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Study on the quality of dahi prepared from Buffalo milk with the addition of different levels of soya milk

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Abstract

An experiment was conducted to measure the feasibility of using soya milk for the preparation of dahi. In this experiment, four different types of dahi were prepared from buffalo milk (BM) with the addition of different levels of soya milk (SM). The dahi samples were designated as 'A' (100% BM), 'B' (80% BM + 20% SM), 'C' (60% BM + 40% SM) and 'D' (40% BM + 60% SM). Quality of dahi was also monitored by using physical, chemical and microbiological tests. From the results of the physical study (smell and taste, body and consistency, color and texture), it was found that the overall score of A, B, C and D type of dahi samples statistically differ significantly. Chemical analysis showed that the acidity percentage, moisture, total solids, fat, protein, carbohydrate and ash contents (g/kg) statistically differ significantly. From the result of the microbiological tests no significant differences were observed for total viable count/ml and yeast count/ml and significant difference was observed in case of total mold count/ml. Finally, it is concluded that 20% soya milk dahi could be used successfully, which would produce dahi nearly similar to the quality of buffalo milk.

Keywords: Quality, dahi, buffalo milk, Soya milk

Introduction

Milk is very nutritious and perhaps an indispensable food for human being. Milk with its products, continued to be one of the most important sources of food for all civilized nation. It is observed that more developed and prosperous the people, the greater the amount of milk and dairy product they consume. Dahi or yoghurt is a popular fermented milk product known for its typical flavor, characteristics semi-solid consistency and high nutritive and therapeutic value with the advent of health foods, there is a considerable increase in the popularity of yoghurt in all part of the world. The preparation of dahi has been investigated by a number of research workers in different parts of the world (Desai *et al.*, 1994; Shukla *et al.*, 1987). But in Bangladesh very little work has been done on the preparation of buffalo milk dahi with the addition of different levels (20, 40 and 60%) of soya milk. The present experiment is very important in this country condition because the people of our country has no idea about this type of dahi (buffalo milk with the addition of different levels 20, 40 and 60%) of soya milk. This new type of dahi can bring significant changes in our national health. So, this experiment is very important for practical point of view.

The objectives of the study were as follows:

- i) To observe the feasibility of using soya milk for manufacturing dahi.
- ii) To compare the physical, chemical and microbiological characteristics of dahi prepared from buffalo milk and different levels of soya milk.
- iii) To recommend an appropriate technology and the level of soya milk to be used for manufacturing dahi.

Materials and Methods

Site and period of experiment: The experiment was carried out at the Dairy Technology and Microbiology Laboratory of the Department of Dairy Science, Bangladesh Agricultural University, Mymensingh, during the period of 12 March to 10 April, 2005.

Collection of soyabean seeds and buffalo milk: The soyabean seed was collected from Department of Crop Botany, Bangladesh Agricultural University, Mymensingh and the buffalo milk was collected from Bangladesh Agricultural University Dairy Farm.

Preparation of soya milk: Soya milk was made from the big-size, thin hull and not more than one year old, straw yellow or yellowish green varieties of soyabean seed free from immature field damaged and black seed. The foreign materials were removed by using grain cleaners. Heavy aspiration removed loose hulls, weed seeds and other light foreign matter. The clean and fresh 250g soyabean seeds were soaked overnight to make the husk soft. After soaking the soyabean seeds were washed with clean water and then the seeds were boiled in water with 0.5% NaHCO₃ at 60°C for 20 minutes. The main purpose of using NaHCO₃ was to remove the bitterness and anti-nutritional factors (trypsin inhibitors). The boiled soyabean seeds were cooled with water and then soyabean husk were removed by means of pressure of two hands and cleaned with continuous flow of fresh water. The clean dehulled soyabeans were ground with water 1.75 lit/250g by a blender for 30 to 40 minutes. The homogenized mash was strained by a fine musline cloth to separate milk from residues. About 200 ml of soya milk was obtained at the first time and the process was repeated again to get minimum 1500 ml soya milk.

Layout of different types of dahi are given below:

Types of dahi	Buffalo milk (ml)	Soya milk (ml)	%
A (control)	1250	0	100 + 0
B	1000	250	80 + 20
C	750	500	60 + 40
D	500	750	40 + 60

Preparation of different types of dahi: The collected buffalo milk was heated to boiling temperature until reduced upto 20% of the original volume of milk. At the time of boiling, sugar was added to the milk at the rate of 10%. During heating, milk was stirred thoroughly with the help of the spoon. After desired heating milk pan was taken out from the heater and allowed to cool down to heat 45°C. The starter culture was added to the milk at the rate of 3%. Starter culture was dissolved properly by stirring it and then milk was poured in several pre-boiled water washed plastic cups of about 100 ml size and kept undisturbed at an incubation temperature of 37°C until complete coagulation of the samples. After complete coagulation, the dahi samples were taken out from the incubator and were stored in a refrigerator at about 5°C for analytical purpose. This type of dahi is designated as A type of dahi. Same procedure were applied for B, C and D dahi samples, where soya milk was added with buffalo milk at the rate of 20, 40 and 60% respectively.

Results and Discussion

Table 1. Chemical quality of buffalo milk and soya milk sample

Type of milk	Chemical parameters							
	Acidity (%)	Moisture (g/kg)	Total solids (g/kg)	Fat (g/kg)	SNF (g/kg)	Protein (g/kg)	Carbohydrate (lactose) (g/kg)	Ash (g/kg)
Buffalo milk	0.16±	825.6±	174.4±	78.7±	95.7±	38.3±	48.9±	8.4±
	0.0029	3.87	3.87	3.51	2.29	1.09	1.29	0.25
Soya milk	0.04±	894.7±	105.3±	21±	85.4±	45±	32.7±	7.7±
	0.002	116.9	1.6	3.6	3.26	3.46	3.05	0.25

Chemical parameters (acidity%, moisture, total solids, fat, SNF, protein, carbohydrate and ash content g/kg) of buffalo milk found in the above Table-1 were suitable for further study.

Physical parameters of Dahi: The quality of prepared dahi samples were evaluated with the help of some physical (smell and taste, body and consistency, color and texture) parameters. From the result of physical evaluation, it was found that the overall score (smell and taste, body and consistency, colour and texture) for A, B, C and D type dahi were 91.33 ± 7.23 , 86.33 ± 6.02 , 83.33 ± 4.04 and 69.67 ± 3.78 respectively with a significant difference $P < 0.01$ (Table 2). The results of this study supports the findings of Munzur *et al.* (2004) who found that overall score for whole milk dahi was higher than other samples. According to panelist, the highest score was obtained in 'A' type (control) dahi followed by 'B' and 'C' type dahi and lowest score was obtained in 'D' type (60% SM) dahi.

Table 2. Summary of the results of physical evaluation of dahi samples

Parameters	Type of dahi				LSD value	Level of Significance
	A	B	C	D		
Smell and taste (50)	46 ^a ± 3.46	43.33 ^{ab} ±3.05	42.00 ^{ab} ±2.00	36.33 ^b ±1.52	7.20	**
Body and consistency (30)	27.33 ^a ±2.08	25.66 ^a ±1.52	24.33 ^a ±1.52	19 ^b ±2.00	4.94	**
Color and texture (20)	18 ^a ±1.73	17.33 ^a ±1.53	17.00 ^a ±1.00	14.33 ^b ±1.15	2.60	*
Overall score (100)	91.33 ^a ±7.23	86.33 ^a ±6.02	83.33 ^{ab} ±4.04	69.67 ^b ±3.78	14.96	**

Superscripts not similar within the mean of same row differ significantly.

Where, * = The mean difference is significant at 5% level, ** = The mean difference is significant at 1% level. A = 100% buffalo milk dahi (control), B = 80% buffalo milk + 20% soya milk dahi C = 60% buffalo milk + 40% soya milk dahi, D = 40% buffalo milk + 60% soya milk dahi

Chemical parameters: The quality of prepared dahi samples were evaluated with the help of some chemical (acidity, moisture, total solids, fat, protein, carbohydrate and ash) parameters. The average acidity percentage of dahi sample A, B, C and D were 0.74 ± 0.015 , 0.75 ± 0.010 , 0.76 ± 0.0057 and 0.78 ± 0.010 respectively (Table 3). There were significant difference among the samples ($P < 0.01$). Sarker *et al.* (1996) studied the acidity content of plain misti dahi from different districts of west Bengal and found that acidity percentage was within the range of

0.36 to 1.17. Mean value of moisture, total solids, fat, protein, carbohydrate and ash contents for A, B, C and D type dahi were 693.7 ± 4.91 , 709.33 ± 4.11 , 725.16 ± 3.95 and 740.00 ± 4.03 ; 306.30 ± 4.92 , 290.70 ± 4.12 , 274.80 ± 3.96 and 260.10 ± 3.90 ; 89.33 ± 4.12 , 76.26 ± 2.30 , 63.20 ± 0.81 and 50.17 ± 0.76 ; 43.60 ± 1.24 , 45.10 ± 1.34 , 46.20 ± 1.41 and 48.23 ± 2.25 ; 163.40 ± 2.35 , 159.80 ± 2.95 , 156.10 ± 3.35 and 152.50 ± 3.76 ; 9.80 ± 0.35 , 9.47 ± 0.20 , 9.30 ± 0.10 and 9.20 ± 0.00 g/kg respectively (Table 3). Moisture, total solids, fat and protein contents of dahi samples showed the significant difference ($P < 0.01$) within the different dahi samples and significant difference ($P < 0.05$) were found among those mean value in case of ash and carbohydrate contents of dahi samples. Similar type of result also obtained by Desai *et al.* (1994).

Table 3. Summary of the results of different parameters studied on different dahi samples

Parameters	Type of dahi				LSD value	Level of Significance
	A	B	C	D		
Acidity (%)	$0.74^{b \pm}$ 0.015	$0.75^{ab \pm}$ 0.010	$0.76^{ab \pm}$ 0.0057	$0.78^a \pm$ 0.010	0.03	**
Moisture (g/kg)	$693.7^d \pm$ 4.91	$709.33^c \pm$ 4.11	$725.16^b \pm$ 3.95	$740.0^a \pm$ 4.03	11.62	**
Total solids (g/kg)	$306.3^a \pm$ 4.92	$290.7^b \pm$ 4.12	$274.8^c \pm$ 3.96	$260.1^d \pm$ 3.90	11.62	**
Fat (g/kg)	$89.33^a \pm$ 4.12	$76.26^b \pm$ 2.30	$63.2^c \pm$ 0.81	$50.17^d \pm$ 0.76	6.65	**
Protein (g/kg)	$43.6^c \pm$ 1.24	$45.1^{bc \pm}$ 1.34	$46.2^{ab \pm}$ 1.41	$48.23^a \pm$ 2.25	3.04	*
Carbohydrate (g/kg)	$163.4^a \pm$ 2.35	$159.8^{ab \pm}$ 2.95	$156.1^{bc \pm}$ 3.35	$152.5^c \pm$ 3.76	5.92	*
Ash (g/kg)	$9.8^a \pm$ 0.35	$9.47^{ab \pm}$ 0.20	$9.3^b \pm$ 0.10	$9.2^b \pm$ 0.00	0.39	*

Superscripts not similar within the mean of same row differ significantly.

Where, * = The mean difference is significant at 5% level, ** = The mean difference is significant at 1% level. A = 100% buffalo milk dahi (control), B = 80% buffalo milk + 20% soya milk dahi C = 60% buffalo milk + 40% soya milk dahi, D = 40% buffalo milk + 60% soya milk dahi

Microbiological parameters: Microbiological tests were conducted to measure total viable count, yeast and mould count/ml in different type of dahi samples. Mean value of total viable count, yeast and mould count per ml of dahi sample for A, B, C and D type dahi were 121×10^4 (log 6.08 ± 0.104), 130.33×10^4 (log 6.11 ± 0.086), 137.67×10^4 (log 6.13 ± 0.082) and 153.33×10^4 (log 6.18 ± 0.063); 16.33 (log 1.21 ± 0.057), 21.67 (log 1.33 ± 0.091), 24.67 (log 1.39 ± 0.081) and 30.67 (log 1.48 ± 0.029); 18 (log 1.25 ± 0.073), 16.33 (log 1.21 ± 0.015), 16.67 (log 1.22 ± 0.015) and 19 (log 1.28 ± 0.133) respectively (Table 4). In case of total viable count and mold count there were no significant differences and significant difference ($P < 0.01$) were found among those mean value in case of yeast count. The present investigation partially support the results of Munzur *et al.* (2004).

Table 4. Average viable count, yeast count and mold count of different dahi samples

Microbial parameters	A sample Mean log \pm SD (per ml)	B sample Mean log \pm SD (per ml)	C sample Mean log \pm SD (per ml)	D sample Mean log \pm SD (per ml)	Level of significance
Total viable count	6.08 \pm 0.104	6.11 \pm 0.086	6.13 \pm 0.082	6.18 \pm 0.063	NS
Total yeast count	1.21 ^b \pm 0.057	1.33 ^{ab} \pm 0.091	1.39 ^a \pm 0.081	1.48 ^a \pm 0.029	**
Total mold count	1.25 \pm 0.073	1.21 \pm 0.015	1.22 \pm 0.015	1.28 \pm 0.133	NS

Means with different superscripts in the same row differ significantly.

Where, ** = The mean difference is significant at 1% level, NS = Non significant. A = 100% buffalo milk dahi (control), B = 80% buffalo milk + 20% soya milk dahi, C = 60% buffalo milk + 40% soya milk dahi, D = 40% buffalo milk + 60% soya milk dahi

Table 5. Cost for different types of dahi prepared in the laboratory

Items	Amount	Cost for control dahi (Tk.)	Cost for 20% SM dahi (Tk.)	Cost for 40% SM dahi (Tk.)	Cost for 60% SM dahi (Tk.)
Buffalo milk	1250 ml	25/-	-	-	-
	1000 ml	-	20/-	-	-
	750 ml	-	-	15/-	-
	500 ml	-	-	-	10/-
Soya milk	-	-	-	-	-
	250 ml	-	0.83/-	-	-
	500 ml	-	-	1.67/-	-
	750 ml	-	-	-	2.5/-
Sugar	125g	4/-	4/-	4/-	4/-
Starter culture	37.5g (3%)	1.875/-	1.875/-	1.875/-	1.875/-
Container (Plastic)	1 Nos.	4.5/-	4.5/-	4.5/-	4.5/-
Cost for electricity	1 kg	2/-	2/-	2/-	2/-
Cost for fuel	1 kg	2/-	2/-	2/-	2/-
Labour cost	1 kg	2/-	2/-	2/-	2/-
Depreciation cost	1 kg	2/-	2/-	2/-	2/-
Cost minimum for 1 kg dahi		43.375/-	39.205/-	35.045/-	30.875/-
Vat (1.5%)		0.5/-	0.5/-	0.5/-	0.5/-
Transportation cost		1.5/-	1.5/-	1.5/-	1.5/-
Total cost of production		45.375/-	41.205/-	37.045/-	32.875/-

The production cost for per kg laboratory made A type (control) dahi is 46 Tk., B type (20% SM) is 42 Tk., C type (40% SM) is 38 Tk. and D type (60% SM) is 33 Tk. So, cost Benefit for per kg B type (20% SM) dahi is 4 Tk., C type (40% SM) dahi is 8 Tk. and D type (60% SM) dahi is 13 Tk.

From the overall result it was observed that, although total score of dahi prepared from buffalo milk was highest but the score of 'B' and 'C' type dahi were also within acceptable range. It appears that addition of soya milk at the rate of 20% and 40% produce good quality of dahi. It may be concluded that 20% soya milk could be used successfully to replace buffalo milk. Addition of soya milk not only enrich the nutritive value of dahi, but also make the product cheaper in comparison with buffalo milk.

References

- Desai, S.R., Toro, V.A. and Joshi, S. 1994. Utilization of different fruits in the manufacture of yoghurt. *Indian Journal of Dairy Science*. 47(10): 870-874.
- Munzur, M.M., Islam, M.N., Akhter, S., Islam, M.R. 2004. Effect of different levels of vegetable oil for the manufacture of dahi from skim milk. *Asian-Australasian Journal of Animal Science*. 17(7): 1019-1025.
- Sarkar, S., Kuila, R.K. and Nisra, A.K. 1996. Organoleptical, microbiological and chemical quality of misti dahi sold in different districts of West Bengal. *Indian Journal of Dairy Science*. pp. 49.
- Shukla, F.C., Jain, S.C. and Sandhu, K.S. 1987. Technological and physico-chemical aspects of yoghurt and fruit yoghurt. *A Review Indian J. Dairy Science*. 90(1): 1.