



## COMPARATIVE STUDY ON ORGANOLEPTIC AND MICROBIOLOGICAL QUALITY OF DAHI (YOGHURT) MADE FROM COW MILK AND SOYA MILK

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### ABSTRACT

The present study aimed at preparing acceptable quality of soya milk dahi (soya milk yoghurt) using good quality starter culture and the soya milk to compare the organoleptic and microbiological quality of dahi made from cow milk and soya milk. Soya milk was used at different levels such as Soya milk: Cow milk 75:25, 50:50, 25:75. Fresh cow milk dahi and soya milk dahi were also prepared and judged by a panel of judges for organoleptic qualities. At the same time, the samples were analyzed in the laboratory for organoleptic and microbiological qualities. Statistical analysis showed that overall score was very high in sample B (Soya milk:Cow milk 25:75) and very low in sample E (100% Soya milk). The total counts of bacteria and coliform of the prepared samples did not exceed the standard. From the results of organoleptic and microbiological parameters it can be concluded that soya milk dahi was superior to cow milk dahi and also the findings reveal that sample B was the best considering most of the parameters among five samples.

**Key words:** Soya milk, cow milk, dahi (Yoghurt), organoleptic, quality study, soya milk dahi.

### INTRODUCTION

There is an acute shortage of milk and other protein rich food of animal origin in Bangladesh. Consequently, the incidence of protein malnutrition is very high among preschool children, expectant and nursing mother. Yoghurt or dahi is a good source of B vitamins, proteins, and calcium which are much easier for the body to digest than when they are present in fresh milk (Bhuiyan *et al.* 2010). People who do not drink milk because they can not digest lactose, consume yoghurt which contains less lactose (Khalifa *et al.* 2010; Sanful 2009). Low cost processed supplementary food based on oil seeds and nuts held to be developed in Bangladesh. In our country, the minimum daily requirements of milk 250 ml/day/head as against the availability is 45 ml/d/h (DLS 2006). A similar product soya milk can be used as a milk replacer to meet the deficiency. Soybeans particularly are plentiful, relatively inexpensive and rich in protein. Soy-based foods may provide additional benefits for the consumer due to their hypolipidemic, anti-cholesterolemic, anti-atherogenic properties and reduced allergenicity. Soybean provides high quality protein with minimum saturated fat. Soy protein is highly digestible (92 to 100%) and contains all essential amino acids (Hirpara 2011). Soymilk is not technically milk, but a beverage made from soybeans. It is the liquid that remains after soybeans

are soaked, finely ground, and then strained. It's also a popular cow's milk substitute for vegans and vegetarians. . Soya milk protein could be used in the manufacture of yoghurt (Hardi and Novakovic 1994). Soybean milk is at par in importance with cow milk for children. Ninety per cent of the soybean protein is absorbed in the body and 95-100% of the milk is digested (Van and Offner 2004). Soya curd is an excellent health food and better than soy milk in taste and aroma. It helps to maintain the intestinal health, prevents indigestion and retards the ageing process (Debasree *et al.* 2010). In countries like Japan, China and Indonesia milk prepared from soybean has been used as a substitute for cow's milk for feeding the infant and children. Kim and Kwon (1988) reported that consumption of soya curd and soya milk increase rapidly in Korea. The preparation of yoghurt (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 soya milk dahi. The present experiment is very important in this country condition because the people of our country has no idea about this new food product. Therefore, the present investigation was undertaken to study the effect of soya milk in the preparation of the soya milk dahi and to find out the variations of organoleptic and microbiological qualities of dahi made from cow milk and soya milk.

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## MATERIALS AND METHODS

**Site of the experiment:** The present experiment was conducted at the Dairy Science Laboratory, Animal Nutrition Laboratory and Poultry Science Laboratory of the Bangladesh Agricultural University, Mymensingh during the period from 6 February to 5 May, 2009.

### Preparation of soya milk

**Removal of husk :** 350 g of soybean was soaked in water for 2-4 hours and then dried in the sun. The husk was removed by means of pressure of two hands and cleaned with fresh water.

**Removal of bitterness:** Warm water was added to soak the soybean and 10 g (3%) of cooking soda ( $\text{Na}_2\text{HCO}_3$ ) was added to it and allowed for about 10 minutes to remove the bitterness and colouring matter present. Then the water was drained out.

**Preparation of milk:** The washed soybean was made into a fine paste in a stone grinder with the addition of small amount of water (250 ml). The paste was diluted in 500 ml of water. The mixture was then boiled for 15 minutes, allowed to cool and then strained through cloth. About 50 ml (15%) of clean lime water [ $\text{Ca}(\text{OH})_2$  solution] was added.

**Preparation of cow milk dahi and soya milk dahi:** Whole milk was collected from the Bangladesh Agricultural University Dairy Farm, Mymensingh. Milk standardized to 3.5 percent fat and 8.5 percent SNF was used for the preparation of Dahi. Sugar was added to the milk at the rate of 8 per cent. Milk was heated to 80°C for 5 minutes. The milk was stirred with rod stirrer (spoon). Then the heated milk and soya milk was taken into five conical flask in following ratio 100% cow milk, 50% cow milk + 50% soya milk, 75% cow milk + 25% soya milk, 25% cow milk + 75% soya milk and 100% soya milk. Thereafter, the mixture of heated milk and soya milk was cooled to 40°C and inoculated with desirable proportion of fresh culture (2%) collected from local market. After proper mixing of culture, the above mixture was poured into clean plastic cups. The samples were incubated at 37°C until the complete coagulation. After complete coagulation (8-12 hours) the dahi samples were stored at about 5°C at refrigerator until physical and microbiological tests were done. The prepared five samples were designated as A = (50% soya milk + 50% cow milk) dahi, B = (25% soya milk + 75% cow milk) dahi, C = (75% soya milk + 25% cow milk) dahi, D = 100 % cow milk dahi, E = 100 % soya milk dahi.

**Judging of soya milk dahi samples:** After cooling the samples were judged separately by a team (10 members) of experienced judges.

### Average score card for judging soya milk dahi:

	Maximum points	Sample No(mean±SE)				
		A	B	C	D	E
Smell and taste	50	39.92 ±2.39	44.33 ±2.6	39.83 ±2.3	44.50 ±3.2	34.83 ±2.9
Body and consistence	30	25.17 ±3.07	28.25 ±2.1	24.58 ±2.8	27.42 ±2.1	23.00 ±2.9
Colour and texture	20	16.83 ±2.12	18.17 ±2.0	16.08 ±1.6	17.58 ±1.6	15.42 ±1.7

**Microscopic examination:** Total viable count and coliform count of different dahi samples were determined according to the method as described in the “Standard Methods for Examination of Dairy Products” American Public Health Association (APHA 1998)

**Data analysis:** Data collected and calculated from prepared sample were statistically analyzed using completely Randomized design (CRD) with two factors in MSTAT programme. (Steel and torrie 1980)

## RESULTS AND DISCUSSION

The smell and taste score of dahi samples A, B, C, D and E are presented in Table 1 and Figure 1. Significant difference was found in respect of smell and taste of different dahi samples. Table 1 and Figure 1 showed that smell and taste was very appetising in sample D and very less in sample E. Kinik and Akulut (1996) evaluated that sensory properties and volatile aroma compounds in yoghurt prepared using various proportions of soya milk. Yoghurts containing 50% cow milk and 50% soya milk were highly acceptable. The body and consistency scores of different dahi samples A, B, C, D and E are presented in Table 1. Significant difference ( $P<0.01$ ) was found in respect of body and consistency of different dahi samples. Table 1 and Figure 2 showed that the body and consistency of the sample differed slightly. The body and consistency score was the highest in sample B and the lowest in sample E. The body and consistency score was improved due to addition of starch. Rossodivita (2002) reported that the mixing of soya milk and cow milk increased the firmness of its yogurt. The colour and texture scores of dahi samples A, B, C, D and E are presented in table 1. Significant difference ( $P<0.1$ ) was found in respect of colour and texture of cow milk dahi and soya milk dahi. Table 1 and Figure 3 showed that there were some differences between the colour and texture of different types of dahi samples. Park *et al.* (2012) found that the colour and texture of soy-based dahi were developed and consumer acceptance increased. The overall score is presented in Table 1. Significant difference ( $P<0.01$ ) was found in respect of overall score of cow milk dahi

**Table 1.** Comparison of average score of various organoleptic parameters of cow milk dahi and soya milk dahi

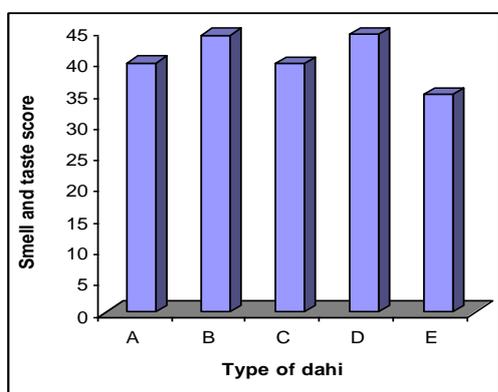
Organoleptic parameters	A (mean±SE)	B (mean±SE)	C (mean±SE)	D (mean±Se)	E (mean±SE)	Level of significance
Smell and taste	39.92±2.39	44.33±2.64	39.83±2.29	44.50±3.23	34.83±2.93	***
Body and consistency	25.17±3.07	28.25±2.05	24.58±2.81	27.42±2.11	23.00±2.86	***
Colour and Texture	16.83±2.12	18.17±1.99	16.08±1.62	17.58±1.56	15.42±1.68	**
Overall final score	82.17±5.22	90.83±5.92	80.58±5.78	89.83±4.24	73.50±4.34	***

\*\* Significant at 1% level , \*\*\* Significant at 0.1% level

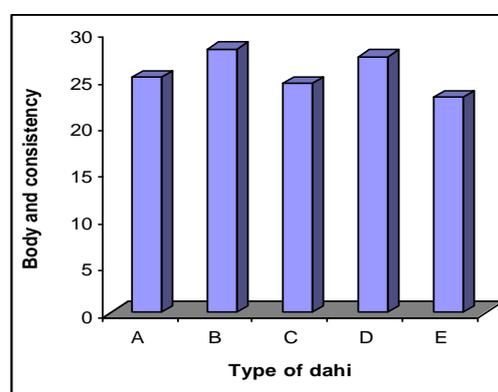
**Table 2.** Comparison of microbiological status of cow milk dahi and soya milk dahi

Microbial parameters	A (mean±SE)	B (mean±SE)	C (mean±SE)	D (mean±SE)	E (mean±SE)	Level of significance
SPC(Standard Plate Count)	43.33 ±12.34	46.00 ±17.06	39.00 ±23.52	56.33 ±11.15	35.00 ±7.21	***
Coliform	0.34 ±0.00	0.49 ±0.58	0.25 ±1.15	0.67 ±0.580	0.00 ±0.00	NS

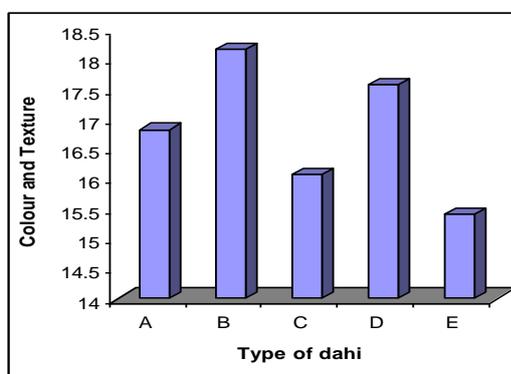
\*\*\* Significant at 0.1% level , NS: Non-significant



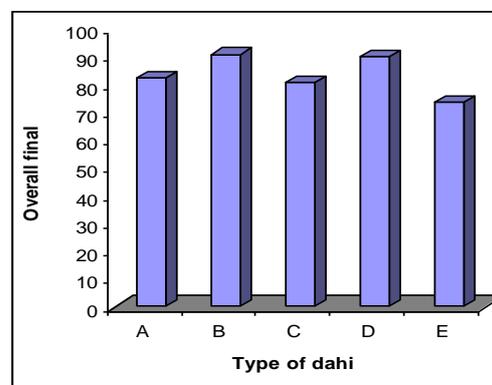
**Figure 1.** Variation among soya milk and cow milk dahi samples on the basis of smell and taste score



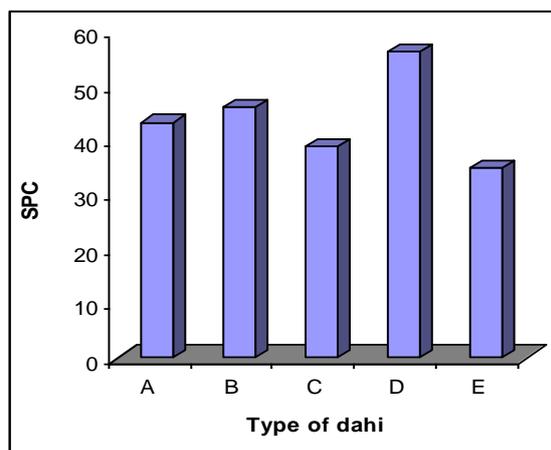
**Figure 2.** Variation among soya milk and soya milk dahi samples on the basis of body and consistency score



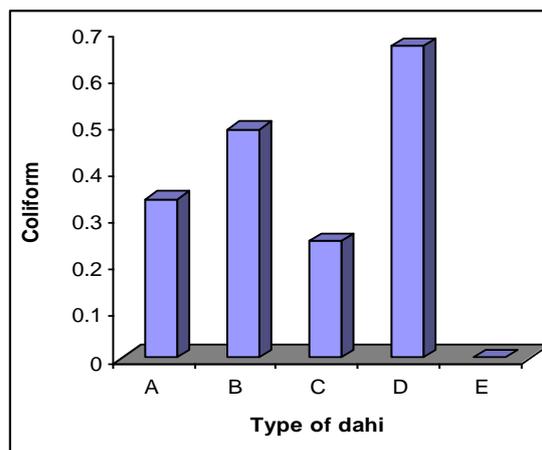
**Figure 3.** Variation among soya milk and cow milk dahi samples on the basis of colour and texture score



**Figure 4.** Variation among soya milk and cow milk dahi samples on the basis of overall final score



**Figure 5.** Comparison of microbiological parameters (SPC) of different dahi samples



**Figure 6.** Comparison of microbiological parameters (Coliform) of different dahi samples

and soya milk dahi. Table 1 and Figure 4 showed that the overall score of the samples differed within the samples. Overall score was very high in sample B and very low in sample E.

On the experiment it was observed that the total viable count of different milk dahi samples A, B, C, D and E are presented in Table 2. Statistical analysis showed that SPC of different dahi samples differed significantly. Highest number of bacteria was found in sample D and lowest was in sample E respectively. Table 2 and Figure 5 gave a clear idea about the viable bacteria in different types of dahi samples. The average coliform count per ml of dahi samples A, B, C, D and E are shown in Table 2.

There was no significant difference among the samples. Table 2 and Figure 6 shows the coliform content of the dahi samples. Patel *et al.* (1989) reported that when soybean curd was prepared using (i) *Streptococcus thermophilus* HST + *Lactobacillus bulgaricus* LBW, (ii) *Acidophilus* yoghurt starter culture (Hansen's), (iii) *Streptococcus thermophilus* CHI + *L. bulgaricus* CH<sub>2</sub>, (iv) domestic dahi starter culture and (v) *S. thermophilus* B3641 + *L. bulgaricus* B548, then it was found that (i) and (ii) showed good results for acid production and sensory quality. It is an accepted fact that the total bacterial counts and coliforms in foods plays important role in determining the hygienic and sanitary quality of the product. Total Counts of the prepared dahi samples of the present study did not exceed the standard suggested by American Public health Association (1998).

## CONCLUSION

It was concluded that soya milk dahi was superior to cow milk dahi considering physical and microbiological qualities. Total viable bacteria and coliform bacteria counts of the present study did not exceed the standard suggested by APHA(1998).

## REFERENCES

- APHA (American Public Health Association). 1998. Standard Methods for Examination of Dairy Products. 20th edition, Washington.D.C., USA.
- Bhuiyan AI, Wadud A, Nahar A and Al-Amin M. 2010. Effects of different approaches on the quality of *dahi*. Bangladesh journal of Agricultural University 8(2): 233–238.
- DLS (Department of Livestock Service). 2006. Annual report. Ministry of Fisheries and Livestock, Government of Bangladesh, Dhaka, Bangladesh.
- Debasree G, Lalitagauri R & Parimal, C. 2010. Nutraceutical Potential of Cow Milk and Soy Milk Curd (Dahi). Indian Chemical Engineer 52(4): 336- 346.
- Desai SR, Toro VA and Joshi SV. 1994. Utilization of different fruits in the manufacture of yoghurt. Indian Journal of Dairy Science 47 (10): 870-874.
- Hardi, J and Novakovic P. 1994. The feasibility of yoghurt manufacture using cow milk and soya milk blends. Znanost-i-Praksa-u-Poljoprivaredi-i-Prehranbenoj-Tehnologiji 22(3): 475-490.
- Hirpara K, Jana AH and Patel HG. 2011. Synergy of dairy with non-dairy Ingredients or product: A review. African Journal of Food Science 5(16): 817-832.
- Kim SH and Kwon TW, 1988. Vegetable protein foods in Korea. Soyabean abstract 14(6): 301
- Kinik, O and Akbulut N. 1996. A study on the flavour compounds and sensory properties

- of yoghurt prepared from soya milk. Soyabean Abstract 19( 4): 239.
- Khalifa, MEA, Elgasim AE, Zaghoul AH, and Mahfouz MB. 2010. Applications of inulin and mucilage as stabilizers in yoghurt production. Amrican Journal of Food Technology 6: 31-39.
- Park SY, Lee DK, Hyang MA, Kim JR, Kim MJ, Kyeong MC, Lee SW, Kim SO, Kyung SC, Lee KO and Nam JH.2012. producing functional soy-based yogurt incubated with bifidobacterium longum spm1205 isolated from healthy adult koreans. Biotechnology & Biotechnological Equipment 26(1): 2759-2764.
- Patel JR, Dave RI, Sannabhadti SS and Dave JM. 1989. Effect of selected lactic cultures on beany flavour in soycurd. Indian Journal of Dairy Science 42(2): 230-234.
- Radwan HM. 1996. Production and evaluation of soya milk fortified yoghurt. Soyabean Abstract. 20 (2): 122.
- Rossodivita. 2002. Evaluation of the nutritional state of adolescents from two secondary schools in Rome. IX congresso Nazionale della Societa Italiana di Medicina dell Adolescenza, Catanzaro 54(6): 659-660.
- Sanful, RE. 2009. The use of Tiger-nut (cyperus esculentus), cow milk and their composite as substrates for yoghurt production. Pakistan Journal of Nutrition 8: 755-758.
- Steel RGR and Torrie JH, 1980. Principles and procedures of statistics(2<sup>nd</sup> edn.) Mc.Graw-Hill Int. Book Co.New Delhi.
- Shukla FC, Jain SC and Sandhu KS. 1997. Technological and physico-chemical aspects of yoghurt and fruit yoghurt. A Review of Indian Journal of Dairy Science 90(1): 1.
- Van Eys JE and Offner A. 2004. “Manual of quality analyses for soybean products in the feed industry”, Global Animal Nutrition Solutions Inc., Forqueux, France, <http://www.slideshare.net/drvasuc/manual-ofquality-analysis-soya-products>.