



QUALITY EVALUATION OF DAHI (CURD) MADE IN THE LABORATORY AND COLLECTED FROM LOCAL MARKETS OF MYMENSINGH DISTRICT IN BANGLADESH

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ABSTRACT

The research was conducted to evaluate the quality of Dahi (Curd) made in the laboratory and collected from three local markets (China Moor, Vagnamari Bazar and Kalibazar) of Mymensingh District. Laboratory made dahi samples (A) and collected dahi samples from China Moor (B), Vagnamari Bazar (C) and Kalibazar (D) were analyzed at the Dairy Technology Laboratory and Dairy Microbiology Laboratory, Department of Dairy Science, Bangladesh Agricultural University to investigate the physical and chemical quality. Significant difference in smell and taste ($p < 0.01$), colour and texture ($p < 0.05$), Protein ($p < 0.01$), acidity ($p < 0.01$) and P^H ($p < 0.05$) value and microbiological status ($p < 0.05$) were found among different dahi samples. Laboratory made dahi was the best in quality. However, overall physical score, fat and total solids content of laboratory made dahi samples were not significantly differed with the local market dahi. This investigation suggested that Laboratory made dahi was superior to local market dahi.

Key words: Dahi, local market, laboratory made dahi, whole milk.

INTRODUCTION

Milk is an ideal food and contains higher nutritive value as compared to other general foods. It supplies high biological value proteins, bone-forming minerals and health-giving vitamins. Sweet Dahi (sweet curd) is one of the most popular fermented milk products, which is made in earthen pots usually from cow's milk and sometime from buffalo milk which are overgrown by microorganisms. Bacterial enzymes, particularly amylases, proteases, lipases, hydrolyze the polysaccharide, proteins and lipids to nontoxic products with flavor, aroma and texture.

It is a highly nutritious product containing all the nutrients present in milk. It has been demonstrated that acid milk is somewhat easily digestible than normal milk. For some individuals, dahi has definite therapeutic value, especially who suffer from stomach and intestinal disorders. This concept is probably due to the fact that the acid fermenting bacteria and lactose of milk are able to create conditions in the intestinal tract which are unfavorable for the growth of putrefactive bacteria and thereby prevents the formation of gas and a

condition known as auto-intoxication (Rangappa and Achaya 1974). Dahi is also effective in lowering the blood cholesterol level (Mann and Sperry 1974). In Bangladesh dahi is prepared by various sweetmeat shops in local and urban areas. The quality of Dahi varies from shop to shop and area to area depending on the composition of milk used, preparation methods, storage quality, etc. Still now dahi prepared by some ghosh of certain distinct regions of Bangladesh is famous. For example, Dahi made by Dayamoy and Anil Gosh in Mymensingh, Dahi of Mohorom Ali Dohi Ghor in Bogra District of Bangladesh, etc. The aim of the present study was to investigate and compare the quality of the local market dahi in reference to the laboratory made dahi.

MATERIALS AND METHODS

The experiment was conducted at the Dairy Technology and Microbiology Laboratory of Dairy Science Department, Bangladesh Agricultural University, Mymensingh, during the period of July to November 2009.

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Collection and preservation of sample: The sweet dahi samples were collected from three different local markets of Mymensingh District of Bangladesh: (B) sample from China Moor, (C) sample from Vagnamari Bazar and (D) sample from Kalibazar. 500 g of each sample was randomly collected in 'earthen-pot' under strict hygienic condition and brought to the Dairy Technology Laboratory with the help of ice pot, maintaining the temperature at about 4°C and stored at 4 - 5°C in the laboratory until physical and chemical tests were completed.

Preparation of dahi in the Laboratory: The whole milk was heated to boiling temperature until its volume was reduced by approximately 20% of the weight of milk. Sugar was added at the rate of 10% of weight of whole milk. Then the milk was allowed to reduce temperature up to 35°C. At that temperature 2 - 3% starter culture was added and dissolved nicely by stirring it. The milk was then poured in several cleaned plastic cups of about 100 ml sizes for incubation. The samples were incubated at 37°C until complete coagulation occurred. After that the dahi samples were stored at about 4-5°C in refrigerator for future use. This sample was designated as (A) sample.

Testing of dahi: All the samples were tested for organoleptic, chemical and microbiological parameters.

- Organoleptic tests:** A panel of four experienced judges examined the samples according to organoleptic parameters, like smell and taste (50 marks), body and consistency (30 marks), color and texture (20 marks) etc.
- Chemical tests:** All the samples were chemically analyzed for measuring the parameters, of p^H value, acidity (%), total solids content (g/kg), fat content (g/kg), protein content (g/kg) ash content (g/kg) etc.
- Microbial test:** All the samples were tested for their microbial qualities using the total viable bacterial count (Standard plate count method).

Chemical analysis: Total solids (g/kg), protein (g/kg) and ash content (g/kg) were determined as per the methods described in the AOAC (2003). The fat (g/kg) and acidity (%) were determined by using the procedure described by Aggarwala and Sharma (1961).

Microbiological examination: Total viable counts of different dahi samples were done using standard plate count (S.P.C.) method according to American Public Health Association (APHA, 1998) for the assessment of microbiological status.

Statistical analysis: Data obtained from different parameters were analyzed statistically designed in Completely Randomized Design (CRD) with one factor in MSTAT programme. The differences

among locations means were compared by Duncan's Multiple Range test (DMRT) (Gomez and Gomez, 1984). The data were expressed as the mean \pm SE. Differences were considered significant at $P < 0.05$ and $P < 0.01$.

RESULT AND DISCUSSION

Organoleptic evaluation: The scores for smell and taste, body and consistency, color and texture and overall physical score are given in the Table 1.

Smell and taste: The mean value of smell and taste scores for the samples of A, B, C and D were 48.56, 42.0, 38.33 and 41.56 respectively (Table 1). Significant difference ($p < 0.01$) was found between the laboratory made dahi sample and local market dahi samples in respect of smell and taste. According to Bhuiyan *et al.* (2010) the smell and taste score of whole milk dahi samples was 44.50. This score for laboratory made dahi sample was slightly higher than the stated value of Bhuiyan *et al.* (2010). The variation in smell and taste score of dahi usually depends on type of milk, starter culture and manufacturing process involved (Younus, 1998).

Body and consistency: The average body and consistency scores for A, B, C and D dahi samples were 28.83, 24.17, 24.28 and 26.0 respectively (Table 1). There was no significant difference among the dahi samples in respect of body and consistency score. This score of plain dahi made from cow milk was 27.13 (Nahar *et al.* 2009). Body and consistency score decreases due to storing of dahi samples after preparation. Laboratory made dahi samples should have higher score than that of local markets dahi samples as it had comparatively shorter storage period.

Color and texture: The average color and texture scores were 17.50, 15.39, 15.89 and 15.78 respectively for A, B, C, and D dahi samples (Table 1). There were significant differences ($p < 0.05$) within the color and texture score of laboratory and local market dahi samples. Nahar *et al.* (2009) found that color and texture score of whole milk dahi was 17.60. Color and texture score of the present study agrees with the findings of Amin (2001) and Sultana (2005).

Overall score: Overall score of A, B, C and D of dahi samples given by judges were 93.05, 81.59, 79.50 and 83.34 respectively (Table 1). There was no significant difference within the overall score of different dahi samples. The findings of Bhuiyan *et al.* (2010), overall score of plain dahi was 89.23. The overall score of laboratory made dahi was higher and local markets dahi samples were lower compared to the findings of Bhuiyan *et al.* (2010), which might be due to variation in body and consistency score, milk composition etc.

Chemical parameters: The chemical parameters of A, B, C and D dahi samples are presented in Table 2.

pH value: The average pH value of A, B, C and D samples were 4.55, 4.37, 4.17 and 4.10 respectively (Table 2). There were statistically significant difference ($p < 0.05$) between the laboratory made dahi samples and local market dahi samples. Kamruzzaman *et al.* (2002) reported that pH value of dahi samples varied from 4.01 to 4.16. According to Fellows (1991) good quality dahi has a pH value of about 4.5. The pH value of laboratory made dahi sample (A) agreed with the findings of Fellows (1991). The pH value of dahi samples collected from Sylhet District ranged from 4.59 – 5.74 (Dey *et al.* 2011). The results of the present study were more or less similar to the findings of Kamruzzaman *et al.* (2002), Fellows (1991) and Dey *et al.* (2011).

Acidity: The acidity percentage of A, B, C and D samples were 0.63, 0.79, 0.85 and 0.90, respectively (Table 2). There were significant difference ($p < 0.01$) among the different dahi samples in respect of acidity percentage. Sarkar *et al.* (1996) showed that sweet dahi had a titratable acidity of 0.36 to 1.17%. Huq *et al.* (2012) reported that acidity percentage of Bogra and Tangail sweet curds were 0.58 and 0.81

respectively and according to Bureau of Indian Standard, it is 0.8%.

Total solids: Mean value of total solids with statistically insignificant difference of A, B, C and D samples were 264.8, 282.9, 271.2 and 279.1 g/kg, respectively (Table 2). Variation in total solids content of dahi could be attributed due to addition of sugar (Ghosh and Rajorhia 1987).

Fat content: It was found that mean fat content of A, B, C and D samples were 48.0, 47.0, 41.0 and 50.7 g/kg respectively (Table 2). There was no significant difference within the fat content value of different dahi samples. In this experiment, fat content of C dahi was slightly higher than that of A dahi sample which might be due to variation in raw milk composition. Chowdhury *et al.* (2011) reported that fat content of different types of dahi samples varied from 40.23 to 51.02%. Ghosh and Rajorhia (1987) found that fat percent of plain sweet dahi varied from 4.3 to 8.8%. Akin *et al.* (1995) reported that cow milk Dahi contained 4.9% fat. The results of the present study agreed with the findings of Chowdhury *et al.* (2011) and Ghosh and Rajorhia (1987).

Table 1. Comparison of average score among various physical parameters of dahi samples

Physical parameters	Samples				Level of significance
	A	B	C	D	
Smell and Taste	48.56±0.51 ^a	42.0±3.00 ^b	38.33±3.51 ^b	41.56±2.5 ^b	**
Body & consistency	28.83±0.76	24.17±2.7	24.28±2.39	26.0±2.00	NS
Color & texture	17.50±2.12 ^a	15.39±1.4 ^b	15.89±1.17 ^b	15.78±0.39 ^b	*
Overall score obtained	93.05±3.80	81.59±5.9	79.50±7.07	83.34±3.89	NS

** = Significant at 1% level of probability, * = Significant at 5% level of probability, NS = Not significant, Mean values with different superscripts in the same row very significantly.

Table 2. Average score card of chemical composition of dahi collected from different sources

Chemical Parameters	Samples				Level of Significance
	A	B	C	D	
pH	4.55±0.5 ^a	4.37±0.06 ^{ab}	4.17±0.25 ^b	4.10±0.17 ^b	*
Acidity (%)	0.63±0.30 ^c	0.79±0.04 ^b	0.85±0.05 ^{ab}	0.90±0.02 ^a	**
Total solids (g/kg)	264.8±1.03	282.9±0.72	271.2±0.94	279.1±0.46	NS
Fat (g/kg)	48.0±0.62	47.0±0.46	41.0±0.17	50.7±0.15	NS
Protein (g/kg)	36.7±0.21 ^a	37.0±0.11 ^a	32.4±0.18 ^b	31.1±0.11 ^b	**
Ash (g/kg)	7.5±0.30	7.68±0.32	7.1±0.30	7.15±0.20	NS
Total viable bacterial count (cfu/ml)	5.77±0.35 ^c	6.87±0.75 ^b	7.63±0.47	7.39±0.20 ^a	*

** = Significant at 1% level of probability, * = Significant at 5% level of probability, NS = Not significant, Mean values with different superscripts in same row very significantly.

Protein content: The average protein content of A, B, C and D samples were 36.7, 37.0, 32.4 and 31.1 g/kg, respectively (Table 2). There was highly significant difference ($p < 0.01$) within the protein content value of laboratory made samples and local market samples. Protein content of A, B, C and D samples were more or less similar to the protein content of plain dahi (3.99%) reported by Rashid and Miyamoto (2005). Rangappa and Achaya (1974) found that good quality dahi contained around 3.2 to 3.4% protein. In this experiment, protein content of A and B dahi samples was slightly higher and protein value of D dahi was slightly lower than the value reported by Rangappa and Achaya (1974), which might be due to high level of protein in raw milk used and reduction of 20% volume of milk. According to Bureau of Indian Standard average protein content of cow milk dahi is 3.33%.

Ash content: Mean value of ash content of A, B, C and D samples were 7.5, 7.68, 7.1 and 7.15 g/kg respectively (Table 2). There was no significant difference among the ash content values of different types of dahi samples. The mean ash contents of Bogra and Tangail sweet curds were 0.53% and 0.70%, respectively (Huq *et al.* 2012). According to Bureau of Indian Standard, average ash content of

sweet curd is 0.72%. The results of this research were supported by Huq *et al.* (2012) and Bureau of Indian Standard. Ash content of A, B, C and D samples were slightly lower than the values reported by Nahar *et al.* (2007) and Rahman (1998). They found that mean ash content of cow milk dahi were 8.09% and 8.25%.

Microbial parameters:

Total viable bacterial counts: It was found that average total viable bacterial counts of different types of dahi samples (A, B, C and D) were 5.77, 6.87, 7.63 and 7.39 cfu/ml (log value) respectively (Table 2). Statistical analysis showed that significant differences ($p < 0.05$) were existed among the dahi samples in relation to total viable bacterial counts. These findings agreed with the findings of Deyl *et al.* (2011). The total viable bacterial count per ml. of different types of dahi prepared from cow, buffalo and goat milk were 5.878, 5.996 and 5.859 cfu/ml (Log value), respectively (Deyl *et al.* 2011). The present investigation also partially supported by the result of Adeyl (1998), who found that the total viable bacteria contained per ml of Laboratory made sweet dahi samples were within the range of 6.2 to 6.3 cfu/ml (Log value).

CONCLUSION

From the results of physical, chemical and microbiological parameters, it may be concluded that though there are some dahi shops or market famous for manufacturing dahi, but quality of laboratory made dahi is always superior to local market dahi available in Mymensingh District.

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