

# PHYSICO-CHEMICAL AND ORGANOLEPTIC QUALITY OF MARKET CURD\*

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Dahi is an indigenous fermented milk and is being widely used in India. From a biological stand point, fermented milk products are characterized by the accumulation of microbial metabolic products such as lactic acid, ethyl alcohol and a variety of other chemicals called flavour substances. Besides imparting nutrition, the fermented milk products help preserve the precious fluid milk which otherwise would deteriorate rapidly under high ambient temperatures of storage. In India, curd is largely made at home from mixed cultures set under varying time temperature combinations. Flavor and texture of curd may vary from house to house. However, lately, many dairy plants have standardized curd production using controlled culture composition under well defined conditions of time and temperature of incubation. Poor quality milk, unhygienic practices associated with the processes involved and the use of 'wild type' starter culture give rise to poor grade curd having six to twelve hours shelf life only. In Kerala, a number of organized agencies are being engaged in the production and distribution of curd. But no work has been carried out to evaluate the physico-chemical and organo-leptic quality of curd. Research in the field of quality evaluation of market curd will help to create awareness among public about the existing situation and protect the consumer's health and rights. Hence the present study was undertaken to evaluate the physico-chemical and organoleptic quality of curd distributed through the retail outlets.

## Materials and Methods

A total of 80 curd samples each consisting of 500g belonging to four brands viz., A, B, C

and D were collected from retail outlets in and around Thrissur Corporation. From each brand, 20 samples were collected. All samples of curd were tested to evaluate the organoleptic qualities such as colour and appearance, flavour, body and texture and product acidity.

The samples were subjected to sensory evaluation by a four member panel using the score card prescribed by Ranganadham and Gupta (1987) with slight modifications in awarding marks to flavour, body and texture and product acidity. The physico-chemical parameters such as titratable acidity (Scott *et al.*, 2001) and pH (Elico L1 612 pH analyser) were also assessed.

## Results and Discussion

### 1. Titratable acidity

The mean titratable acidity of the curd samples from the four brands are given in Table(1). The analysis of variance test revealed a highly significant difference ( $p < 0.01$ ) in the titratable acidity of curd samples from the four brands.

**Table 1.** Mean titratable acidity of market curd samples

Brands of curd	Mean $\pm$ SE (% lactic acid)
A	1.643 $\pm$ 0.10 <sup>a</sup>
B	1.632 $\pm$ 0.04 <sup>a</sup>
C	1.460 $\pm$ 0.09 <sup>a</sup>
D	1.123 $\pm$ 1.10 <sup>b</sup>

*N* = 20 from each brand Critical difference = 0.2581  
Superscript with different letter differs significantly

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The samples of brand A had the highest mean titratable acidity, while the samples belonging to brand D had the lowest. Of the samples, one of the samples from brand A had the highest acidity (2.16% lactic acid), while the lowest (0.76% lactic acid) was observed in a sample from brand D.

The data when subjected to critical difference test revealed significant difference ( $p < 0.05$ ) between the mean titratable acidity of the samples of A and D, B and D and C and D. The highest acidity was observed in samples of brand A ( $1.643 \pm 0.10$ ) and lowest in the samples of brand D ( $1.123 \pm 1.10$ ). Dahi from South India were of poor or watery texture, sour taste, alcoholic flavour and contained lactobacilli and yeast, while streptococci were present only in samples collected from North (Laxminarayana *et al.*, 1952). Repeated subculturing of the starter culture cause elimination of streptococci and the predominance of lactobacilli and yeast which result in increased acid production and thereby reduce the shelf life of the product (Mohanani *et al.*, 1985). The higher acidity content in market curd could be due to the use of different types of cultures, varied processing techniques and storage of dahi at high temperatures.

The acidity of the samples from brand D is in accordance with that of findings of Mohanani *et al.* (1984) and Rao *et al.* (2002) in dahi. The samples in the present study had much higher acidity than that reported in dahi (Younus *et al.*, 2002; Soomro *et al.*, 2003) and in misti dahi (Sarkar *et al.*, 1996). All the samples from brands A, B and C did not meet the standards prescribed by Indian Standards (1980) for sour dahi, but 20 per cent of the samples from brand D met the standards.

## 2. pH

The mean pH of curd samples from the four brands are given in Table (2). The analysis of variance test revealed a highly significant difference ( $p < 0.01$ ) in the pH of the samples from all the four brands. Critical difference test revealed a significant difference between the mean pH of samples from brands A and D, B and D and C and D. On the other hand, no significant difference was observed between the mean pH of samples from brands A, B and C. The samples of brand D had the highest mean pH ( $3.840 \pm 0.06$ ) and the lowest mean pH was observed in the samples of brand B

( $3.621 \pm 0.01$ ). However, the pH of curd samples of the present study was much lower than that reported by Younus *et al.* (2002) and Soomro *et al.* (2003). The low pH values may be due to presence of acid-producing organism in large numbers. However, 50, 40 and 10 per cent of the samples of brand D, C and A met the standards prescribed for fermented milks by IDF (1992). The samples having lower pH values had yeasty flavour and alcoholic aroma which reduced the shelf life of the product.

**Table 2.** Mean pH of market curd samples

Brands of curd	Mean $\pm$ SE
A	$3.679 \pm 0.02^b$
B	$3.621 \pm 0.01^b$
C	$3.702 \pm 0.06^b$
D	$3.840 \pm 0.06^a$

*N* = 20 from each brand Critical difference = 0.125  
Superscript with different letters varies significantly

## 3. Organoleptic evaluation of market curd

The four different brands of curd from retail market were also subjected to sensory evaluation. The sensory evaluation of the market curd was carried out by Kruskal – Wallis test and no significant variation was found among the brands for flavour, body and texture and colour and appearance. But the product acidity of the market curds varied at a highly significant ( $p < 0.01$ ) level.

The mean scores of organoleptic evaluation of curd samples from the four brands are given in Table (3). The samples of the brand C had the highest mean flavour score ( $28.65 \pm 0.65$ ) and the lowest score was observed in the samples of brand B ( $27.15 \pm 1.20$ ). But there was no significant difference between the flavour score of the samples of different brands. High acid taste was reported for two samples of brand A and four samples of brand B. One of the samples from brand C had yeasty and another had abnormal flavour. Bitter flavour was noticed in two samples of brand B. Gupta *et al.* (2000) also had reported yeasty flavour in misti dahi samples procured from market. Mohanani *et al.* (1984) observed that yeast can cause reduction in flavour producing organism in dahi starter cultures.



**Table 3.** Organoleptic evaluation of curd samples from the four brands

Brand	Mean $\pm$ SE Flavour	Body and texture	Colour and appearance	Product acidity
A	28.30 $\pm$ 0.65	27.30 $\pm$ 0.96	7.10 $\pm$ 0.18	9.50 $\pm$ 0.27 <sup>b</sup>
B	27.15 $\pm$ 1.20	25.20 $\pm$ 1.40	7.55 $\pm$ 0.17	9.65 $\pm$ 0.50 <sup>b</sup>
C	28.65 $\pm$ 0.65	24.25 $\pm$ 0.70	7.40 $\pm$ 0.48	11.25 $\pm$ 0.42 <sup>a</sup>
D	28.50 $\pm$ 1.18	26.20 $\pm$ 0.49	7.55 $\pm$ 0.24	10.90 $\pm$ 0.18 <sup>a</sup>

*N = 20 from each brand Figures bearing the same superscript within the column do not differ significantly*

High acid taste of curd may be due to excessive amount of inoculum used in the production or storage of dahi at high temperatures. The mean body and texture score was highest in the samples of the brand A (27.30  $\pm$  0.96) and the mean lowest score was observed in the samples of the brand C (24.25  $\pm$  0.70). Kruskal-Wallis test did not reveal significant difference between the mean score of the samples of various brands. Wheying off was noticed in four samples of brand A and two samples of brand D, which may be associated with higher acidity, higher temperature of incubation and prolonged storage of the product. Thin body was mainly noticed in samples of brand C which could be due to low total solid content or insufficient acid production in the curd. One of the samples of the brand produced gassiness, which is a serious defect noticed in dahi due to growth of contaminated yeast or with coliforms, which can reduce the shelf life of the product. Grainy texture was noticed in two of the samples of brand A. Rangappa and Acharya (1973) also reported that milk stored for too long, before seeding often gives rise to broken curd with poor taste. The mean colour and appearance score of the samples of various brands did not differ significantly. The mean score was highest for samples belonging to brands B and D and the samples of the brand A had the lowest score. All the curd samples were found to be free of surface discoloration and visible foreign matter. Kruskal-Wallis test revealed significant difference ( $p < 0.01$ ) between the mean score for product acidity in the samples of various brands. Perusal of data presented in Table (3) revealed that the samples of brand C had the highest mean product acidity score (11.25  $\pm$  0.42) and the lowest in the samples of brand A (9.5  $\pm$  0.27). Also highly significant ( $p < 0.01$ ) difference was observed between

the mean score of the samples of the brands B and C and B and D. No significant difference was noted between the mean scores of samples of brands A and B and C and D. Excessive acidity gives curd, a sour, biting taste.

The study points to the necessity of preparation of curd with standard acidity and pH. This could be achieved by maintaining pure starter cultures, use of potable water, strict adherence to recommended time-temperature combination for pasteurization and refrigerated storage of the product. The brands can conform to the standards if proper control measures are taken during every stage of production, processing, transport and distribution of curd.

### Summary

A total of 80 market curd samples retailed in Thrissur Corporation, belonging to four different brands viz., A, B, C and D were collected and evaluated for the physico-chemical and organoleptic qualities. Twenty samples were collected from each brand. A highly significant ( $p < 0.01$ ) difference was observed in the titratable acidity of curd samples from the four brands. The samples of brand A had the highest mean titratable acidity, while the samples belonging to brand D had the lowest. All the samples from brands A, B and C did not meet the standards prescribed by Indian Standards for sour dahi, but 20 per cent of the samples from brand D met the standards. Highly significant difference ( $p < 0.01$ ) was observed in the pH of the samples from all the four brands. The samples of brand D had the highest mean pH (3.840  $\pm$  0.06) and the lowest mean pH was observed in the samples of brand B (3.621  $\pm$  0.01). However, 50, 40 and 10 per cent of the samples of brand D, C and A met the standards prescribed for fermented milks by IDF. Organoleptic evaluation revealed that

product acidity of the market curds varied at a highly significant ( $p < 0.01$ ) level. The mean body and texture score was highest in the samples of the brand A ( $27.30 \pm 0.96$ ) and the mean lowest score was observed in the samples of the brand C ( $24.25 \pm 0.70$ ). The samples of brand C had the highest mean product acidity score ( $11.25 \pm 0.417$ ) and the lowest in the sample of brand A ( $9.5 \pm 0.269$ ).

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