ASSESSMENT THE CHEMICAL QUALITY TEST OF BANGLADESHI PROCESSED LIQUID MARKET MILKS

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Submitted to the Department of Nutrition and Food Engineering in the partial fulfillment of B.Sc. in Nutrition and Food Engineering

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APPROVAL

This Project titled "**Assessment the Chemical Quality Test of Bangladeshi Processed Milk",** submitted by Jarin Tasnim to the Department of Nutrition and Food Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Nutrition and Food Engineering and approved as to its style and contents. The presentation has been held on __/__/____.

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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Md. Nawal Sarwer, Lecturer**, **Department of Nutrition and Food Engineering**, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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ABSTRACT

Being one of the most complete and nutritious foods found in nature, milk is rich in important nutrients and is therefore a crucial component of human nutrition. There are about 12 distinct processed package milk brands available in Bangladesh, a country where dairy consumption is deeply rooted in culinary and dietary customs. Processed package milk is widely available and consumed, which highlights its importance in people's everyday lives throughout the nation. To ensure the security and chemical integrity of these milk products, study was done. Four processed packet milk samples from various brands that are sold in grocery stores were chosen for a thorough analysis. Essential chemical quality tests, including the soda, salt, sugar, starch, formalin, and alcohol tests, were the focus of the analysis. The study's encouraging findings showed that the four milk samples that were chosen for analysis did not include soda, salt, sugar, starch, or alcohol. This result is especially noteworthy as it validates the investigated milk companies' dedication to offering consumers pure and unadulterated dairy products. The lack of these often found pollutants and additives complies with the required levels of quality and safety in the dairy sector.There are questions regarding the preservation techniques used in the dairy supply chain because formalin was found in two of the four milk samples. The possible health risks associated with formalin, a substance used for preservation, have been a topic of debate. Strict quality control procedures must be followed throughout the production and distribution stages, as evidenced by the formalin found in the milk samples. Formalin is a preservation tool, but its inadvertent inclusion in consumable products raises concerns regarding regulatory compliance and possible health hazards to consumers. The analysis of processed package milk in Bangladesh by the research provides insight into the chemical composition of these goods, demonstrating the lack of typical additions such as soda, salt, sugar, and starch. Although this shows how committed the dairy sector is to produce high-quality goods, the finding of formalin in two samples highlights the necessity for ongoing examination and advancement in maintaining the integrity and safety of processed milk. Building a robust and reliable dairy business that puts the health and well-being of the populace first requires cooperation between regulatory bodies, farmers, and consumers.

Keywords: Human nutrition, Chemical quality, Pollutants, Additives, Formalin.

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CHAPTER 1
INTRODUCTION

1.1. Introduction

One of the most nutrient-dense foods that humans can eat is milk. Because its contains all types of nutrients like water, protein, fat, Vitamin, minerals etc. [1] People consume not only local whole milk but also processed packet milk. At present many processed packet milk found in Bangladesh like pasteurized milk, UHT milk etc. This processed milk treats with highly modern treatment and ensure its quality. Pasteurized milk should be consumed within 7 days of manufacturing but UHT milk should be consumed within 6 months after production. [3]

But nowadays, Adulteration is a very common thing in Bangladesh. Milk may get adulterated with additional elements which harmful for human health such as adding salt, sugar, detergent, formalin, Alkaline etc.

A variety of chemical and hygienic standards for pasteurized milk are established by the Bangladesh Standards and Testing Institution (BSTI) (BSTI 2002). For the milk that has been subjected to UHT treatment, no standard is known to exist. [2]

To ensure the quality of milk needs its balanced chemical composition so that people consume the quality full processed packet milk.

Figure 1: Processed Packet Milk (Bangla Tribune)

1.2 Objectives of the study

- Determine the chemical quality composition of different samples from different milk brands in Bangladesh.
- Evaluate for any presence or absence of harmful substances.
- Determine whether or not people can consume with ease.

CHAPTER 2
LITERATURE REVIEW

As the body's main source of protein, vitamins, and minerals, as well as other necessary components, milk is a crucial part of everyday nutrition.[4] To support the population's nutritional demands, Bangladesh's dairy sector contributes significantly. Pasteurization and ultra-high temperature (UHT) treatment are two of the several processing methods used to ensure the safety and quality of milk. [5,6] This study evaluated the quality tests of pasteurized and UHT milk in Bangladesh with an emphasis on microbiological testing, especially total coliform count and total viable bacterial count.

The safety and health of consumers are significantly affected by the positive results of the microbiological testing.[7] Research has unequivocally demonstrated that store-bought pasteurized and ultra-pasteurized milk sustains a high level of quality that is fit for human consumption. The lack of higher bacteria counts in these processed milk varieties is evidence of the effectiveness of ultra-pasteurization and pasteurization processes in maintaining the product's microbiological safety. These techniques include heating milk to certain temperatures in order to destroy unwanted germs without lowering the milk's nutritious value. When these processing methods are used successfully, milk's shelf life is increased and customers are protected from health hazards that might arise from bacterial contamination. Customers' trust in pasteurized and ultra-pasteurized milk as a healthy and safe food option is strengthened by this guarantee of microbiological safety. [8,9]

Bangladesh's dairy industry is very powerful and has a big impact on the country's nutritional and economic conditions. For many households in Bangladesh, especially those living in rural regions, the dairy business is a major source of income. Millions of people now make their living from dairy farming, which has become a common and essential activity. Dairy farming is a widespread household activity, particularly in the rural areas of the nation, therefore the industry has a profound influence on daily living in addition to the economy. The dairy business has a significant role in influencing Bangladesh's socio-economic dynamics because of its many contributions, which go beyond generating cash and include nutrition, rural employment, and communal subsistence. [7]

At constant prices, the dairy industry makes up 1.54% of Bangladesh's GDP, which is a substantial contribution to the country's economy. Additionally, it employs 20% and 45% of the working force in different capacities and part-time work, respectively.[8] Bangladesh yields 9.4 million tons of milk per year as opposed to the 15.04 million tons required. The International

Farm Comparison Network (IFCN, 2019) [9] states that the country produces 8.08 million tons of milk overall. This suggests that only 63% of the entire demand is produced in Bangladesh (the IFCN states that this percentage is 54%). One of the main job sources is the dairy industry. Millions of individuals are thought to be involved in dairy farming, especially in rural regions, which helps to improve livelihoods and reduce poverty. Bangladesh is one of Asia's top milk-producing nations. The nation generated more than 11 million metric tons of milk a year, according to data. [10]

Small-scale dairy farms, where individual farmers own a few cows or buffaloes, make up the bulk of dairy farms in Bangladesh. An important part of the total production and distribution of milk is produced by smallholder farmers. Since much of the informal segment of the industry is made up of small farmers and market intermediaries, there are either insufficient or no quality control processes in place. Consequently, the quality of the milk cannot be guaranteed. Moreover, in order to increase output and/or cover expenses, farmers usually feel under pressure to contaminate more milk as they don't get paid fairly for their produce. It was discovered that every sample collected for a study in the Barisal district had water contamination. Cane sugar (26%), powdered milk (14%), and starch (12%) were the other adulterants detected in the samples.[10] For the populace, dairy products are an essential source of nourishment. Bangladeshi individuals often drink large amounts of milk and dairy products, which helps them meet their daily needs for important minerals like calcium and protein.[7]

Dairy farmers may now reach markets more easily thanks to the construction of new processing plants and centers specifically designed for collecting milk. By simplifying the whole supply chain from collection to distribution, the construction of these facilities represents a major advancement in the dairy business. These processing facilities are essential to the effective gathering of milk from different sources, its subsequent processing to fulfill quality requirements, and its delivery to a range of markets. A more strong and accessible market for dairy farmers has been fostered by the integration of such centralized centers, which has also increased the overall efficiency of the dairy production process and strengthened the accessibility of dairy products to consumers. [11] The Bangladeshi government has launched many initiatives targeted at empowering and assisting dairy farmers as part of a deliberate attempt to strengthen the dairy industry. These all-encompassing projects include a variety of actions, such as focused training courses created to provide farmers the abilities and information they need to improve their dairy operations. Understanding the value of animal health, the government has also launched vaccination programs to protect dairy cows and, eventually, guarantee the supply of nutritious milk. Furthermore, the government has subsidized cow feed in an effort to lessen farmers' financial burdens and encourage sustainable farming methods. Through tackling crucial facets of dairy production, such as farmer education, animal well-being, and feed affordability, these initiatives highlight the government's dedication to cultivating a robust and thriving dairy sector in Bangladesh. [10]

Bangladesh has the capacity to export dairy goods, yet precise figures on exports of dairy products may differ. Bangladeshi dairy products need to focus quality assurance and follow international standards in order to increase their competitiveness in the global market. The promotion of strict quality control procedures and adherence to internationally acknowledged standards is expected to enhance the worldwide market reputation of dairy products originating from Bangladesh. The amount of milk that the nation can produce on its own is still insufficient to meet demand, even with the dairy sector in the nation flourishing. Consequently, imports contribute significantly to satisfying the demands of the home market. Bangladesh may lessen its need on imports and establish its dairy industry as a strong competitor in the world market by making sure that its domestically produced dairy products satisfy international quality standards. Along with improving the image of Bangladeshi dairy products, investing in quality assurance procedures would boost exports and create a more resilient and self-sufficient dairy sector, both of which will benefit the country's economy. Even though local production has increased over time, the amount of milk and milk derivatives imported has increased. Solid and powdered milk product imports totaled $365.87 million in 2019–20, according to the International Trade Center. [10]

Processed milk is a staple in diets because of its many health advantages, versatility, and rich nutritional makeup. Fortified milk is a fantastic source of essential nutrients for several bodily functions, since it contains essential elements including calcium, vitamin D, protein, vitamin B12, and phosphorus.[12] These ingredients are essential for supporting bone health, strengthening the immune system, and enhancing general wellbeing. Among the best food sources of calcium, which is essential for the development and upkeep of strong bones and teeth, milk stands out. Consuming milk on a regular basis helps to preserve the ideal level of bone density, which is crucial for the prevention of diseases such as osteoporosis. Osteoporosis, a condition characterized by weakened bones and an increased risk of fractures, can be avoided with regular milk drinking. Milk has a lot of calcium, which is good for your bones. [13] Processed milk is a convenient and adaptable way to provide a steady and considerable supply of important nutrients including calcium, vitamin D, and protein.[4] This regular eating routine establishes the groundwork for long-term wellbeing in addition to meeting acute health demands. Milk helps maintain general skeletal health by strengthening teeth and bones, which lowers the chance of fractures and provides a strong foundation for an active and healthy life. Including processed milk in everyday meals is an easy yet effective way for people to take charge of their health—both now and in the future.[13]

One of the best sources of protein is milk, which contains all of the necessary amino acids that the human body needs. These amino acids are essential for many physiological processes, such as the maintenance of the immune system, the growth of muscles, and tissue repair. These amino acids are also necessary for the creation of important hormones and enzymes.[14] For the body to absorb calcium effectively, vitamin D is necessary. To increase their nutritional content, several processed milk products include vitamin D. A key strategy to support the body's appropriate calcium absorption and improve the processed milk's overall nutritional profile is the purposeful inclusion of vitamin D. Maintaining overall bone health depends on the synergy between calcium and vitamin D since the latter acts as a facilitator to ensure that the absorbed calcium is appropriately used for the construction and maintenance of strong and healthy bones. This fortification technique emphasizes the value of processed milk as a deliberate and all-encompassing approach to supporting skeletal well-being, as well as a stand-alone nutritional supply.[15]

One significant benefit of processed milk products is their longer shelf life, which makes them more convenient and easily obtainable for customers. Pasteurized and ultra-high temperature (UHT) treated milk are a few of examples of such items. By decreasing the possibility of rotting and waste, the preservation methods used during processing help products last longer. Processed milk's longer shelf life makes it more feasible for customers to plan and use these products more effectively when including them into their regular meals. These processing systems' ease not only fits well with current lifestyles, but they also guarantee that people can have a steady supply of milk in their homes, encouraging regular intake and enhancing general nutritional well-being. [16]

Among beverages, milk is particularly good at keeping you hydrated and contributes significantly to your total fluid consumption. Milk stands out as a nutritious and healthful choice to assist hydration because of its well-balanced combination of water, electrolytes, and important nutrients. Milk's water content helps the body restore the fluids it needs to operate, while electrolytes help keep the body's electrolyte balance and correct hydration levels. Furthermore, milk's nutritional value as a hydrating beverage is enhanced by the mix of components, which includes proteins, vitamins, and minerals. Because of this, milk serves as both a healthy option for meeting water demands and a delicious and fulfilling beverage. It also has the added advantage of soothing thirst and giving vital nutrients for general health. [17]

It is crucial to evaluate the chemical quality of processed milk for a number of reasons. First of all, it guarantees that the milk satisfies strict quality and safety requirements, protecting the health of the user. Key components include fat content, protein levels, lactose, minerals, and any

possible contaminants or adulterants may all be identified and quantified with the use of chemical analysis. By keeping an eye on these variables, one may make sure that the processed milk's nutritional value complies with legal specifications as well as customer expectations. [18] The chemical quality of processed milk must be guaranteed in order to provide a consistent and dependable product that will win over customers' confidence and loyalty. Dairy farmers may ensure that set criteria are followed by closely monitoring the chemical composition of every batch. This methodical process helps to ensure consistency and superior quality by removing variances in flavor, nutritional value, and safety. Maintaining consistency in the quality of products is not only essential for adhering to regulations, but it also has a significant impact on how consumers perceive them. Customers develop brand confidence and brand loyalty when they can count on processed milk to have a constant chemical quality. [19] In a competitive market, this trust is critical because customers are more inclined to select and stick with brands that regularly live up to their expectations in terms of quality, safety, and nutritional content.

One of the most important tools for locating and fixing anomalies in the handling and processing of milk is chemical analysis. Dairy producers can identify problems like spoiling, contamination, or inappropriate storage conditions that might jeopardize the final product's safety and quality by closely examining its chemical makeup. By using chemical analysis to identify these problems, producers may take immediate corrective action and stop the sale of dangerous or subpar dairy products quickly and accurately. By guaranteeing that only goods that satisfy strict quality standards make it onto the market, this proactive strategy not only complies with legal requirements but also protects the reputation of the dairy sector. It highlights the dedication of dairy farmers to provide consumers with healthful, dependable, and safe milk products, bolstering the overall integrity of the industry. [20]

Chemical analysis is a complex procedure that examines numerous components of processed milk's composition using a variety of methodologies. The goal is to determine the milk's quality. Among the essential methods is proximate analysis, which includes the examination of moisture, fat, protein, lactose, and minerals. This all-encompassing method offers a broad overview of the nutritional composition of the milk. Titration methods are essential for assessing acidity, which is a crucial factor affecting flavor and shelf life. Methods like spectrophotometry and chromatography provide accuracy for measuring certain elements like pigments, vitamins, fatty acids, and amino acids.[21]

Measurements of compounds such as lactose are aided by enzymatic tests. When determining the milk's mineral content and making sure it satisfies dietary requirements, atomic absorption spectroscopy comes in handy. Microbiological pollutants can be found using molecular techniques like Polymerase Chain Reaction (PCR), which guarantees product safety. Analysis of

milk urea nitrogen (MUN) also sheds light on how dairy cows metabolize proteins. With the use of these various approaches, dairy farmers are able to ensure the safety, nutritional value, and general integrity of processed milk while also maintaining uniformity and regulatory compliance. When these methods are used, a strong foundation for quality control is created, guaranteeing that consumers will receive a product that satisfies their taste buds while also adhering to strict safety and nutritional guidelines.[22]

A deliberate focus on boosting production is necessary to meet Bangladesh's predicted demand for milk by 2030, given the existing gap of around 5.0 million metric tons and the extra 6.0 million metric tons forecast by that same year. Over the next five years, increasing the efficiency of milk production per cow is the key to closing this disparity. Milk production may be increased by putting certain strategies into effect, such as better diet, breeding techniques, and healthcare for dairy cow. Investing in farmers' education about contemporary dairy management practices and technology adoption can also be a key factor in raising productivity. By giving these projects top priority, Bangladesh may endeavor to fulfill the increasing demand, become self-sufficient in milk production, and solve the present shortfall, thereby ensuring a sustainable and flourishing dairy industry. [10]

CHAPTER 3
MATERIALS AND METHODS

3.1 Sample Collection

There are two main methods used in Bangladesh to sell milk. Farmers typically bring milk to market in open pots to sell it unprocessed, right out of the market. In other situations, dairy farms or farmers supply their milk to milk companies, who then package the processed milk and sell it in stores under a particular brand name after pasteurizing or UHT-treating it. In this study, different brands of processed liquid milk were bought from Bangladesh's retail markets in Dhaka. Random selection was used to choose the samples. Four samples in all, numbered S- 1, S- 2, S- 3, and S- 4, were designated. Using seller's standard format of plastic packets, all samples were gathered, quickly sent to the laboratory to be kept cold, and inspected right away.

3.2 Adulteration Detection

3.2.1 Soda Test

Materials:

- Test tube
- Weight machine
- Volumetric flask
- Aluminum foil
- Spoon
- Sample

Figure 2: Different Brands of Milk Sample

Figure 3: Volumetric Flasks (Perth Scientific)

Chemical/ Reagent:

- Rosalic Acid solution: A 100 ml solution is created by adding distilled water to 0.1 g of powdered rosalic acid that has been weighed and dissolved in 30 ml of ethyl alcohol.

- Ethyl Alcohol (CH3CH2OH): Fill a 100 ml volumetric flask halfway with distilled water, then add 95 ml of ethyl alcohol and stir thoroughly.

Procedure:

A 5 milliliter sample of milk is placed in a test tube. Add four to five drops of rosalic acid and five milliliters of ethyl alcohol. After shaking the test, the color is noted. If the hue is adjusted to a pinkish red, it means that sodium carbonate or sodium bicarbonate has been added to the milk sample, making it unsafe for ingestion by humans.

3.2.2 Salt Test

Materials:

- Pipette
- Testube

Figure 4: Pipette (Walmart.Ca)

Figure 5: Test tube (Hurst Scientific)

Chemical/ Reagent:

- Silver nitrate (AgNO3) solution
- Potassium dichromate (k2Cr2O7) solution.

Procedure:

One milliliter of milk is well mixed with two to three drops of 1% potassium dichromate and five milliliters of 0.8 percent silver nitrate. A yellowish tint indicates that salt has been added to the milk; a chocolate tint indicates that salt has not been added.

3.2.3 Sugar Test

Materials:

- Test tube
- Test tube holder
- Pipette
- Weight Machine
- Water Bath
- Aluminum foil
- Spoon

Figure 6: Weight Machine (Bio - Equip)

Figure 7: Water Bath (Dreamstime.com)

Reagent / Chemical:

- Resorcinol
- Hydrochloric acid (HCl)

Procedure:

After taking 10 milliliters of milk, 5 milliliters of hydrochloric acid and 0.1 grams of resorcinol are added. After a good shake, it is submerged for five minutes in a bath of boiling water. The presence of added sugar in milk is indicated by its crimson appearance.

3.2.4 Starch Test

Materials:

- Test tube
- Pipette
- Dropper

Figure 8: Dropper (Science Lab Ltd.)

Reagent / Chemical:

- Iodine solution (1%)

Procedure:

5 cc of milk is taken and slowly heated. Next, two to three drops of a 1% iodine solution are added to room temperature milk. The milk begins to become blue, which is an indication that starch has been added.

3.2.5 Formalin Test

Apparatus:

- Test tube
- Pipette

Reagent / Chemical:

- Sulphuric Acid (H2SO4)

Procedure:

5 ml of concentrated sulfuric acid is added to the test tube's sides without shaking after 10 ml of milk has been taken. The presence of formalin was indicated if a violet or blue ring developed at the junction of the two layers.

3.2.6 Alcohol Test

Materials:

- Test tube
- Pipette

Reagent / Chemical:

- 68% ethanol solution: Add 28 ml of distilled water to 68 ml of ethanol, and well mix.

Procedure:
5 ml of milk is taken, and 5 ml of a 68% ethanol solution is added and thoroughly mixed. The presence of alcohol is indicated if the milk coagulates.

CHAPTER 4
RESULTS AND DISCUSSION

4.1 Result
4.1.1 Soda Test

Samples for the study were from retail markets in Dhaka, Bangladesh, and contained four different brands of pasteurized liquid milk. According to table 4.1, we can see that in Sample 1 there is no presence of soda. As like as sample 1, there is also the absence of soda in sample 2 found. As above, in sample 3 and sample 4 there is no presence of soda found. It means the presence of soda was not found in any of the four samples.

Table 4.1: Presence of soda

Sample		1	2	3	4
Soda		×	×	×	×
Presence	√				
Absence	×				

4.1.2 Salt Test

As shown in table 4.2, it was discovered that in Sample 1 there is no presence of salt. As like as sample 1, there is also the absence of salt in sample 2 found. As above, in sample 3 and sample 4 there is no presence of salt found. It means none of the four samples contained salt.

Table 4.2: Presence of Salt

Sample		1	2	3	4
Salt		×	×	×	×
Presence	√				
Absence	×				

4.1.3 Sugar Test

In Table 4.3 shows that in Sample 1 there is no presence of sugar. As like as sample 1, there is also the absence of sugar in sample 2 found. As above, in sample 3 and sample 4 there is no presence of sugar found. It means in all four samples, there was no trace of sugar.

Table 4.2: Presence of Sugar

Sample		1	2	3	4
Sugar		×	×	×	×
Presence	√				
Absence	×				

4.1.4 Starch Test

As shown in table 4.4, in Sample 1 there is no presence of starch. As like as sample 1, there is also the absence of starch in sample 2 found. As above, in sample 3 and sample 4 there is no presence of starch found. It means not even one of the four samples contained starch.

Table 4.3: Presence of Starch

Sample	1	2	3	4
Starch	×	×	×	×

Presence	√
Absence	×

4.1.5 Formalin Test

According to table 4.5 it shows that in Sample 1 there is no presence of formalin. As like as sample 1, there is also the absence of formalin in sample 2 found. But in sample 3 and sample 4 there is presence of formalin found. It means among the four samples, sample 3 and sample 4 contained formalin. Sample 1 and sample 2 do not contain formalin.

Table 4.5: Presence of Formalin

Sample	1	2	3	4
Formalin	×	×	√	√

Presence	√
Absence	×

4.1.6 Alcohol Test

As shown in table 4.6, in Sample 1 there is no presence of alcohol. As like as sample 1, there is also the absence of alcohol in sample 2 found. As above, in sample 3 and sample 4 there is no presence of alcohol found. It means among the four samples, not even one included alcohol.

Table 4.4: Presence of Alcohol

Sample	1	2	3	4
Alcohol	×	×	×	×

Presence	√
Absence	×

4.2 Discussion

An approach to quality control in the dairy sector that is more sophisticated and focuses primarily on public health is provided by the analysis of milk samples. The analysis of each milk sample showed that it was of great quality and devoid of typical adulterants including soda, sugar, salt, starch, and alcohol, which is encouraging. This highlights a praiseworthy commitment to manufacturing pure and unadulterated dairy products that are in line with guidelines that put the welfare of customers first. This sector's dedication to providing the public with safe and healthful products is demonstrated by the evaluated samples' lack of these common additives, which also shows that the industry is following legal requirements. Customers may be reassured by this favorable result, which also highlights the dairy industry's accountability for maintaining quality standards for the sake of public health.

The study's findings indicate that there was no detectable soda in any of four samples (S- 1, S- 2, S- 3, and S- 4), which is a good thing about the milk products under investigation. The examined samples did not contain soda, which is known as a carbonated beverage with a high sugar content that frequently contains artificial sweeteners and other additives. This is an important finding because drinking soda with milk has been linked to possible health problems. Numerous health problems, including type 2 diabetes, obesity, and dental problems, can be brought on by the high sugar level in sodas. The fact that soda was not present in the tested milk samples emphasizes how crucial it is for the dairy sector to follow traditional and nutrient-sound procedures to provide safe and healthful milk products that are in line with consumer health and well-being. [23]

The findings of the study show that, contrary to estimates, none of four samples (S- 1, S- 2, S- 3, and S- 4) contained salt. Considering that milk and salt together are typically thought to be potentially harmful to health, this is an interesting finding. It is thought that the combination of salt and milk creates a risky internal energy rush, or "Agni," that might upset the body's delicate equilibrium. This combination might potentially lead to the complete extinction of all energy, which would be extremely dangerous. These results are consistent with the warnings expressed against the combination of milk and salt, highlighting the need of following traditional dietary guidelines to protect people's health. In order to fully comprehend the possible effects of particular food combinations and how they affect human health, more investigation and education are necessary. [24] Similar results were discovered in (Hossain et al., 2011) [6]

There was not even the slightest hint of sugar in any of four samples (S- 1, S- 2, S- 3, and S- 4). This discovery is significant, especially considering the established negative health consequences linked to the use of milk that has added sugar. Since added sugars in milk can lead to a number of health issues, the fact that there was no sugar in the samples under analysis is a good thing.[25] We can see that same types of findings the absence of sugar in all samples in (Rashid, 2022) [26]

The results of the study highlight one advantageous feature of the tested milk samples: none of four samples (S- 1, S- 2, S- 3, and S- 4) contained starch. This finding is noteworthy in light of the possible health hazards linked to excessive starch consumption. The same kinds of results, such as the absence of starch in every sample, are evident in (Hossain et al., 2011) [6]. It is crucial to stay away from starch in milk products since it might have negative effects on the intestines, including diarrhea. Moreover, the buildup of starch may be extremely dangerous for diabetics, increasing the likelihood of problems and blood sugar variations. The lack of starch in the examined samples shows a dedication to making milk products that are in line with health concerns, enhancing customers' wellbeing by preventing potential digestive and health-related issues linked to excessive starch consumption. [27]

Based on the study results, there is a clear difference between the four samples: S- 3 and S- 4 contain formalin, which is a substance that is used to preserve milk samples. But formalin was absent from Samples 1 and 2, on the other hand. Although formalin is used for preservation, there may be health hazards associated with its ingestion. Abdominal discomfort, nausea, diarrhea, breathing problems, fever, blurred vision, and weakening or irregular heartbeat are among the side symptoms linked to formalin use. Formalin has been found in certain samples, which emphasizes how crucial stringent quality control procedures are in the dairy business to protect consumers' health and safety. If formalin is found in milk samples, more research and regulatory actions are necessary to reduce the possible health risks. [28]. But in (Uddin et al., 2016) [29] there is no formalin found in any samples. These are the differences between the two studies. But (Uddin et al., 2016) conducted in Mymensingh Town, Bangladesh and This whole study conducted in Dhaka, Bangladesh.

The absence of alcohol in any of four samples (S- 1, S- 2, S- 3, and S- 4) is a good finding of the study. Considering the well-known health risks linked to alcohol intake, this discovery is especially important. Alcohol use has been linked to several diseases and harmful health outcomes, including heart problems and liver damage. One indication of a dedication to creating and preserving dairy products' purity is the absence of alcohol in the tested milk samples. Similar finding found in (Uddin et al., 2016) [29]

CHAPTER 5
CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The analysis of milk samples shows a conflicting picture of the dairy industry's approach to quality control, with a general focus on public health. Positively, every milk sample that was analyzed was found to be of high quality and devoid of typical additions including soda, sugar, salt, starch, and alcohol. At first, this discovery gives one hope that the dairy products under investigation are pure and safe. But the story takes a worrying turn when it turns out that formalin, a dangerous chemical with dire consequences for ingestion by humans, was found to be tampered with two of the samples.

As a recognized preservative, formalin should not be consumed by humans and its presence in milk presents serious health hazards. The sentence emphasizes how urgent it is to solve this problem and the possible harm that drinking formalin-contaminated milk might cause to consumers. This information emphasizes how important it is to implement strict regulations to guarantee the safety and purity of dairy products because the public's health might suffer greatly if these issues are ignored.

Focusing on the dairy sector in Bangladesh, the study promotes taking proactive measures to preserve the quality of processed milk so that it is fit for human consumption. It implies that regular government inspections of the milk that is marketed should be a key component of this effort. The goal of these inspections would be to confirm that the dairy products are produced and distributed according to minimal regulatory criteria. In order to create a strong regulatory system that protects the interests and health of consumers, government intervention is essential.

In conclusion, the study's result presents a complex picture of the milk sample quality, praising the lack of common chemicals while raising red flags about the presence of formalin in certain samples. It promotes a multimodal strategy that includes legal requirements, educational campaigns, and government action to preserve milk quality and public health.

5.2 Recommendation

To ensure the production of safe and high-quality dairy products, the dairy sector in Bangladesh must take steps to prevent post-processing contamination. Since pasteurized milk is a household staple, national authorities should take proactive steps to ensure the quality of pasteurized milk by enforcing strict and routine monitoring protocols, which include systematic inspections, the use of cutting-edge testing techniques, and ensuring strict adherence to hygiene standards throughout the production and distribution processes. The dairy sector in Bangladesh may protect consumer health and welfare and enhance its reputation for supplying dependable and healthy dairy products by emphasizing the prevention of post-processing contamination and putting strong quality control mechanisms in place.

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APPENDICES

Table 4.1: Presence of soda

Sample	1	2	3	4
Soda	×	×	×	×
* √ Presence, × Absence				

Table 4.2: Presence of Salt

Sample	1	2	3	4
Salt	×	×	×	×
* √ Presence, × Absence				

Table 4.3: Presence of Sugar

Sample	1	2	3	4
Sugar	×	×	×	×
* √ Presence, × Absence				

Table 4.4: Presence of Starch

Sample	1	2	3	4
Starch	×	×	×	×
* √ Presence, × Absence				

Table 4.5: Presence of Formalin

Sample	1	2	3	4
Alcohol	×	×	√	√
* √ Presence, × Absence				

Table 4.6: Presence of Alcohol

Sample	1	2	3	4
Alcohol	×	×	×	×
* √ Presence, × Absence				

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Synopsis of the thesis

1. Name: Jarin Tasnim

2. Id: 191-34-870

3. Project title: Assessment of the Chemical Quality Test of Bangladeshi Processed Liquid Market Milks.

4. Introduction:

A highly valued and frequently eaten commodity, milk is regarded as the most nutritious food found in nature. Nutritionally speaking, milk is a balanced meal since it contains water, fat, protein, carbohydrates, minerals, and vitamins. Even though milk has a high nutritious content, toxic chemicals in it can pose a risk to human health and even cause death. Adulterating milk is an often committed act in Bangladesh. So, it is important to evaluate milk quality **(S. Dey, 2013)**.

Food produced and processed in a safe, hygienic way, free of pathogens, is what consumers desire. It must be healthy and nutritious. To meet consumer demand, milk production must be of the highest calibre. Good milk is clear of silt and dangerous substances, has a normal chemical composition, and is devoid of hazardous germs and chemicals. Milk is delivered to customers by milkmen in both urban and rural areas of Bangladesh after being prepared in an irregular manner **(S. Dey, 2013)** . The idea of pasteurized and ultra-high-temperature (UHT) milk is widely accepted in Bangladesh, although consumer acceptance of the practice has grown significantly. This processed milk is treated with highly modern treatment and ensures its quality. Pasteurized milk should be consumed within 7 days of manufacturing but UHT milk should be consumed within 6 months after production **(T J Hossain, 2011).**

Problem Statement and Justification

No problems were found during the tests.

5. Objective:

- Determine the chemical quality composition of different samples from different milk brands in Bangladesh.
- Evaluate for any presence or absence of harmful substances.
- Determine whether or not people can consume with ease.

6. Materials:

6.1 Sample:

- Liquid processed milk (4)

6.2 Instrument:

- Weight machine
- Test tube
- Test tube holder
- Beaker
- Pipette
- Dropper
- Volumetric flask
- Water Bath

7. Method:

A. Soda Test:

- In the test tube, take a 5 ml sample of milk. Pour in 5 milliliters of ethanol. Mix thoroughly after adding two to three drops of rosalic acid solution. Check out the hue. Should the hue shift to a pinkish red, it is assumed that the milk has been tampered with using sodium bicarbonate or carbonate, making it unsafe for human consumption.

B. Salt Test:

- Pour 5 milliliters of silver nitrate into the test tube. Put two or three drops of potassium dichromate in. Shake it well after adding 1 milliliter of milk. Look at the hue. Milk that includes salt is shown by the test tube's contents becoming yellow. If it has a chocolate hue, the milk is salted-free.

C. Sugar Test:

- Put 10 milliliters of milk in a test tube. Add 0.1 gm of resorcinol and 5 ml of hydrochloric acid. Give the test tube a good shake before immersing it in a bath of boiling water for five minutes. Take note of the hue. If the hue is red, it means that milk has added sugar.

D. Starch Test:

- Take in five milliliters of milk. Include two to three drops of 1% iodine solution, then thoroughly shake. Check out the hue. When starch is added to milk, the hue turns blue.

E. Formalin Test:

- 10 milliliters of milk sample and 5 milliliters of concentrated sulfuric acid are added to the test tube walls, shaken, and watched. Formalin is present if a violet ring forms where two layers converge.

8. Place of the Study:

Food Analytical Laboratory, Daffodil International University, Department of Nutrition and Food Engineering.

9. Period of the Study:

On October 3, 2023, I began working on my project.

10. Supervisions:

Main Supervisor: Md. Nawal Sarwer, Lecturer, Department of Nutrition and Food Engineering.

11. Expected Outcome:

- Good Quality
- Presence or absence of chemical in milk samples
- Consumer demand
- Easily consume by consumers depends on quality

12. Conclusion:

The analysis of milk samples shows a conflicting picture of the dairy industry's approach to quality control, with a general focus on public health. Positively, every milk sample that was analyzed was found to be of high quality and devoid of typical additions including soda, sugar, salt, starch, and alcohol. At first, this discovery gives one hope that the dairy products under investigation are pure and safe. But the story takes a worrying turn when it turns out that formalin, a dangerous chemical with dire consequences for ingestion by humans, was found to be tampered with two of the samples.

Formalin, a preservative, poses serious health risks to humans when present in milk. The study emphasizes the urgent need to address this issue and implement strict regulations to ensure the safety and purity of dairy products. It focuses on the Bangladeshi dairy sector and suggests proactive measures to preserve processed milk quality for human consumption. Regular government inspections of marketed milk should be a key component of this effort, ensuring minimal regulatory criteria are met. Government intervention is essential to create a strong regulatory system that protects consumer interests and health. The study emphasizes the importance of addressing these issues to ensure the safety and purity of dairy products.

In conclusion, the study's result presents a complex picture of the milk sample quality, praising the lack of common chemicals while raising red flags about the presence of formalin in certain samples. It promotes a multimodal strategy that includes legal requirements, educational campaigns, and government action to preserve milk quality and public health.

13. Reference:

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Signature of the Supervisor	Signature of the Co-Supervisor