

# Chapter 1

## Introduction

Milk is considered as the nature's single almost complete food [1]. It plays a pivotal role by providing balanced nutritional supplement. Besides, milk contains all essential body building proteins, bone forming minerals, health providing vitamins, energy providing lactose and milk fat [2], thus an ideal nutritious food for human consumption. Bangladesh is one of the most densely populated countries in the world. Chittagong is the second largest city and the commercial capital of Bangladesh. Human population of Chittagong city (CC) is 5,253,000 and total estimated demand (250 ml/day/person) of fluid milk is 1313250 liter /day [3]. The amount required is much higher than the milk being produced. With the boom in the population the requirement is ever on the rise leading the marketing channel prone to adulteration to fulfil the increased requirement of milk. Adulteration leads to deterioration of milk and lacks nutritional fulfilment [5]. To ensure the safe, nutritionally balanced milk more emphasis should be given on the regulation and frequent chemical analytical study is necessary. Recently, consumers' awareness developed regarding the content of milk i.e., TS%, FAT%, protein content and microbial quality [6]. Presence of these components in standard ratio is another important concern. Consumers always go for the best quality milk. A good quality milk means, the milk which is free from harmful toxic substances, sediment, pathogenic bacteria and extraneous substances and have good color, flavor, with standard nutritional composition [7]. According to Bangladesh Standards Testing Institution, the standards of quality milk are specific gravity within 1.028-1.034, Fat 3.5%, Solids Non-Fat (SNF) 8.0 % [3] but like many other developing countries, in Bangladesh milk is produced in a very unorganized way and these standards are barely maintained, making milk prone to adulteration. In 2013 a study in Barishal, Bangladesh shows 100% of the milk brands were adulterated with water irrespective of collection points and months [8]. Besides, water adulteration in Chittagong [4] and formalin adulteration in Mymensingh [9] were also found. To minimize the adulteration and ensure nutritionally balanced milk to the consumers, more analytical study is necessary. The information is very limited on the nutritional content/quality of different brand milk in Chittagong area.

However, very limited number of research works have been carried out in Bangladesh regarding

milk quality. Therefore, the present study will undertake with the aim to make a comparative study regarding chemical, microbiological and preservative quality of the milk produced in different dairy farms, milk of different vendors and brand market milk available at different points in Chittagong area.

## Chapter 2

### Materials and methods

#### Place of Study and Collection of samples

Analyses of the samples were performed in Dairy Science Lab, under the Department of Dairy and Poultry Science, Faculty of Veterinary Medicine, Chattogram Veterinary and Animal Sciences University, Khulshi, Chittagong, Bangladesh. Five different brand milk under five different company, from Chittagong City were selected for milk brand collection (Table 1) between January and March, 2022.

#### Chemical parameters

- Fat content
- Solids-not-Fat (SNF) content
- Total Solids (TS) content
- Water Percentage and
- Lactose and Protein content

Specific gravity test of milk samples will be performed by using Quevenne lactometer, lactometer, according to the method as described by Aggarwala and Sharma (13), the percentage of fat by Gerber method; Solids-not-Fat (SNF) and total solids (TS) according to Eckles *et al.* (14).

**Table 1: Selected Brands**

Brand list	Brand Name
Brand 1	Pran
Brand 2	Aarong
Brand 3	Milk Vita
Brand4	Canvas
Brand5	Nahar

Raw milk was collected from different super shops, departmental stores, and named as milk brand 1, 2, 3, 4, 5. After bringing to the laboratory, the milk containing packs were thoroughly oscillated to mix the inner content properly and opened by using a sterile scissors. Then, quality analysis was performed.

**Quality Tests:** Specific gravity, Fat %, Solids-not-fat (SNF)%, Total solid(TS) %, were determined by [10].



**Fig 1: Lab work for qualitative tests.**

**Statistical Analysis:** The Mean Standard Deviation of the data were calculated to explain data scientifically.

## Chapter 3

### Result and Discussion

The average specific gravity of all the brand milk was within the limit (1.028-1.032) of Bangladesh Standard [3]. This result agrees with the findings of [11]. Among the five-brand milk the average specific gravity was lowest in case of Brand 1 (Pran) 1.0304, And highest in case of Brand 4 (Canvas) and Brand (Nahar) 1.0328 as shown in Table 2. The average specific gravity of Brand 1 (Pran) was slightly lower than other brands but within the standard value of raw milk (1.026-1.034

**Table 2: Specific gravity of milk samples.**

Serial No.	Mean $\pm$ SD
Brand 1 (Pran)	1.0304 $\pm$ 0.004
Brand 2 (Aarong)	1.0322 $\pm$ 0.003
Brand 3 (MilkVita)	1.0308 $\pm$ 0.001
Brand 4 (Canvas)	1.0328 $\pm$ 0.003
Brand 5 (Nahar)	1.0328 $\pm$ 0.003

Among the five brands milk, no brand showed the average Fat % within the standard mark of 3.5% as given by [3]. The lowest Fat% was found in case of Brand 2 (Aarong) 1.46%, And the highest was found in case of Brand 4 (Canvas) and brand 5 (Nahar) 3.4 %. As shown in Table 3, the average Fat% of all the five brands were below the limit (3.5 %) of Bangladesh Standard [1], Although each of the brands have written packet level of 3.5 % standard Fat.

The average Fat % of Brand 4 (Canvas) and Brand 5 (Nahar) was slightly close to the standard value of raw milk (3.5 %). But the average Fat% of other brand milk brands were too low than that of standard level. Fat% is higher than the findings of [13] for raw milk.

**Table 3: Fat % of milk samples.**

Serial No.	Mean $\pm$ SD
Brand 1 (Pran)	1.52 $\pm$ 0.258
Brand 2 (Aarong)	1.46 $\pm$ 0.321
Brand 3 (MilkVita)	2.96 $\pm$ 0.167
Brand 4 (Canvas)	3.4 $\pm$ 0.311
Brand 5 (Nahar)	3.4 $\pm$ 0.321

Table 4 shows the SNF % of Brand 1 (Pran), Brand 2 (Aarong), Brand 3 (Milkvita), Brand 4 (Canvas) and Brand 5 (Nahar) were 8.27, 8.954, 8.915, 9.273, 9.273 respectively. The SNF % of Brand 1 (Pran) was lowest (8.271) and SNF % of Brand 4 (Canvas) & Brand 5 (Nahar) were the highest (9.273) and among the five brands. Only, the SNF % of Pran is below the limit (8.5 %) of Bangladesh Standard [1].

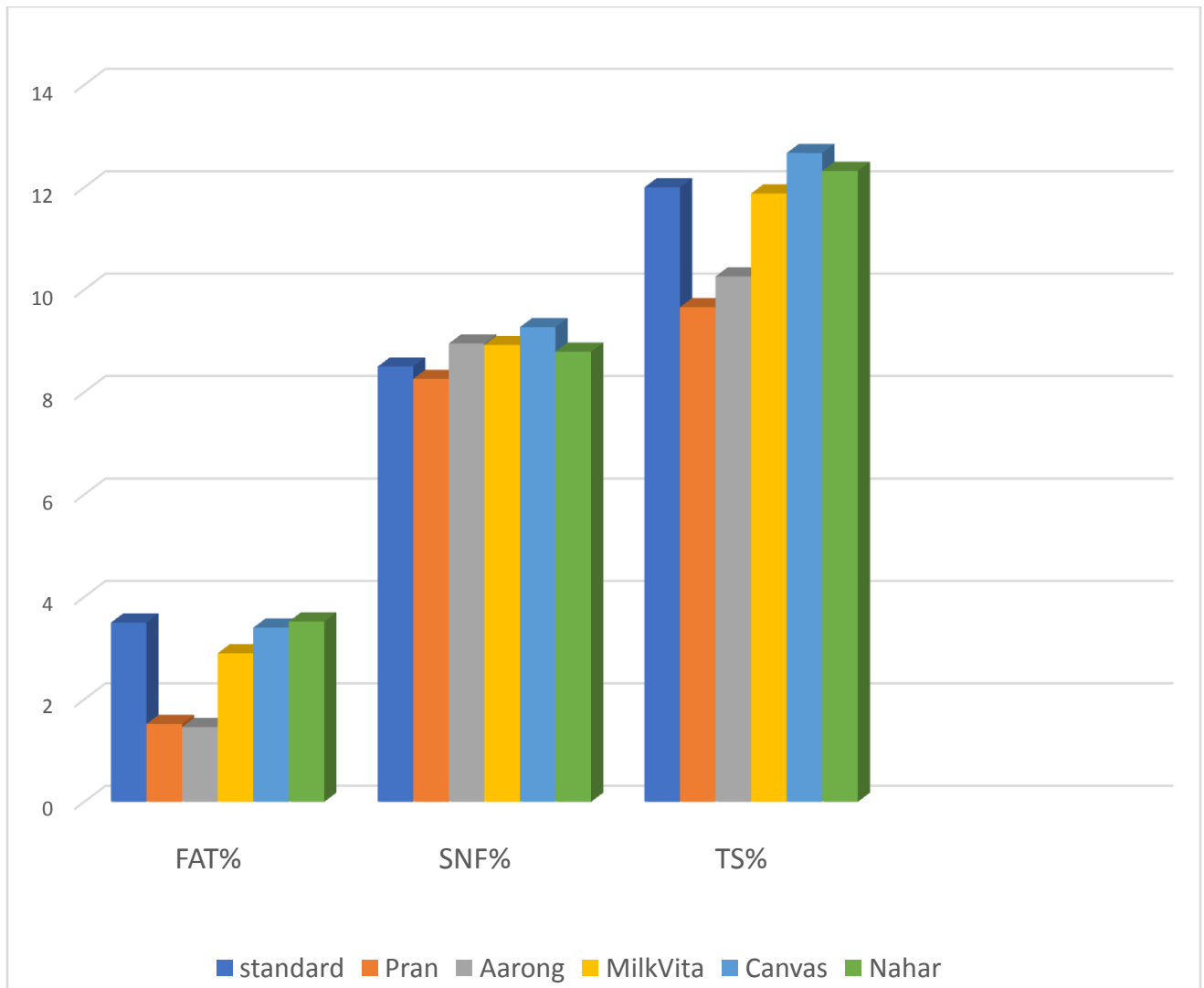
**Table 4: SNF % of milk samples.**

Serial No.	Mean $\pm$ SD
Brand 1 (Pran)	8.271 $\pm$ 0.399
Brand 2 (Aarong)	8.954 $\pm$ 0.947
Brand 3 (MilkVita)	8.915 $\pm$ 0.316
Brand 4 (Canvas)	9.273 $\pm$ 0.515
Brand 5 (Nahar)	9.273 $\pm$ 0.515

The average TS% of the Fivebrandreveals that most brands do not abide by the standard given by Bangladesh Standard [1]. The table 05 shows the average TS% of Brand1 (Pran),Brand 2 (Aarong), Brand 3 (Milkvita), Brand 4(Canvas), Brand5(Nahar) are 9.66%, 10.255%, 11.875%, 12.673%, 12.673% respectively. This indicates three major brands including brand1(PRAN) and Brand 2 (Aarong), Brand 3 (MilkVita)have TS % below the standard 12% that is written on the packet. The other twoBrand 4 (Canvas) and Brand 5(Nahar)are within the standard level of Bangladesh Standard [1].

**Table 4: Total solid (TS) % of milk samples.**

Serial No.	Mean $\pm$ SD
Brand 1 (Pran)	9.6612 $\pm$ 0.681
Brand 2(Aarong)	10.255 $\pm$ 1.076
Brand 3 (Milkvita)	11.875 $\pm$ 0.228
Brand 4 (Canvas)	12.673 $\pm$ 0.725
Brand 5 (Nahar)	12.673 $\pm$ 0.725



**Figure 2: Comparison of chemical content among different brand milk with standard.**

Figure 2 shows pictorial comparison of the brand milk nutrient level with the standard level, that is given on the brand milk packet. First diagram shows the Fat % of that of Brand 4 (Canvas) and Brand 5 (Nahar) is close to the standard level, while the other brands are too below the standard level. In case of Solids not fat (SNF %) only one brand is below the standard while the other brands fulfil these criteria. Last diagram shows the Total solid (TS%) of two brands maintains the standard level, while the other are just showing the standard level on the milk packet. The analysis reveals the quality of brand 4 (Canvas) & brand 5 (Nahar) is the best among the mostly consumed brand milk in Chittagong city, while the other brands lack in nutrient fulfilment.



## **Chapter 4**

### **Conclusion**

Being an ideal food milk is consumed in large amount, where the brand milk gets the preference. The quality of these milk depends largely on the nutrient in proper standard manner. This study was conducted to analyze the nutrient (Fat%,SNF%, TS%) of these brand milk and investigate if matches with the written nutrient level given on the milk packet. The study findings shows that majority of the brand milk lacks the standard nutrient level and fails to provide the amount written on the packet. However, further study could be done to find out the other elements like microbial content, foreign content, trace elements. This study would be helpful for the regulatory authority to further investigate on the major consumed brand.

### **Limitations**

Our sample size was limited.

### **Recommendations**

- 1) The regulatory authorities like BSTI should increase regulatory activities.
- 2) The Govt. should help to investigate on the major consumed brand.
- 3) Strict laws and regulation should be implemented.
- 4) More funded study would make the investigation easier.

However, further study needs to be conducted on antibiotic, shelf stability, etc.

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## **Biography**

The author Md. Emon Hossain, son of Mojibor Rahman and ShaheenRahman, passed his Secondary School Certificate (SSC) examination from West End High School, Lalbag, Dhaka, in 2014 and Higher School Certificate (HSC) examination from Dhaka College, Dhaka in 2016. Thereafter, he enrolled for Doctor of Veterinary Medicine (DVM) degree in Chattogram Veterinary and Animal Sciences University (CVASU), Bangladesh and now is an intern student in this university.