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Study on the Assessment of Chemical Qualities of Milk Produced by Primary Cooperative Societies (Milk Vita)

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Abstract: Investigation was carried out to determine specific gravity and chemical quality of milk produced by different primary societies of Bangladesh Milk Producers' Cooperative Union Ltd. (Milk Vita). The chemical qualities of milk produced by primary cooperative societies were quite good i.e., fat, SNF and TS content of milk ranged between 4.327 and 4.853, 7.707 and 7.788, 12.03 and 12.62% respectively. Specific gravity and fat content of milk of these societies were within the normal range but the range of SNF content of milk was slightly lower than the normal range. Out of twenty five primary cooperative societies engaged in the supply of milk of different dairy plants of Milk Vita, Bangalpara primary cooperative society was superior (fat 4.853%, SNF 7.766%, TS 12.62% and specific gravity 1.027) than those of other societies.

Key words: Milk, specific gravity, solids-not-fat, total solids, milk fat

Introduction

Milk is the most unique and ideal food for all mammals including human. It meets the nutritional requirement of the body more perfectly than any other single food.

The composition of normal cow's milk varies to a great extent. The chemical composition of milk varies greatly as a consequence of numerous factors such as species, breed of animal (Ghosh and Ananta Krishnan, 1965), climate, lactation etc. The main constituents of milk are water, fat, proteins (casein and albumin), lactose (milk sugar) and ash. The constituents other than water is called total solids (TS) and the total solids minus the fat is solids-not-fat (SNF).

In Bangladesh there are some milk producing zones where a good quantity of milk is produced by cooperative milk producers. Bangladesh Milk Products Cooperative Union Limited (Milk Vita) collects milk from these milk producing zones through their primary cooperative societies. These primary cooperative societies supply milk regularly to different dairy plants established by Milk Vita. Most of the milk and milk products produced by Milk Vita are consumed by urban people of Bangladesh. But we have very little knowledge about the indigenous type of cows milk collected by different dairy plants of Milk Vita through their milk producing primary cooperative societies. The objective of the above mentioned dairy plants is to ensure the supply of fresh milk to the consumers. Under the above circumstances the present investigation was undertaken with the following objectives:

- * To study the specific gravity, composition (fat, solid-not-fat, total solids content) of indigenous cows milk collected by Milk Vita from different areas of Bangladesh
- * To find out the difference in the chemical quality of milk produced by different primary societies of Milk Vita.

Materials and Methods

This experiment was conducted in 5 different dairy plants of Bangladesh Milk Producers Cooperative Union Ltd. (Milk Vita) for a period of four months (July to October 1999). Milk samples were collected from 5 milk producing cooperative societies. The name of the milk producing primary cooperative societies under different dairy plant are as follows:

Name of the society	Location
Rautara primary Cooperative Society	Shahjadpur thana, Serajganj
Reshambari Primary Cooperative Society	Shahjadpur thana, Serajganj
Brianganu Primary Cooperative Society	Shahjadpur thana, Serajganj
Bangalpara Primary Cooperative Society	Shahjadpur thana, Serajganj
Bill Chandan Uttarpara Primary Cooperative	Shahjadpur thana, Serajganj

The experimental period dealing with the above mentioned five cooperative primary societies under Baghabari dairy plant was from 9th July, 1996 to 23rd July, 1999. Milk samples were taken

from each primary society for consecutive 15 days.

In this experiment milk samples were taken randomly when each primary society supplied milk to the concerned dairy plant after their collection. Milk samples were taken consecutively for 15 days and analyzed for the desired parameters. Five primary societies were selected from each dairy plant so that 75 samples could be taken from five societies of each plant. Thus a total of 375 samples were taken for the whole experiment from five dairy plants. After collection these samples were transferred to the laboratory of the concerned dairy plant and the collected milk samples analyzed within two hours after collection. Two hundred milliliters of milk samples were taken in respective sample collecting containers.

The following parameters were taken for each milk sample to determine the quality of milk:

- Specific gravity of milk
- Fat content of milk
- Solids-not-fat (SNF) content of milk
- Total solids (TS) content of milk

Results and Discussion

Specific gravity: The average values and standard deviation of specific gravity of milk collected from different primary cooperative societies varies between 1.024 to 1.027 (Table 1). Generally normal cows milk may range in specific gravity from 1.027 to 1.035 (Eckles *et al.*, 1951). Simpfinderfer (1988) collected 335 samples from individual Holstein cows and observed that specific gravity ranged between 1.023 to 1.035. Statistically it was found that there were significant difference ($P < 0.01$) within the specific gravity of milk collected from different primary societies. It was evident from the results that specific gravity of milk samples from primary societies viz. Rautara, Reshambari, Bangalpara, Bill Chandan Uttar Para under Baghabari dairy plant, Shadepur, Dayna, Elasin under Tangail chilling centre, Damla, Rarikhal and Hashara under Sreenagar chilling centre, Munshiganj were within the normal range mentioned by Eckles *et al.* (1951). Specific gravity of milk from other primary cooperative societies except the above mentioned societies were however, within the range observed by Simpfinderfer (1988).

Fat content: The average values and standard deviation of fat content of milk samples collected from different primary cooperative societies ranged between 3.632 to 4.987% (Table 1). Statistical analysis showed that the difference between fat percentage of milk samples collected from different primary cooperative societies were found significant ($P < 0.01$). Generally fat content ranged between 2.5 to 8% (Judkins and

Islam *et al.*: Milk, specific gravity, solids-not-fat, total solids, milk fat

Table 1: Results of specific gravity, fat, solids-not-fat (SNF), total solids (TS) content of milk collected from twenty five primary cooperative societies under five dairy plants

		Name of the primary cooperative societies													
Parameters studied	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Specific gravity	1.027	1.027	1.026	1.027	1.027	1.026	1.027	1.027	1.027	1.026	1.026	1.026	1.025	1.025	
Fat content (%)	4.720	4.547	4.340	4.853	4.720	4.080	4.247	4.240	3.632	4.100	4.427	4.587	4.893	4.987	
SNF content (%)	7.719	7.788	7.606	7.766	7.732	7.621	7.580	7.649	7.207	7.287	7.455	7.549	7.419	7.405	
TS content (%)	12.433	12.340	11.911	12.619	12.415	11.701	11.973	11.689	11.439	11.387	11.815	12.002	12.313	12.331	
		Name of the primary cooperative societies													
Parameters studied	15	16	17	18	19	20	21	22	23	24	25	LSD values			
Specific gravity	1.025	1.024	1.024	1.024	1.025	1.025	1.027	1.027	1.027	1.026	1.026				
Fat Content (%)	4.560	4.167	4.420	4.447	4.800	3.980	4.553	4.432	3.707	4.153	4.493	0.0093**			
SNF content (%)	7.561	7.007	7.060	7.027	7.387	7.173	7.753	7.707	7.613	7.600	7.587	0.2258**			
TS content (%)	12.148	11.170	11.547	11.173	12.120	11.153	12.307	12.033	11.313	11.750	12.080	0.3410**			
1 = Rautara	2 = Reshmbari	3 = Bringaru	4 = Bangalpara	5 = B.C. uttar para											
6 = Singjaru	7 = Shadepur	8 = Dayna	9 = Elasin	10 = B. Bathuejani											
11 = Sreerampur	12 = Baranali	13 = Dhulla	14 = Gorgoj	15 = Kakjoar											
16 = Chamta	17 = Venna bari	18 = Satpar	19 = Patikel bari	20 = Amgram											
21 = Damla	22 = Rarikhal	23 = Sashara	24 = Narisha	25 = M. Kamar gaon											

** Significant at 1% level (P<0.01)

Keener, 1960). The average values of fat content of 25 primary cooperative societies under five dairy plants of Milk Vita are within the range mentioned by Judkins and Keener (1960).

In this experiment milk was collected from five societies namely Rautara, Reshmbari, Briangaru, Bangalpara and Bill Chandan Uttar Para under Baghabari dairy plant and the fat contents were 4.725, 4.547, 4.34, 4.853 and 4.72% respectively. Rahman (1995) observed that the average fat percentage of milk samples collected from Baghabari dairy plant was 4.28 ± 0.02799 . The average fat content found in this study is slightly higher than that reported by Rahman (1995).

Solids-not-fat (SNF) content: The average SNF content of the collected milk samples of different primary cooperative societies ranged between 7.007 to 7.788% (Table 1). Statistical analysis indicated that there is significant difference (P<0.01) in the SNF content of milk samples collected from twenty five cooperative societies.

Yadav and Sarawat (1982) in an experiment observed that SNF content varied between 6.39 to 8.86% which is in agreement with the findings of this experiment.

In this experiment milk collected from five societies viz. Rautara, Reshmbari, Briangaru, Bangalpara and Bill Chandan Uttar Para under Baghabari dairy plant and the average SNF content were 7.719, 7.88, 7.606, 7.766 and 7.732% respectively. Rahman (1995) observed that the average SNF content of mixed collected from different primary cooperative society under Baghabari dairy plant was 7.69%. The findings of this study were in conformity with the findings of Rahman (1995).

Total solids (TS) content: Statistical analysis showed that the difference between the TS content of milk samples collected from different primary cooperative societies were significant (P<0.01) (Table 1).

In this experiment milk samples were taken from five societies under Baghabari dairy plant namely Rautara, Reshmbari, Briangaru, Bangalpara and Bill Chandan Uttar Para primary society and it was observed that the values of total solids content of milk were 12.433, 12.355, 11.911, 12.619 and 12.415% respectively. It was also observed that five societies viz. Sreerampur, Barinalli, Dhulla, Hargoj and Kakjoar under Manikganj chilling centre were 11.815, 12.002, 12.313, 12.331 and 12.148% respectively and five societies viz. Singjaru, Shadepur, Dayna, Elasin and Bill Bathuejani under Tangail chilling centre were 11.701, 11.973, 11.689, 11.439 and 11.387% respectively. The average total solids content of milk of five primary cooperative societies viz. Chamta, Vennabari, Satpar, Patikelbari and Amgram under Takerhat pasteurization plant were 11.173, 11.547, 11.473, 12.12 and

11.153% respectively. Average total solids percentage of milk of five primary cooperatively societies under Sreenagar chilling centre ranged between 11.313 to 12.307%. The comparatively lower total solids content of milk collected from Elasin, Bill Bathuejani, Amgram and Hashara primary cooperative society may be due to the selectively lower fat content of milk as well as SNF content. The results are in agreement with a number of workers (Yadav and Sarawat, 1982; Islam *et al.*, 1984). Ismal *et al.* (1984) found lower total solids percentage in milk from local markets (8.55-12%). Rahman (1995) observed that total solids content of milk collected from Manikganj chilling centre, Tangail chilling centre, Takerhat pasteurization plant and Baghabari dairy plant were 11.48, 10.78, 10.72 and 12.91% respectively.

From the above mentioned findings it appears that milk composition is influenced by a number of factors. In this investigation milk was collected from different primary cooperative societies without considering heredity, season, environment, feed, stage of lactation, pregnancy, age etc. which resulted in a slight variation in the composition of milk. Most of the societies supplied milk to Milk Vita dairy plant in the morning but sometimes a few societies supplied milk in the evening. Islam (1990) reported that fat content of morning milk is lower than the fat content of evening milk. Islam (1990) also reported that specific gravity is slightly lower in the evening milk than the specific gravity of the morning milk. So milking hour slightly affects specific gravity and fat content of the collected milk samples.

Milk samples have been taken from twenty-five primary cooperative societies for this experiment from July to October and due to this reason a narrow variation in the composition of milk might have occurred. Primary societies under different dairy plant supplied indigenous cows milk to the concerned dairy plant of Milk Vita. Due to lack of pure breed indigenous type of cows milk of different areas of Bangladesh varied and it showed close agreement with Directorate of Livestock Services annual report, 1955-56.

Scarcity of green fodder, high temperature and under feeding reduced the SNF content of milk. The investigation conducted covered partly the period in the rainy season (July-August). During the month of July-August most of the areas of Manikganj, Takerhat and Sreenagar region were flooded and due to this scarcity of green fodder and prevailing high temperature adversely affected the average values of SNF percentage of milk of these regions.

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