

## **Evaluation of buffalo dahi sold at open market in Chattogram**



**A production report submitted in partial satisfaction of the requirement for the  
Degree of Doctor of Veterinary Medicine (DVM)**

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## **Statement of Author**

I, Md. Abu Younus Shajid, hereby declare that I have successfully completed all of the tasks listed in this report. The information was acquired from books, national and international periodicals, and other sources. All references used in this work have been given due credit. As a result, I am exclusively responsible for gathering, processing, maintaining, and disseminating all the data assembled in this report.

.....

The Author

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## **Abstract**

The goal of the current Study was to determine the organoleptic status and chemical composition of buffalo dahi sold in the Chattogram Metropolitan region. Buffalo dahi samples of 2 different shops named Zaman restaurant and Gopal sweets corner were collected. This experiment was held from 15<sup>th</sup> May to 26<sup>th</sup> August, 2023. In this study the fat, moisture and titratable acidity percentage were examined by standard method. Organoleptic test like smell and taste, body and consistency, color and texture were also determined in specific standard method. According to this study, average fat level in buffalo dahi was 8.5 to 8.9%. In our analysis, the moisture content of buffalo dahi was 76.45 to 79%. The average acidity percentage was in the range from 0.84 to 0.89%. The best score for the organoleptic test and chemical composition (fat, moisture and acidity) percentage were found in Gopal sweet corner's dahi and lowest observed in Zaman restaurant's dahi. The quality of buffalo dahi found in Chattogram was fair. The buffalo dahi which were available on the market of Chattogram can be regarded as suitable for human consumption.

**Key Words-** Bufalo dahi, Fat, Moisture, Titrable Acidity, Smell, Consistency, Texture



## Chapter 1: Introduction

Buffalo dahi is a classic yogurt or fermented milk food from the Indian subcontinent, is often made with buffalo milk. It is naturally probiotic (homemade yogurt) while the term yogurt refers to the pasteurized commercial known as heat treated fermented milk. The higher fat content of buffalo milk results in a thicker yogurt mass, which is why it is generally thought to be superior for manufacturing yogurt than cow milk.

Bacterial fermentation of buffalo milk produces buffalo curd. Several microorganisms are used in this procedure to transform the lactose in buffalo milk into lactic acid. The flavor and color are also developed during fermentation. Compared to cow's milk, buffalo milk has more protein, fat, lactose, minerals, and vitamins. In 100 gm buffalo dahi, there are calories 98 kcal, fat 4.3 gm, carbohydrate 3.4 gm, protein 11gm. Both conventional and modern methods can be used to make buffalo curd. Traditionally, buffalo milk is filtered, boiled to remove the scum, and then chilled at room temperature. It is then thoroughly combined and spooned into clay pots after adding a few spoonsful of curd from an earlier batch. A sheet of paper is placed over the pot to create a seal, and the pot is left to stand for 12 hours. Besides, when an acidic substance, such as vinegar or lemon juice, is added to milk, the milk protein tangles up into curd, which are solid masses. The whey, or water that has been separated, is squeezed out to leave only the curd behind. Curdling is the term for the action of milk coagulating to generate curd. In culture system, the milk is heated to 90°C and agitated for nearly an hour, which lowers the water content by around 20%.



**Figure 1:** Buffalo dahi in Chattogram

When the milk has cooled to 45°C and has been put into clay pots, the culture is added. Buffalo dahi is often preserved through refrigeration. The curd should be kept in the refrigerator at 4°C (39°F) or less by placing it in an airtight container. This will inhibit the development of bacteria

and extend the time during which the curd will remain fresh. The buffalo curd's shelf life can be increased by sparingly seasoning it with salt. Salt prevents the formation of harmful microbes and can extend the shelf life of the curd. The traditional method of fermenting is used in various cultures to preserve buffalo curd. When doing this, the curd is first partially set before the liquid whey is drained out to thicken it. In clay pots or other suitable storage vessels, the thicker curd is kept. The curd continues to slowly ferment, aiding in its preservation and giving it a unique taste. Extra moisture could facilitate the growth of undesirable germs and ruin the curd. Before storing the curd, make sure to remove extra whey, and keep the storage container dry. The helpful bacteria necessary for fermentation are present in the previously created starting culture. Using a starter ensures that the fresh batch of curd is filled with these beneficial bacteria, which can help keep the curd from going sour.

Buffalo curd is a nutritious source of probiotics, which are beneficial bacteria that support a balanced gut flora. Probiotics can maintain a healthy immune system, enhance nutritional absorption, and aid in better digestion. A healthy gut environment can be preserved with the help of the probiotics in buffalo dahi. Buffalo dahi can aid in reducing symptoms including bloating, gas, and irregular bowel movements. Buffalo dahi is rich in calcium, protein, vitamin and minerals. People who are lactose intolerant may find that dahi is useful to digest since dahi's active cultures aid in the breakdown of lactose, a milk sugar. It is very important for mental and skin health. For cardiovascular health, it is also important.

A growing public health concern is the quality and safety of dahi. Due to the globalization of the food supply and the growing complexity of the food chain, "food quality" and "food safety" are currently two crucial topics in the food industry and are closely related. It is the responsibility of the consumer to buy things that are risk-free for their health. On the other hand, "food safety" aims to prevent consumer health risks such as microbiological risks, pesticide residues, improper use of food additives, and pollutants like chemicals, biological toxins, and adulteration. Alternatively, "food quality" refers to all characteristics that affect a product's perceived value by the consumer. This includes both positive and negative characteristics, such as the origin, color, flavor, texture, and method of food processing, as well as negative characteristics like spoilage, contamination with dirt, discoloration, and off-odors.

Dahi has a variety of benefits for those who frequently take it (Fig.2)

Yogurt should be a regular part of our diets because of all the health benefits it offers, including controlling bowel movements, fostering a healthy gut, and combating infections. A small change in lactose level is the only nutrient that differs from that found in milk. Dahi is easily digestible by those who suffer from lactose intolerance syndrome. As it is offered and consumed at all celebrations and special events, dahi also has a unique social value.

To best of my knowledge few research have been carried out in this regards. So, the present study was undertaken following objectives.



Figure 2: Benefits of dahi

### Objectives-

- To know the organoleptic score of buffalo dahi,
- To know the chemical quality (moisture, acidity, and fat) percentage of buffalo dahi.

## Chapter 2: Materials and methods

### 2.1: Experimental site:

The current study was performed at Chattogram Veterinary and Animal Sciences University, Khulshi, Chattogram, in the dairy science laboratory of the department of dairy and poultry science.

### 2.2: Samples collection:

From Chittagong City, two distinct samples of buffalo dahi from two distinct markets were chosen for the buffalo dahi (Figure 5 and Figure 6). Each sample was collected separately in a sterile container and put in a plastic bag for transportation to the lab under the guidelines suggested for and cool chain is also maintained.



**Figure 3:** Chattogram Veterinary and Animal Sciences University



**Figure 4:** Chattogram district map



**Figure 5:** Dahi from Hotel Zaman



**Figure 6:** Dahi from Gopal sweet restaurant



**Figure 7:** Sample from Zaman restaurant



**Figure 8:** Sample from Gopal sweets Corner

### **2.3: Organoleptic test procedure:**

All dahi samples were evaluated based on their flavor and body, consistency, color, and texture. A group of experienced judges determined the samples' overall organoleptic score.

### **2.4: Chemical test procedure:**

#### **2.4.1: Test procedure of determination of fat:**

The Gerber Method was used to calculate the dahi's fat percentage in this study (Kleyn et al., 2001).

#### **The equipment and reagents are needed:**

1. H<sub>2</sub>SO<sub>4</sub>
2. Iso-amyl alcohol
3. Sample of dahi
4. Butyrometer with its cap
5. Test tube rack
6. Centrifuge machine of 1100 rpm
7. Water bath
8. Pipette (3)
9. Permanent marker

#### **Procedure:**

Buffalo dahi was measured out at 9g in a beaker. The butyrometer was filled with 11 ml of H<sub>2</sub>SO<sub>4</sub>. 11 ml H<sub>2</sub>SO<sub>4</sub> is thoroughly combined with 9g of dahi. Additionally, 1 ml of amyl alcohol was added to it. The lock stopper was used to shut the aperture, and it shook vigorously until the last white particle vanished. At 1100 rpm for five minutes, the centrifuge was operated. The fat column reading was recorded while holding the butyrometer vertically.





**Figure 9:** Weighing of dahi



**Figure 10:** Mixture of Iso amyl alcohol



**Figure 11:** Adding of  $H_2SO_4$



**Figure 12:** Observation of fat percentage

#### 2.4.2: Procedure of determination of moisture percentage:

##### Materials:

1. Moisture analyzer machine (PMB 202 moisture analyzer)
2. Sample of dahi
3. Beaker

##### Procedure:

- The moisture analyzer initially connected to the power source and turned on. A sample of dahi was collected and placed in a beaker. Next, a tray of the analyzer was filled with a 5 gm dahi sample. The tray was then placed on the scale, and the weight was recorded. Until the machine received the end signal, the sample was heated for 15 min 26 sec.



**Figure 13:** Weighing of dahi by PMB 202 Analyzer



**Figure 14:** Moisture percentage measured by PMB 202 Analyzer



### 2.4.3. Test procedure of determination of acidity percentage:

Acidity percentage was measured by titration method (Fahmid et al., 2016). Materials required-

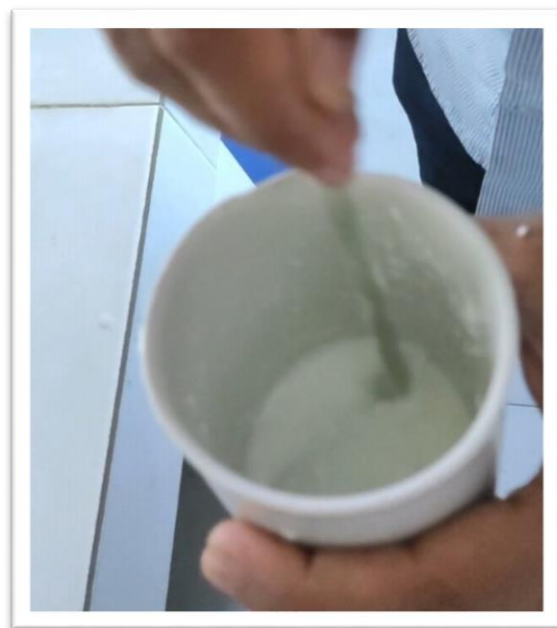
- Sample of dahi
- 10 ml pipette
- Digital balance
- Burette
- White porcelain beaker
- Reagents-5. a. NaOH solution - 0.1 (N)  
5.b-Alcohol phenolphthalein solution 1%

#### Procedure:

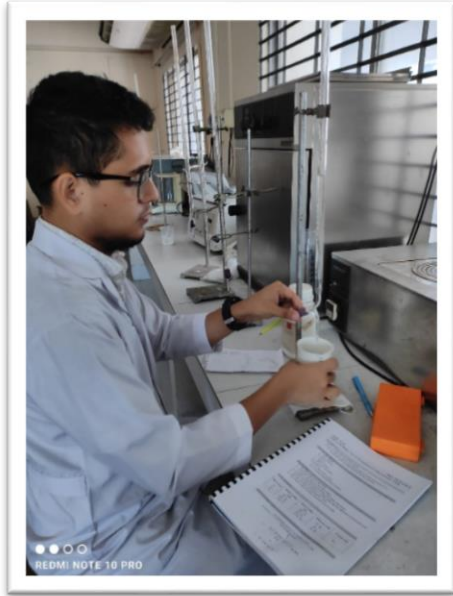
- The dahi sample was well blended with 3 ml of water. The sample was then placed in a porcelain beaker. The material was mixed with 2–3 drops of phenolphthalein indicator. Titration was completed by adding 0.1N NaOH solution until a faint pink color was visible.



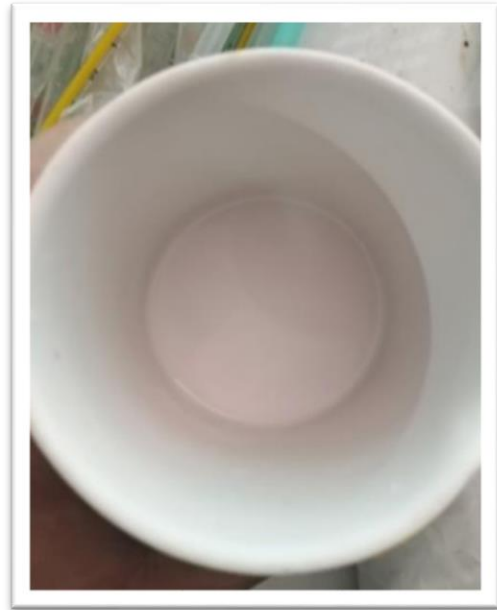
**Figure 15:** Weighing of dahi sample



**Figure 16:** Mixture of phenolphthalein with the sample



**Figure 17:** Performing titration for determining acidity



**Figure 18:** Faint pink color of milk at the end of titration

## **2.5: Statistical analysis:**

Using Microsoft Excel 2010, data on the chemical make-up of dahi were compiled. STATA 14.2 was used to examine the Mean and SD7 Statistical Analysis.

## Chapter 3: Result and Discussion

### 3.1: Organoleptic test result:

According to the suggested protocol, dahi's organoleptic examinations were conducted on its body, consistency, color, texture, and total score (**Table 1**).

#### 3.1.1: Smell and taste:

The highest score ( $45.33 \pm 0.58$ ) was found in Gopal dahi, whereas the lowest value ( $37.66 \pm 1.53$ ) was found in Zaman dahi sample (**Table 1**). This result is totally supported with (Kober et al., 2007).

**Table 1. Organoleptic test of buffalo dahi in Chattogram Metropolitan area.**

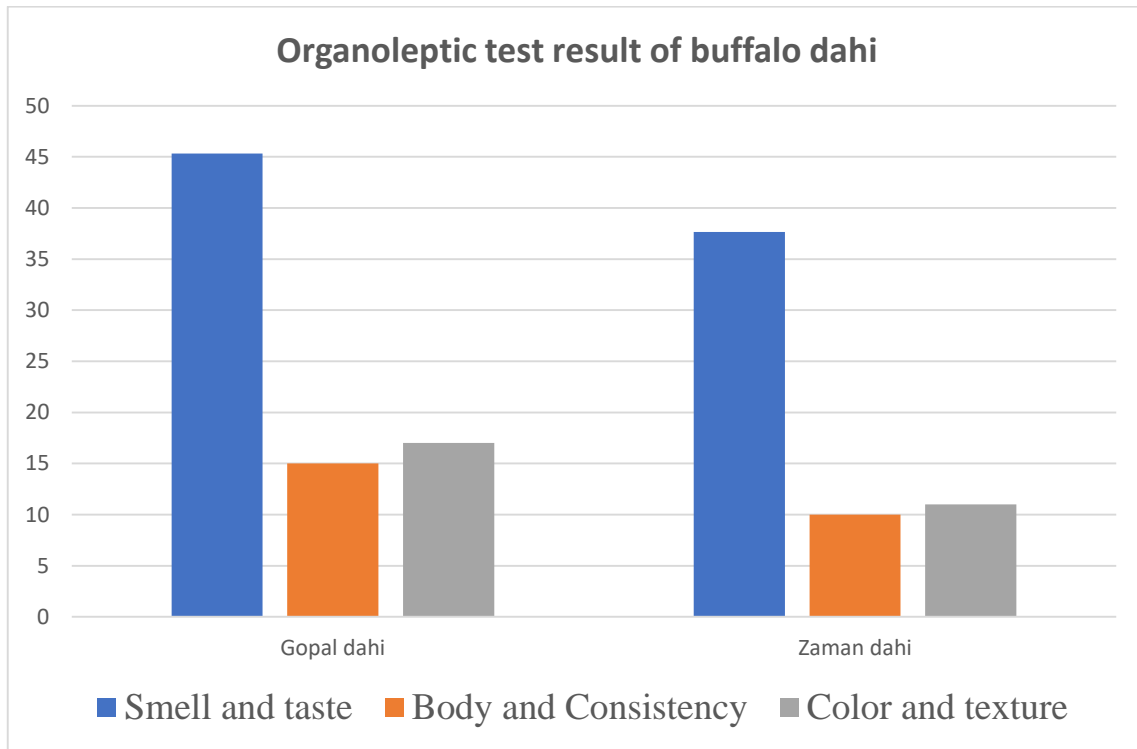
Parameter	Gopal sweets Corner (Mean $\pm$ SD)	Zaman Restaurant (Mean $\pm$ SD)
Smell and taste (50)	$45.33 \pm 0.58$	$37.66 \pm 1.53$
Body and consistency (20)	$15 \pm 0.13$	$10 \pm 0.34$
Color and texture (30)	$17.77 \pm 0.58$	$11.77 \pm 0.13$

#### 3.1.2: Body and consistency:

The Gopal dahi got the highest body and consistency score ( $15 \pm 0.13$ ) while the Zaman dahi got the lowest score ( $10 \pm 0.34$ ) examined by judges (**Table 1**). Mangashetti et al., (2003) found that dahi made from more concentrated milk with 7.5% added sugar has smooth, textural characteristics. The variation in body and consistency score of collected dahi sample may be due to different starter culture, total solids content and manufacturing process employed. Our lab test result is totally related with (Kober et al., 2007).

#### 3.1.3: Color and texture:

Zaman dahi ( $11.77 \pm 0.58$ ) got the lowest value for color and texture, while gopal dahi ( $17.77 \pm 0.58$ ) got the highest score (**Table 1**). Functional additives offer health advantages by enhancing the hardness, viscosity, and creaminess of dahi (Kober et al., 2007). This test result is commonly accepted with (Kober et al., 2007). These extra characteristics (Color and texture) could influence consumer acceptance and preference (Fox, 2001).



**Figure 19:** Organoleptic test result of buffalo dahi

### 3.2: Chemical parameter

#### 3.2.1: Acidity:

The acidity percentage of buffalo dahi from Zaman Restaurant was  $0.84 \pm 0.10$  while acidity percentage of dahi from Gopal sweets corner was  $0.89 \pm 0.03$  (**Table 2**). The acidity percentage of buffalo dahi in Gopal sweets corner was more than Zaman Restaurant's buffalo dahi. Acidity indicates the existence of hydrogen ions in a solution. To indicate the number of hydrogen ions in 100 ml of solution as a percentage, we use the term "acidity percentage." The acidity range remains from 0.91-0.93 (Bilgin et al., 2016). On the other hand, acidity range remains 0.69-0.72 (Kuladip et al., 2019). The buffaloes in Chattogram were fed on natural grass with rice straws, and their milk typically went to Gopal Sweets Corner. These weeds contain a variety of chemicals, including citric and malic acids with varying amounts, which could alter the dahi's growing acidity (Arnold et al., 2021). Zaman restaurant's dahi acidity was significantly

impacted by the improper culture dosage system by their own observance. Fat may also be decreased by adulterating milk by adding water or blending buffalo milk with ewes', goats', and cows' milk (Bilgin et al., 2016).

**Table 2: Chemical Parameters of buffalo dahi Samples available in Chattogram area.**

Parameters	Gopal sweets corner (Mean $\pm$ SD)	Zaman restaurant (Mean $\pm$ SD)
Fat%	8.9 $\pm$ 0.14	8.5 $\pm$ 0.41
Moisture%	79 $\pm$ 0.34	76.45 $\pm$ 0.44
Acidity%	0.89 $\pm$ 0.03	0.84 $\pm$ 0.10

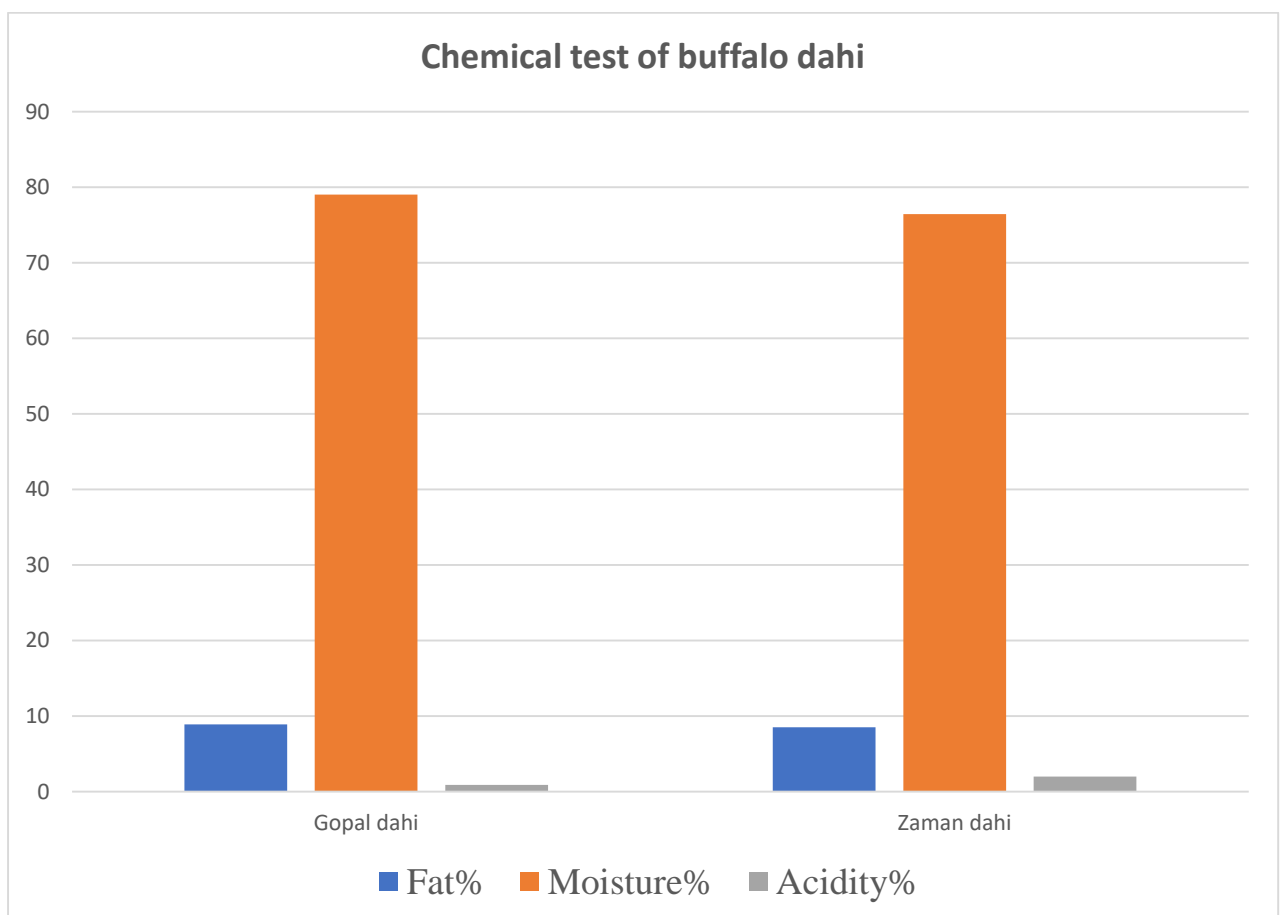
### 3.2.2: Moisture:

The moisture percentage of buffalo dahi from Zaman Restaurant was 76.45 $\pm$ 0.44 while acidity percentage of dahi from Gopal sweets corner was 79 $\pm$ 0.34 (**Table 2**). The moisture percentage of buffalo dahi in Gopal sweets corner was more than Zaman Restaurant's buffalo dahi. The word "moisture percentage" refers to the water content of any substance. Moisture is important for dahi's texture and consistency, creaminess, taste. It is also helpful for nutrient absorption, culturing process, longevity and freshness. Consumers take it easily for consumption. The moisture content should not cross the limit because the additional moisture would result in a humid environment that would be ideal for the growth of mold or some anaerobic bacteria. Again, low moisture content would accelerate the manufacturing process, which may have involved over drying and would affect the taste. Normally moisture percentage of buffalo dahi range remains from 50%-55% in 32-34 degree Celsius (Maxhuni et al.,2000). Gopal sweet corner's buffalo dahi was too cold in storage, cutting time was too long. So, that cause might be the increasing amount moisture (Maxhuni et al.,2000).

### 3.2.3: Fat test result:

The fat percentage of buffalo dahi from Zaman Restaurant was 8.5 $\pm$ 0.41 while fat percentage of dahi from Gopal sweets corner was 8.9 $\pm$ 0.14 (**Table 2**). The fat percentage of buffalo dahi in Gopal sweets corner was more than Zaman Restaurant's buffalo dahi. Dahi's moisture content is a crucial element that affects the dahi's overall texture, flavor, and quality. Dahi's

smooth mouthfeel and creamy smoothness are a result of the perfect amount of moisture in it. When made from whole milk, yoghurt should have a minimum of 3% fat content (Bilgin et al., 2016). Our lab test result of fat content is totally agree with this (Bilgin et al., 2016). The fat content of buffalo dahi range from 5.70 to 18.00% (Arnold et al., 2021). The low-fat variance in buffalo dahi of zaman restaurant may be due to changes in raw milk, methods to reduce fat, and procedures such adulterating milk by adding water or blending buffalo milk with ewes', goats', and cows' milks (Bilgin et al., 2016). Normally, the fat content of buffalo dahi is very high comparative to dahi of cow because while the negligible amounts of free fatty acids and volatile fatty acids are generated by microbial contamination in the buffalo milk, the natural lipases in raw buffalo milk may participate in lipid metabolism (Arnold et al., 2021).



**Figure 20:** Chemical test of buffalo dahi

## **Chapter 4: Conclusion**

It may be concluded that the buffalo dahi of Gopal sweets corner was higher quality in terms of organoleptic and chemical parameter than dahi of Zaman restaurant. The study shows that the open markets of buffalo dahi in Chattogram follows the standard method in dahi manufacturing. A comprehensive research work is still required to set a standard for commercial production of dahi in Chattogram to have uniformity and superiority in its organoleptical and chemical quality.

### **Limitations-**

Our collected sample size was limited.

### **Recommendations-**

- 1) Regulatory organizations like BSTI should step up their regulatory efforts.
- 2) The government should assist in the investigation of dahi which are sold in open market.
- 3) Strict legislation and rules should be put in place.
- 4) A study with more funding would make the investigation faster.

## References-

- Arnold, M., Rajagukguk, Y. V., & Gramza-Michałowska, A.** (2021). Characterization of Dadih: Traditional Fermented Buffalo Milk of Minangkabau. *Beverages*, 7(3), 60.
- Bilgin, B., & Kaptan, B.** (2016). A study on microbiological and physicochemical properties of homemade and small-scale dairy plant buffalo milk yoghurts. *International Journal of Pharmaceutical Research & Allied Sciences*, 5(3).
- DLS. 2022 "Livestock economy at a glance" 22:80
- Fahmid, S., Sajjad, A., Khan, M., Jamil, N., & Ali, J.** (2016). Determination of chemical composition of milk marketed in Quetta, Pakistan. *Int. J. Adv. Res. Biol. Sci*, 3(5), 98-103.
- Fox, R.** (2001). Constructivism examined. *Oxford review of education*, 27(1), 23-35.
- Kleyn, D. H., Lynch, J. M., Barbano, D. M., Bloom, M. J., & Mitchell, M. W.** Collaborators: Cooper LS Cusak E Fick M Hanks T Heslen MK Johnson J Kleyn DH Mercer F Monahan D Peat B Petit M, 2001. Determination of fat in raw and processed milks by the Gerber method: collaborative study. *Journal of AOAC international*, 84(5), 1499-1508.
- Kober, A. K. M. H., Mannan, M. A., Debnath, G. K., & Akter, S.** (2007). Quality evaluation of dahi/yogurt sold in Chittagong metropolitan area in Bangladesh. *International Journal of Sustainable Agricultural Technology*, 3, 41-46.
- Kuladip Prakash Shinde, Ramesh Chandra, Chand Ram Grover, Sunita Verma and Shailesh Kumar Gupt** (2019) Chemical composition of dahi prepared from whole Murrah buffalo milk using *Lactobacillus plantarum* CRD 2 and *Lactobacillus rhamnosus* CRD 9 probiotics cultures. *International Journal of Chemical Studies* 2019; 7(2): 885-888
- Maxhuni, S., Lamçe, E., & Maxhuni, A. S.** (2000) Production of Curd, the Importance Indicator for Compared Buffalo's Milk Standardization with non-Standardized.



## **BIOGRAPHY**

I am Md. Abu Younus Shajid, son Md Muslim Uddin and Badrunnahar Rina. I passed the Secondary School Certificate examination in 2014 (G.P. A-5.00) followed by Higher Secondary Certificate examination in 2016 (G.PA-5.00). Now I am an intern veterinarian under the Faculty of Veterinary Medicine in Chattogram Veterinary and Animal Sciences University. In the future, I would like to engage in research on clinical animal diseases in Bangladesh and work as a veterinarian.