

Effects of different level of starter culture and sugar on manufacturing characteristics of *Misti Dahi* (Sweet Yoghurt)

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Abstract

The research was undertaken to know the effects of different level of sugar and mixed culture on qualitative characteristics of dahi. Milk samples were collected and boiled to reduce the 20% of their volume and divided into four portions after boiling. Sugar was added at 8, 10, 12 and 14% of of milk and boiled again for a while. After boiling milk samples were cooled down to 37^o C and 1, 2, 3 and 4% mixed culture was added in each of the four level sugar added milk. The combination of 4 × 4 = 16 samples were prepared and were incubated at 37^o C in an incubator until coagulation. From the organoleptic evaluation it was found that dahi samples prepared by adding 10 and 12% sugar level obtained more score then that of the 8 and 14% sugar added dahi samples. Culture level and sugar level both had influence on coagulation time. Coagulation time was less when low sugar and high level of culture was used, on the other hand coagulation time was more when high level sugar and low level culture was used. Chemical analysis showed that total solids and solids-not-fat, protein, carbohydrates content of dahi samples were significantly increased due to the increased level of sugar and culture. But on other parameters effects of sugar and culture were not appreciable. It was concluded that sugar level and culture level both can changes the quality of dahi samples. A combination of 10% sugar with 2% culture and 12% sugar with 3% culture was found appropriate for dahi making.

Keywords: *Misti Dahi*, Starter Culture, Manufacture

Introduction

Dahi is the curd resulting from lactic acid fermentation of milk. Dahi is the simplest way of preserving milk for human consumption in a tropical condition. The lactic acid produced during fermentation checks putrefactive changes while giving it an acid type pleasant aromatic taste, which is particularly refreshing in a hot climate. The ancient people had discovered that fermentation had certain therapeutic values originally absent in milk. While some persons are allergic to sweet milk, they can often consume dahi. Digestibility of milk constituents is also reported to improve, due to the partial breakdown. Ingestion of curds, it is now explained, encourages synthesis of thiamine by coliform organisms in the intestines of rats, even nullifying the inhibiting effect of drugs like sulphaguanidine on the biosynthesis of the vitamin by the organisms.

With the advent of health foods, dahi is valued for controlling the growth of intestinal bacteria and incurring intestinal diseases like constipation, diarrhoea and dysentery. Dahi is also found effective in lowering blood cholesterol. Dahi is not only popular for its therapeutic value but its nutritive value is also unique. It contains all the nutrients present in milk except a little variation in lactose content. Lactose content of dahi is about 30 % (per cent) lower than milk as because some portion of lactose is fermented for the formation of lactic acid. People who has lactose intolerance syndrome can easily digest dahi. Dahi has also a special social value as being served and consumed in all festival and occasions.

Three types of dahi are available at local markets in Bangladesh. These are (i) Sweet dahi (ii) Sour dahi and (iii) Fruit or Flavoured dahi, Generally mixed culture of *Streptococcus lactis*, *Streptococcus thermophilus*, *Lactobacillus bulgaricus* and *Lactobaullus plantarum* are used for making different types of dahi. The amount of culture necessary depends mainly on season of the year due to the variations in ambient temperature. In summer 1 to 2 per cent and in winter 5 to 10 per cent by volume of culture are required for optimum coagulation (Rongappa and Achaya, 1974). Together with culture, 10 to 12% sugar is added for making sweet dahi but no sugar is required for making sour dahi. Fruit or flavoured dahi is prepared by using different fruit juice or added flavour together with culture and sugar.

In Bangladesh a good number of research works also have been done by various workers (Munzur, 1999 and Hossain, 1999). But no work has yet been done on the level of sugar to be used for manufacturing sweet dahi. Similarly data, regarding culture level is also scanty. Interaction effect of sugar and culture also showed be monitored. In order to obtain upto date information about the level of sugar and culture to be used and their effects on quality, the present research work was undertaken.

The main objectives of the research work were:

- i) To establish optimum level of sugar and culture to be used for the manufacture of misti or sweet dahi.
- ii) To observe the interaction effects of sugar and culture on the quality of dahi.

Materials and Methods

This experiment was carried out at the Laboratory of Dairy Science of Bangladesh Agricultural University, Mymensingh. The whole milk was heated to boiling temperature to reduce approximately 20% of the volume of milk and was divided into four equal portions. Sugar was added at 8, 10, 12 and 14% respectively in each part of milk. The sugar was added with milk and further divided into four. The temperature of milk was reduced to 35 to 40 °C and 1, 2, 3 and 4% starter culture was added chronologically in each of the four portions of 8, 10, 12 and 14% sugar added milk and were incubated at 37°C until complete coagulation. During incubation period the percentage of acidity was determined after every half (½) an hour until complete coagulation and time required for coagulation was recorded for each sample. After coagulation the samples were stored at 5 °C in refrigerator until used. The prepared samples were designated as:

A = 08% sugar containing Dahi + 1, 2, 3, and 4% starter culture

B = 10% sugar containing Dahi + 1, 2, 3, and 4% starter culture

C = 12% sugar containing Dahi + 1, 2, 3, and 4% starter culture

D = 14% sugar containing Dahi + 1, 2, 3, and 4% starter culture

Organoleptic and chemical tests were done immediately after preparation.

a) Organoleptic tests

A panel of experienced judges examined the samples according to the following organoleptic parameters: i) Smell and taste; ii) Body and consistency; iii) Colour and texture

Score card for panel test is attached to the appendix section.

b) Chemical tests

All the samples were chemically analysed for measuring the following parameters. 1) Fat content 2) Protein content 3) Solids-not-fat 4) Total solids (TS) content 5) Carbohydrate 6) Ash content and 7) Acidity content according to procedures suggested by Aggarwala and Sharma (1961).

Data were analysed statistically by using Statistical package program MSTAT. Duncan's Multiple Range Test (DMRT) test was done to find out the significant difference among treatment means.

Results and Discussion

The results obtained on different parameters are summarized in this section.

Organoleptic evaluation

Smell and taste: The highest smell and taste score was in 12% sugar added dahi and lowest was in the 8% sugar containing dahi which is presented in Table 1. Statistical analysis showed that there was significant difference ($P < 0.01$) within the smell and taste scores of different dahi samples. On the other hand, smell and taste score of 1, 2, 3 and 4% starter added dahi (i.e. a, b, c and d) samples were no significantly different that are mentioned in the Table 2. The interaction effects of sugar and culture level were also non significant (Table 3). The result of interaction effect indicates that highest smell and taste score was obtained in Cc combination (12% sugar and 3% culture combination) and lowest score was

obtained in Ab combination (8% sugar and 2% culture). The results of different combinations of sugar and culture level it was found that sugar level had significant effect on smell and taste score but culture level had no significant effect. Similarly interaction effect had also no significant effect on smell and taste score. From the results it is clear that judges prefer 12% sugar level and for this reason score was highest, second highest score was for 14% sugar added dahi samples. The variations in smell and taste score of dahi samples usually depends on types of milk, starter culture and manufacturing process involved (Younus, 1998) and Rangappa and Achoya (1974) mentioned that milk stored too long before seeding often develops poor flavour. In this experiment variations in flavour score was mainly influenced by sugar level.

Table 1. Average score of various organoleptic characteristics of dahi containing different level of sugar

Parameters studies	Types of dahi				LSD value	Level of significance
	A	B	C	D		
a) Smell and Taste (50)	43.59 ±4.03 ^b	45.22 ±3.71 ^{ab}	46.72 ±2.83 ^a	45.94 ±2.94 ^{ab}	2.671	**
a) Body and Consistency (30)	27.63 ±1.68 ^a	28.16 ±1.39 ^a	26.47 ±2.85 ^{ab}	24.53 ±2.31 ^b	2.639	**
b) Colour and Texture (20)	18.09 ±1.44 ^{ab}	19.09 ±0.64 ^a	17.81 ±1.69 ^b	17.91 ±1.61 ^b	1.118	**
d) Overall score (100)	88.69 ±6.68 ^a	91.13 ±6.40 ^b	90.41 ±4.42 ^b	88.38 ±4.25 ^a	4.213	*

A = 8 % sugar, B = 10 % sugar, C = 12 % sugar, D = 14 % sugar

* = 5% level of significant, ** = 1% level of significant

Body and consistency: The body and consistency score of dahi samples prepared by using different combinations of sugar and culture are show in Table 1 & 2. The highest score was obtained from B type (10% sugar added) dahi and lowest score was from D type (14% sugar added). There was significant difference within the body and consistency score of dahi prepared by using different levels of sugar. The body and consistency score of dahi prepared by adding 1, 2, 3 and 4 % culture (i.e. a, b, c and d type) were not significantly different. Interaction effects of sugar and culture level on body condition score were also non-significant (Table 3). The result of interaction effect indicates that highest smell and taste score was obtained in Ba and Bd combination (10% sugar and 1 and 4% culture combination) and lowest score was obtained in Dd combination (14% sugar and 4% culture). The variations in body condition score was mainly occurred due to the variations in sugar level. Culture level and interaction effects of culture and sugar were also less important regarding body and consistency score of different dahi samples. Shukla and Sain (1986) reported that body and consistency score of dahi samples could be improved by adding gelatin during preparation.

Table 2. Average score of various organoleptic characteristics of dahi containing different level of culture

Parameters studies	Type of dahi				Level of significance
	a	b	c	d	
a) Smell and Taste (50)	45.56 ± 2.99	45.69 ± 3.56	45.19 ±4.22	45.03 ±3.53	NS
b) Body and consistency (30)	26.38 ±2.90	27.08 ±2.08	26.69 ± 2.61	26.66 ±2.54	NS
c) Colour and texture (20)	18.19 ±1.57	18.31 ±1.45	18.38 ±1.39	18.03 ±1.58	NS
d) Overall score (100)	89.47 ±4.91	90.44 ±5.41	89.63 ±6.41	89.06 ±5.70	NS

a = 1% culture, b = 2% culture, c = 3% culture, d = 4% culture, NS = non significant

Colour and texture: The colour and texture score of different dahi samples are present in (Table 1 & 2). There were significant differences within the colour and texture score of different samples. Highest score was recorded in 10% (B type) sugar added dahi. On the other hand lowest score was seen in 12% sugar added dahi. Average colour and texture score of 1, 2, 3 and 4% culture (a, b, c and d type) dahi were non significant. Highest score was found at 3% culture added dahi and lowest score was obtained at 4% culture added dahi. The interaction effects of sugar and culture level combination were also non significant (Table 3). The interaction effect indicates that highest colour and texture was obtained in Ba combination (10% sugar and 1% culture combination) and lowest score was obtained in Dd combination (14% sugar and 4% culture). From the result of this experiment it was found that colour and texture score was mainly influenced by sugar level, not by culture or, by their interactions. The result of present study agrees with the findings of Begum (2004) who found that colour and texture score of dahi prepared from whole milk was higher than other samples.

Table 3. Average score of various organoleptic characteristics of dahi different combination level of sugar and culture (Interaction effect)

Parameters	Types of dahi																Level of significance
	Aa	Ab	Ac	Ad	Ba	Bb	Bc	Bd	Ca	Cb	Cc	Cd	Da	Db	Dc	Dd	
a) Smell and Taste (50)	43.75	43.00	43.63	44.00	45.75	46.13	44.25	44.75	46.50	46.88	47.13	46.38	46.25	46.75	45.75	45.00	NS
b) Body and consistency (30)	27.50	27.63	27.75	27.63	28.25	28.00	28.13	28.25	26.13	26.63	26.13	27.00	23.63	26.00	24.75	23.75	NS
c) Colour and texture (20)	18.00	17.75	18.38	18.25	19.25	19.00	19.13	19.00	17.75	18.38	17.63	17.50	17.75	18.13	18.38	17.38	NS
d) Overall score (100)	89.25	88.38	88.50	88.63	91.88	91.88	90.25	90.50	89.13	90.63	90.88	91.00	87.63	90.88	88.88	86.13	NS

Aa = 8% sugar + 1% culture

Ab = 8% sugar + 2% culture

Ac = 8% sugar + 3% culture

Ad = 8% sugar + 4% culture

Ba = 10% sugar + 1% culture

Bb = 10% sugar + 2% culture

Bc = 10% sugar + 3% culture

Bd = 10% sugar + 4% culture

Ca = 12% sugar + 1% culture

Cb = 12% sugar + 2% culture

Cc = 12% sugar + 3% culture

Cd = 12% sugar + 4% culture

Da = 14% sugar + 1% culture

Db = 14% sugar + 2% culture

Dc = 14% sugar + 3% culture

Dd = 14% sugar + 4% culture

NS = non significant

Overall score: The overall score of dahi given by judges on the basis of smell and taste, body and consistency and colour and texture showed significant difference for 8, 10, 12 and 14% sugar added dahi respectively (Table 1). Overall score of 1, 2, 3 and 4% culture added dahi samples showed no significant difference among the different samples (Table 2). The interaction effects of sugar and culture level on overall score was non significant (Table 3). Overall score also revealed that sugar level was more important than culture level regarding the overall score of physical parameters of dahi samples. It was observed that 8% sugar level seems to be lower and 14% was higher. The penalist better chose sugar level of 10 to 12%. As a result score of different physical parameters like, smell and taste, body and consistency, colour and texture was higher in 10- to 12% sugar added dahi samples. The results of the present findings supported by Nahar (2000) and Begum (2004) who found that total score for whole milk dahi was higher than other samples.

Chemical parameters

Fat Content: The fat content of different dahi is presented in Table 4 & 5. There was no significant difference of the fat content of different dahi prepared either adding sugar or culture. Similarly the interaction effects of sugar and culture level were also non-significant (Table 6). Sarker *et al.* (1992) found that fat content of dahi samples of different areas of West Bengal ranged from 1.1 to 11.5% with an average of 5.14%. Ali (1998) found that fat percent of dahi. Fat content of the present experiment showed that quality of all types of dahi were superior in terms of average fat content.

Table 4. Average score card of chemical composition of dahi containing of different level of sugar

Parameters studies	Types of dahi				LSD value	Level of significance
	A	B	C	D		
Fat (g/kg)	52.92 ± 1.5	53.33±1.2	52.50±2.0	52.08±1.3	-	NS
Protein (g/kg)	45.20± 0.90 ^a	44.37±0.90 ^b	43.50±0.90 ^c	42.97±0.80 ^d	0.225	**
SNF (g/kg)	189.07 ±5.6 ^d	209.43±6.4 ^c	228.00±6.5 ^b	248.59±6.7 ^a	10.36	**
TS (g/kg)	242.57±7.5 ^d	262.10±8.5 ^c	280.05±9.1 ^b	298.27±9.2 ^a	2.657	**
Total carbohydrates (lactose + sugar) g/kg	133.07±4.9 ^d	152.43±5.2 ^c	171.83±5.5 ^b	191.30±5.9 ^a	1.420	**
Ash (g/kg)	9.18±0.20	9.13±0.10	9.11±0.10	9.15±0.10	-	NS
Acidity %	0.52±0.01	0.52±0.01	0.52±0.01	0.52±0.02	-	NS
Coagulation time	2.95±0.58 ^c	3.51±0.98 ^{bc}	3.95±0.94 ^{ab}	4.38±0.77 ^a	5.680	**

A = 8 % sugar, B = 10 % sugar, C = 12 % sugar, D = 14 % sugar, NS = non significant, ** = 1% level of significant

Protein content: The average protein content of different types of dahi samples are presented in Table 4 & 5. There was significant difference of protein content of different types of dahi. Highest protein was found in 8% sugar added dahi. In the present experiment, protein was slightly higher in 8% sugar added dahi which was due to protein synthesis by added bacteria at 8% level. As the sugar level increases bacterial growth decrease as because the media become unfavorable for their growth. This was supported by coagulation time also. Dahi coagulation time was less in 8% sugar added sample than 10, 12 or 14% sugar added samples. Average protein content of 1, 2, 3 and 4% culture added samples were showed non-significant difference among different dahi samples. Interaction effects of sugar and culture level were also found non-significant (Table 6). Ramgappa and Achaya (1974) reported that good quality dahi contains around 3.2 to 3.4% of protein. The protein content of the present experiment agrees with the findings of Desai *et al.* (1994), Rahman (1998) and Ali (1998). From this experiment it is observed that sugar level has little effect on protein content but interaction effects of sugar and culture level had no effect on protein content.

Table 5. Average score card of chemical composition of dahi by adding different level of culture.

Parameters studies	Types of dahi				LSD value	Level of significance
	a	b	c	d		
Fat (g/kg)	52.29±1.8	52.63±1.5	52.87±1.6	53.04±1.6	-	NS
Protein (g/kg)	43.98±1.2	44.02±1.2	44.02±1.2	44.02±1.2	-	NS
SNF (g/kg)	218.57±23.60	219.39±24.60	218.57±23.60	218.57±23.60	-	NS
TS (g/kg)	270.78±23.3	270.73±23.2	270.73±23.2	270.73±23.2	-	NS
Total carbohydrates (lactose + sugar) (g/kg)	162.16±23.30	162.16±23.30	162.16±23.30	162.16±23.30	-	NS
Ash (g/kg)	9.10±0.10	9.12±0.20	9.21±0.20	9.14±0.10	-	NS
Acidity %	0.52±0.02	0.52±0.01	0.52±0.01	0.52±0.01	-	NS
Coagulation time	4.02±0.93 ^a	3.79±1.0 ^{ab}	3.59±0.98 ^{ab}	3.39±0.97 ^b	5.680	**

a = 1% culture, b = 2% culture, c = 3% culture, d = 4% culture, NS = non significant, ** = 5% level of significant

Solids-not-fat (SNF): The solids-not-fat content of different types of dahi are presented in Table 4 & 5. The results showed that solids-not-fat content of 14% sugar added samples were significantly higher than that of the SNF content of other samples SNF increase due to the addition of sugar and the increment was more when more sugar was added. On the other hand SNF content 1, 2, 3 and 4% culture added samples were statistically non significant which was seen among the SNF content of different dahi. Interaction effects of sugar and culture also showed non-significant difference (Table 6). Normally the SNF content of misti dahi ranges from 18.30 to 23.06 % (Gonc and Okter, 1973).

Total solids (TS) content: The total solids (TS) content of different types of dahi are presented in Table 4 & 5. The results showed that TS content of 14% sugar added samples were significantly higher than that of the other dahi. TS increase due to the addition of sugar and the increment was more when more sugar was added. On the other hand TS content of 1, 2, 3 and 4% culture added samples were statistically non-significant which was seen among the TS content of different dahi. Interaction effects of sugar and culture also showed non-significant difference (Table 6). Normally the TS content of misti dahi ranges from 21.80 to 23.81 % (Gonc and Okter, 1973).

Carbohydrates (Lactose + Sugar) content: The total carbohydrates (lactose + sugar) content of different types of dahi are presented in (Table 4 & 5). The results showed that there was significant difference within the lactose + sucrose content of different dahi. This is due to by addition of different levels (8, 10, 12 and 14%) of sugar. Normally the lactose content of dahi ranges from 46.00 to 53.00 g/kg (Rangappa and Achaya, 1974). In this experiment the level of lactose by deducting the sucrose level were falls in normal ranged. On the other hand the carbohydrate (lactose + sucrose) content of 1, 2, 3 and 4% culture added dahi were showed non-significant difference among the different level of culture added dahi.

The interaction effects of sugar and culture level were also non significant (Table 6). The highest carbohydrates (lactose + sugar) content was 14% sugar added dahi sample than others. The lactose of carbohydrates increased due to the addition of sugar and the increment was more when more sugar was added.

Ash content: The ash content of different types of dahi samples are presnted in Table 4 & 5. The results showed that there was no significant difference of ash content of different types of dahi. On the other hand ash content of 1, 2, 3 and 4% culture added dahi were not statistically significant of different dahi. Interaction effects of sugar and culture also showed non significant difference (Table 6). The findings of this study agrees with the work of Chakrabarty (1998) who reported that ash content of plain dahi made from whole cow milk was 9.8 ± 1.0 g/kg.

Acidity and Coagulation Time: The acidity and coagulation time for different types of dahi are presented in Table 4 and 5. It was found that acidity increasing with time and culture level used. Rate of increase in acidity was fast in 8% to sugar level followed by 10, 12 and 14% sugar added samples. Within each sugar level increase was rapid for 4% culture added samples followed by 3, 2 and 1% culture added samples. There was significant difference of coagulation time of different samples. Less time was required for coagulation of milk when 8% sugar was added. This was due to the fact that as sugar level increase the media becomes more concentrated with sugar and in that type of media bacterial growth decreases. Acid production was low in high sugar media and for this reason coagulation time was more. Coagulation time was significantly affected by culture level also. This indicates with increased culture level coagulation time decreased. This was due to the fact that when more culture was given, more bacteria were available for fermentation and for this reason coagulation time was reduced. Similarly with decreased culture level coagulation time increases. The interaction effects of sugar level and culture level was non significant. (Table 6). Coagulation time was less in Ad (i.e. 10% sugar and 4% culture) samples and highest Da (i.e. 14% sugar and 1% culture) samples. This result of acidity of dahi samples agrees with the findings of Desai et al. (1994) who found that acidity of fruit dahi was significantly increased due to addition of fruit juice/pulp. Mustafa et al. (1997) prepared dahi using different types of seasonal juice and observed that acidity content of dahi increased due to the addition of fruit juice.

Table 6. Average score card of chemical composition of dahi prepared by different combinations of sugar and Culture (Interaction effect)

Parameters	Types of dahi																Level of significance
	Aa	Ab	Ac	Ad	Ba	Bb	Bc	Bd	Ca	Cb	Cc	Cd	Da	Db	Dc	Dd	
Fat (g/kg)	53.00	52.67	52.67	53.33	52.67	53.67	53.33	53.67	52.00	52.67	52.67	52.67	51.50	51.50	52.83	52.50	NS
Protein (g/kg)	45.10	45.23	45.23	45.23	44.37	44.37	44.37	44.37	43.50	43.50	43.50	43.50	42.97	42.97	42.97	42.97	NS
SNF (g/kg)	189.07	189.07	189.07	189.07	209.43	209.43	209.43	209.43	228.00	228.00	228.00	228.00	247.77	247.77	247.77	247.77	NS
TS (g/kg)	242.57	242.57	242.57	242.57	262.10	262.10	262.10	262.10	280.20	280.00	280.00	280.00	298.27	298.27	298.27	298.27	NS
Lactose + sucrose (g/kg)	133.07	133.07	133.07	133.07	152.43	152.43	152.43	152.43	171.83	171.83	171.83	171.83	191.30	191.30	191.30	191.30	NS
Ash (g/kg)	9.07	9.27	9.20	9.20	9.20	9.00	9.20	9.10	9.03	9.07	9.23	9.10	9.10	9.13	9.20	9.17	NS
Acidity %	0.53	0.52	0.52	0.52	0.52	0.53	0.52	5.20	0.51	5.20	5.20	5.20	0.51	0.53	0.52	0.52	NS
Coagulation time	3.26	3.00	2.89	2.65	3.86	3.61	3.32	3.23	4.28	4.14	3.87	3.50	4.69	4.42	4.27	4.16	NS

Aa = 8% sugar + 1% culture
 Ab = 8% sugar + 2% culture
 Ac = 8% sugar + 3% culture
 Ad = 8% sugar + 4% culture

Ba = 10% sugar + 1% culture
 Bb = 10% sugar + 2% culture
 Bc = 10% sugar + 3% culture
 Bd = 10% sugar + 4% culture

Ca = 12% sugar + 1% culture
 Cb = 12% sugar + 2% culture
 Cc = 12% sugar + 3% culture
 Cd = 12% sugar + 4% culture

Da = 14% sugar + 1% culture
 Db = 14% sugar + 2% culture
 Dc = 14% sugar + 3% culture
 Dd = 14% sugar + 4% culture

NS = non significant

Conclusion

From this experiment it is clear that both sugar level and culture level significantly affected coagulation time of dahi for dahi preparation. Low level of sugar is good to reduce the coagulation time but we have to think for taste also. According to judges a sugar level of 10 to 12% was best regarding taste and other physical characteristics. Similarly culture is also important for dahi making. From this experiment it may be concluded that a combination to either 10% sugar with 2% culture or 12% sugar with 3% culture could be used for manufacture of dahi.

References

- Aggarwala, A.C. and Sharma, R.M. 1961. *A Laboratory Manual of Milk Inspection*. 4th edition, Asia Publishing House, Bombay, Calcutta, New Delhi, Indian.
- Ali, S.M. 1998. A study on the quality of milk consumed by students of different Halls and residential people of Bangladesh Agricultural University, Mymensingh. M. S. Thesis, Department of Dairy Science, Bangladesh Agricultural University, Mymensingh.
- Begum, J. 2004. Qualitative characteristics of dahi prepared from non-fat dry milk fortified with vegetable oil. M.S. Thesis, Department of Dairy Science, Bangladesh Agricultural University, Mymensingh.
- Chakrabarty, M. 1998. A study on the preparation of dahi from whole milk of cow, buffalo and their different proportionate mixtures. M. S. Thesis, Department of Dairy Science, Bangladesh Agricultural University, Mymensingh.
- Desai, S.R., Toro, V.A. and Joshi, S.V. 1994. Utilization of different fruits in the manufacture of yogurt. *Indian Journal of Dairy Science*. 47 (10): 870-874.
- Gonc, S. and Oktar, E. 1973. Tec. and chemical composition of winter yogurt made in the Hatay region. *Ege University Ziraat Fakultesi Dergisi*. 10(1): 110.
- Hossain. 1999. Effect of different levels of market culture on dahi preparation. M. S. Thesis, Department of Dairy Science, Bangladesh Agricultural University, Mymensingh.
- Mustafa, M.M.H. 1997. A study on the preparation of fruit dahi (yoghurt). M.S. Thesis, Department of Dairy Science, Bangladesh Agricultural University, Mymensingh.
- Nahar, L. 2000. Studies on the preparation of dahi (yogurt) form skim milk with the addition of vegetable oil and different levels of non-fat dry milk (NDM). M.S. Thesis, Department of Dairy Science, Bangladesh Agricultural University, Mymensingh.
- Rahman, S.M. 1998. A study on the manufacture and shelf life of Jack fruit dahi (yogurt) M. S. Thesis, Department of Dairy Science, Bangladesh Agricultural University, Mymensingh.
- Rangappa, K.S. and Achaya, K.T. 1974. *Indian Dairy Products*. 2nd edition, Asia publishing house, Bombay. pp. 119 – 124.

Sarkar, S.P.J.M. and Sannabhadti, S.S. 1992. A note on the effect of thermization of misti Dahi on the acid producers count. *Indian Journal of Dairy Science*. 45: 13 – 134.

Shukla, F.C. and Sain, S.C. 1986. *Indian Dairy Association*, (N.Z.) Seminar held at Karnal in February.

Younus. 1998. A comparative study on the quality of dahi (Yogurt) available in Mymensingh Town. M. S. Thesis, Department of Dairy Science. Bangladesh Agricultural University, Mymensingh.