ISSN:0976-4933
Journal of Progressive Science
Vol. 01, No.02, pp 97-100 (2010)

Suitability of different levels of citric acid on yield and quality of paneer made from milk of cross-bred cow

S.K.Singh[*], and D.N.Verma[* *]

College of Veterinary and Animal Science, N.D.University of Agriculture & Technology
Faizabad (UP), India

Abstract

The experiment was conducted to study the suitability of different level of citric acid (1, 1.5 and 2 per cent) on the physico-chemical and sensory attributes of paneer made from milk of cross-bred cow. Result evaluated that yield, moisture and lactose content of paneer decreased significantly (P<0.01) with increasing level of citric acid while protein, fat, ash, TS and SNF of paneer decreased significantly (P<0.01) with decreasing level of citric acid and temperature. Acidity of paneer increased significantly (P<0.01) with increasing level of citric acid and temperature. The over all organoleptic scores of paneer was higher (91.00) at 2 per cent level of citric acid.

Key words- Quality of paneer, citric acid levels, and cross-bred milk

Introduction

Paneer is the best known of the few indigenous varieties of cheese and also known as surati paneer. It is probable that paneer was first introduced in India by the Persian and Afghan invaders, who came through Baluchitan and Karakoram Mountain passes of the Himalayas. This may probably be the region for the wide popularity of paneer in the north-western part of India and southern regions.The procedure for the manufacture of paneer was standardized by Bhattacharya *el al*. (1971) at pilot plant level. Randomization of processing parameter s in the manufacture of paneer was attempted by Sachdeva and Singh (1988a). The various type of coagulants (citric acid, lactic acid, acetic acid and sour whey) were used for coagulation purpose. Out of which, citric acid gave the best result (Vishweshwaraiah, 1979). Similar finding were reported by Rao *el al* (1984). Chawla *et al.* (1985) and Arya and Bhaik, (1992). The optimum level of citric acid is one of the important steps in paneer making for its composition to meet the legal requirements, optimize yield, reduced milk solid losses, and maintain uniformity for batch to batch production and to obtain good quality product in term of flavour, body and texture. Therefore, the present study was under taken to see the suitabilty of different levels of citric acid on yield and quality of paneer made from milk of cross-bred cow.

[*] Present address :-Scientist Animal Science, Krishi Vigyan Kendra, Sohaon, Ballia (UP)
[* *] Ex-Dean C.V.Sc. & A.H. , NDAU&T, Faizabad (UP), India

Materials ad methods

The experiment was carried out at the department of Animal Science, NDUA&T, Faizabad, India. The fresh milk was obtained from a cross-bred cow (Holestein Friesian X Tharparkar) for the preparation of paneer. Paneer was manufactured by the procedure standardized by Bhattacharva *et al*. (1971) and subsequently modified by Sachdeva (1983). Paneer was prepared at 80^0 C temperature with 3 different levels of citric acid C_1 (1 per cent), C_2 (1.5 per cent) and C_3 (2 per cent) along with three replications. The yield of paneer was determined by following formula

$$\text{Yield (\%)} = \frac{\text{Weight of paneer}}{\text{Weight of milk}} \text{ X } 100$$

The paneer samples were evaluated organoleptically for different attributes viz. flavour (odour and test), body, texture, colour and appearance, by a selected panel of judges comprising six members. The score card based on 100 point scale as described by Patil and Gupta (1986) was utilized for sensory evaluation. The chemical quality of paneer were analysed on the basis of various factors like moisture, fat, protein, lactose, ash and acidity contend. Moisture content in paneer was determined by the modified gravimetric methode used by Roy (1990). Fat content in paneer was determined by Gerber's method as described in 1S-1224 (part-II) 1977 for analysis of cheese. Protein content in paneer was determined by Kjeldahl methode as described by Davis and Macdonald (1953). Lactose content was determined by Fehling's solution method as described in Lab. Manual in Agriculture chemistry (1960) with some modifications. Ash content was determined by 1S: 5162 (1980) described for Chhana. Titratable acidity in paneer was estimated as per the procedure adopted by Rajorhia *et al.* (1984). The data were statistically analyses by the procedure adopted by Snedecor and Cochran (1968).

Results and Discussion

The average yield of paneer (table- 2) decreased ($P<0.01$) with increased in the concentraction of citric acid. Thus, it is obvious from observation that incorporation of citric acid above their optimum level had an adverse effect on yield of paneer. It is only due to shrinkage of coagulumum at higher level of citric acid solution (Rao *et al*. 1984). The average moisture and lactose content of paneer decrease significantly ($p<0.01$) with increasing levels of citric acid. The declining trend in moisture occurred due to shrinkage of coagulum and subsequently more expulsion of whey from the coagulem. Since lactose is water soluble and it is positively correlated with moisture content declining trend lactose was also noticed with increase in concentration of citric acid. Protein, fat, ash, TS and SNF of paneer increased significantly ($P< 0.01$) with increasing levels of citric acid. Increased concentration of protein, fat, ash, TS, and SNF occurred mainly due to more expulsion of whey from coagulum at higher level of citric acid solution (Rao *et al*. 1984). The average acidity in all the three level of citric acid was significantly different ($P< 0.01$) from each other. The titratable acidity in paneer sample increased with increase on the level of citric acid. It may be only due to the higher concentration of citric acid in whey retained in paneer (Rao *et al*. 1984).

Table 1 Yield, chemical and sensory qualities of paneer at different levels of citric acid

Quantity of Paneer	C_1 (1 %)	C_2 (2 %)	C_3 (3 %)	CD (P=0.05)
A. Yield of paneer (%)	14.95	13.90	12.93	0.191
B. **Chemical quality of paneer**				
1. Moisture (%)	57.36	55.00	52.57	0.204
2. Fat (%)	22.20	23.32	24.63	0.139
3. Protein (%)	15.88	17.10	18.22	0.128
4. Lactose (%)	2.45	2.39	2.31	0.034
5. Ash (%)	2.11	2.19	2.28	0.0211
6. Titratable Acidity (%)	0.319	0.343	0.356	0.0046
7. T S (%)	42.64	45.00	47.43	0.204
8. SNF (%)	20.44	21.68	22.81	0.151
C. **Sensory quality of paneer**				
1.Flavour (50)	42.67	44.03	45.50	0.277
2. Body & Texture (35)	31.00	31.90	33.17	0.359
3.Colour & appearance (15)	12.31	12.32	12.34	NS
4. Total organoleptic score (100)	85.98	88.25	91.00	0.497

Conclusion

So for as the levlels of citric acid are concerned, the average overall organoleptic score was highest (91.00) in case of paneer coagulated with 2 percent level of citric acid solution. The average overall organoluptic score for all the three level were significantly ($P<0.01$) different from each other. Paneer coagulated with 2 percent level of citric acid solution at 80 ^{0}C temperature gave best result due to much shrinkage in coagulum, resulted compact body, best pleasant flavour and good taste.

References

1. Arya, S.P and Bhaik, N.L. (1992) Suitability of cross–bred cow's milk for paneer making. *J. Dairying, Food and Home Sciences*, 11: 71-76
2. Bhattacharya, D.C., Mathur, O.N., Srinivasan, M.R. and Samalik , O.L. (1971) – Studies on the methode of production and shelf- life of paneer (cooking type of acide coagulated cottage chesse). *J. Food Sci. Technol*., 8:117
3. Chawalw, A.K.,Singh , S. and Kanawlia, S.k. (1985)- Development of low fat paneer. *Indian J. Dairy Sci.*, 38 (4): 280
4. Davis,J.G.and Macdonald, F.J.(1993)- Determination of protein by Kjeltahl ' s methode. Richmond's Dairy Chemistry, 5th Edn. Charles Griffin and Co. Ltd . London, 318.
5. IS: 1224 Part II (1977) Estmation of fat by Gerber methode using cheese butyrometer. Indian standereds Institutions, Manak Bhawan, New Delhi.
6. IS: 5162 (1980) Specification for Channa. Indian Standreds Institutions, Manak Bhawan, New Delhi.
7. Laboratory Manual in Agriculture Chemistry (1960). The Bureau of Agricultural -Information. Department of Agriculture 9, University Road, Lucknow

8. Patil, G.R. and Gupta, S.K. (1986) Some aspects of sensory evaluation of paneer. *Indian Dairyman*, 38 : 135
9. Rajorhia, G.S., Pal, D. And Arora , K.L. (1984) – Quality of paneer marketed in Karnal and Delhi. *Indian J. Dairy Sci*.37: 274
10. Rao, M.N. , Rao, B.V.R. and Rao , J.J.(1984) Paneer from buffalo milk . *Indian J. of Dairy Sci.* 37 :50 .
11. Roy, S.K.(1990) Development of paneer like product using non - conventional food solid .Ph. D. Thesis, National Dairy Research Institute, Karnal
12. Sachdeva, S. (1983) Production, packaging and preservation of paneer. Ph.D. Thesis, Kurukshetra University, Kurukshetra
13. Sachevada, S. and Singh, S. (1988 a) Optimization of processing parameters in the manufacture of paneer *J. Food Sci. Technol* ., 25 :142 .
14. Snedecor, G. W. and Cochran, W. G. (1968) Stastical methode. 6th edn. Iowa State University press.
15. Vishweshwaraiah, L. (1979) Studies on paneer. M.Sc. Thesis, University of Agri. Sci., Bangalore.

Received on 12.04.2010, Accepted on 08.10.2010