.
6. Chawla AK, Singh S, Kanawjia SK. Effect of fat levels, additives, and process modifications on composition and quality of paneer and whey. Asian Dairy Res. 1987;6(2):87.
7. Kumar R. Effects of fat levels of milk on the yield, recovery of solids and sensory attributes of Bhadawari buffalo milk paneer. Shrinkhla Ek Shodhparak Vaicharik Patrika. 2021;9(1):17-19.
8. Pal MA, Yadav PL, Sanyal MK. Physical-chemical and sensory characteristics of low fat paneer from high heated milk. Indian J Dairy Sci. 1991;44(7):437-441.
9. Patil GR, Gupta SK. Some aspect of sensory evaluation of paneer. Indian Dairyman. 1986;38(3):135.
10. Sachdeva S, Singh S, Kanawjia SK. Recent development in paneer technology. Indian Dairyman. 1985;37(11):501-505.
11. Verma T, Aggarwal A, Tripathi AD, Rai DC, Jaspal S. Preservation approaches for milk and milk products: A review. Indian J Dairy Sci. 2022;75(5):395-401.
12. Vishwesjwaraiah L, Anantakrishnan CP. Studies on technological aspects of preparing paneer from cow's milk. Asian J Dairy Res. 1985;4(3):171-176.

How to Cite This Article
Soni RK, Soni R, Meena ML, Kumar R, Kumar J, Singh D, *et al*. Evaluating the influence of varying milk fat levels on paneer production efficiency. International Journal of Veterinary Sciences and Animal Husbandry. 2024;SP-9(4):61-63.