PRODUCTION AND QUALITY CONTROL SYSTEM OF DHAKA DAIRY PLANT (MILK VITA)

AN INTERNSHIP REPORT

BY

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Id: 201-34-1034

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 "**Internship Report on Production and Quality Control at Dhaka Dairy plant (Milk vita)** submitted by **Md. Jobayer Masud** 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 .../…/2023

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DECLARATION

I hereby declare that this project has been done by me under the supervision of **Dr. Nizam Uddin,** Associate Professor and Head, Department of NFE, Daffodil International University. I also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree.

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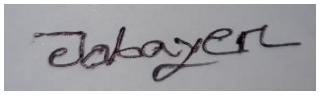

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At first, I would like to express my gratitude to almighty Allah for enabling me the strength and opportunity to complete the report successfully in time. I am obliged to every people who are involved with me in every phase of my life. I am thankful to my parents without whom I cannot be here. Without the support of my parents, I could not be able to achieve my objectives and goals.

I am deeply indebted to my Supervisor, **Dr. Nizam Uddin**, Associate Professor and Head of, the Department of Nutrition and Food Engineering, Daffodil International University for his wholehearted supervision during my organizational attachment period. It would have been difficult to prepare this report up to this mark without his guidance and tremendous support. I would like to express my heartiest gratitude to Co-Supervisor **Ms. Humyra Nowshin**, Senior Lecturer Department of NFE, for his continual encouragement, and energetic supervision.

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I would like to show my impassioned thanks to NFE Faculty members for their numerous inspirations and encouragement during student life.

I am very grateful to Addl.GM (QC) **Md. Anwarul Hasan**, Dhaka Dairy plant. For permitting us to carry out this internship in his organization. I am also grateful to Deputy Manager (QC) **Kbd. Mahmud Rajib Hasan,** Dhaka Dairy Plant, [Milk Vita].

EXECUTIVE SUMMARY

During my two-month internship at Bangladesh Milk Producer's Co-operative Union Limited (Milk Vita) in Mirpur, Section 7, Dhaka, Bangladesh. Milk Vita is a prominent national-level cooperative organization in Bangladesh, and my internship allowed me to gain valuable practical knowledge and expertise in various aspects, including liquid milk processing, packaging, quality control, and research and development. Milk Vita serves as the parent company that produces a wide range of dairy products, including liquid milk, yogurt, ice cream, labang, matha, roshgolla, roshomalai, among others. I am deeply grateful to Bangladesh Milk Producer's Co-operative Union Limited (Milk Vita) for giving me the opportunity to intern with them and learn from their operations. Throughout my internship, they provided me with the necessary resources and support to apply the theoretical knowledge I had acquired and gain hands-on experience in my field of study. This experience has been immensely beneficial in bridging the gap between theory and practice and has equipped me with invaluable skills for my future endeavors.

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INTRODUCTION

1.1 Introduction

In the final semester of my Bachelor of Science in Nutrition and Food Engineering, I got a chance to work at the Dhaka Dairy plant, Bangladesh Milk Producer's Co-operative Union Limited (Milk vita). The span of my temporary job was from 10th September 2022 to 12th November 2022 Bangladesh Milk Produce r's co-operative Union Limited. (Milk vita). Is the top and biggest Dairy organization in the nation. Bangladesh Milk Producer's Co-operative Union Limited. (Milk vita/) has numerous divisions. The divisions are HR and Admin, Quality Control, Research and Development, Production, Electrical, Mechanical, Store, Distribution, Accounts, Vat, Civil, Resource, Hygiene, etc. My worry was Quality Control Department and Production Department which enveloped the accompanying exercises.

I. Maintain all quality management parameters in accordance with the defined criteria.
II. Make certain that the spirit of innovation and development is preserved.
III. Understanding of item costing and production.
IV. To prepare and submit basic reports as the organization's administration prescribes.
V. Each day, a report on generation use, costing, and efficiency must be submitted to power.
VI. To make fundamental development arrangements in accordance with the Generation

1.2 Aim of Training:

Entry-level roles provide a chance for students to bridge the gap between theory and practical experience, serving as a temporary talent pool for participating departments in the internship program. Each department's primary objective is to train students for essential professional and managerial roles. Regularly, they engage in relevant professional development sessions and workshops to enhance their skills and knowledge.

The internship_

• Internships offer students a hands-on and practical experience within society, whether it is in public, private, or charitable sectors.

• They facilitate the development of significant public administration skills, which cannot be fully taught within the confines of a classroom.

• This prevents a disconnect between performing specific tasks for the internship organization and gaining insights into the complexities of human motivation within a larger institution.

• Internships empower students to apply theoretical concepts learned in classrooms to real-world scenarios in workplaces, including experiences in public administration.

• Students gain valuable real-world exposure by working with public, private, or charitable organizations before entering the job market. This exposure broadens their employment prospects while also teaching them about professional expectations.

• Internships allow students to apply the advanced skills they acquired in the classroom to address real-world management challenges in public, private, or philanthropic settings.

1.3 Product of MILK VITA

Following milk and dairy products are produced in Milk Vita (Dhaka dairy plant):

1. Pasteurized Liquid Milk.
2. Flavored Milk (Chocolate and mango).
3. Ice cream. (Cup, Loly, Choc-bar, and container)
4. Curd (Sweetened and sour)
5. Labang
6. Matha
7. Roshgolla
8. Para Sandesh
9. Chana Misti
10. Roshomalai etc.

Figure 1: Products of Milk Vita

CHAPTER 2

PLANT AND PROCESSES

2.1 Liquid Milk Processing

Initially, fresh raw milk is sourced from farmers in the village areas and promptly stored at a chilled temperature of 4°C. Subsequently, the milk is transported to the "Dhaka Dairy plant" using refrigerated transport. This transportation system is specifically designed with a special refrigeration mechanism to ensure that the milk remains at a consistent 4°C temperature for at least 24 hours.

Mechanical

- Milk collection and transport
- Refrigeration
- Vehicle refrigeration

Main plant

- Liquid milk processing plant
- Standardization plant
- Quality control plant

Other plants

- Yogurt plant
- Ice cream plant
- Sweet met product plant
- Innovation plant

Milk tanker:

Raw milk is collected from rural areas and transferred to the Dhaka dairy plant by tanker. Two different categories of tankers 5ooo Liter10000 Liter. From the milk collection platform, liquid milk is transferred to the reserve tank and then start the standardization process.

2.2 Formulation of Liquid Milk

Every country has its own milk content level for marketing to consumers. As a result, the specified number of components should be retained. For marketing purposes, "BSTI" certified liquid milk is usually as follows:

Milk on average generally contains Bangladeshi standards (BDS)

- 3.25 -3.5% of Fat
- 8 - 9% of SNF (Solid Non-Fat)
- 87% of Water
- 28.6 CLR (Corrective lactometer reading)

Table 2.1: Formulation of milk and dairy products

Product name	**Fat %**	**SNF %**
Ice-cream	10.0	10.72
Choc-bar	7.0	13.38
Sweet curd	5.8	13.5
Choc. Milk	2.0	8.24
Vanilla milk	2.0	8.40
Lassi	3.6	8.5

2.3 Separation process

The initial step in the separation process involves removing a significant portion of cream and fat from raw or whole milk, resulting in skim milk. To enhance the separation of these two components, the raw milk is usually heated to a temperature between 50°C and 55°C. The separation itself occurs in a centrifuge, a device that utilizes centrifugal force to separate substances based on their densities. As the cream is lighter, it migrates toward the center of the centrifuge, while the skim milk is extracted from the top of the vessel through a concentric outlet channel.

Separation process flow chart:

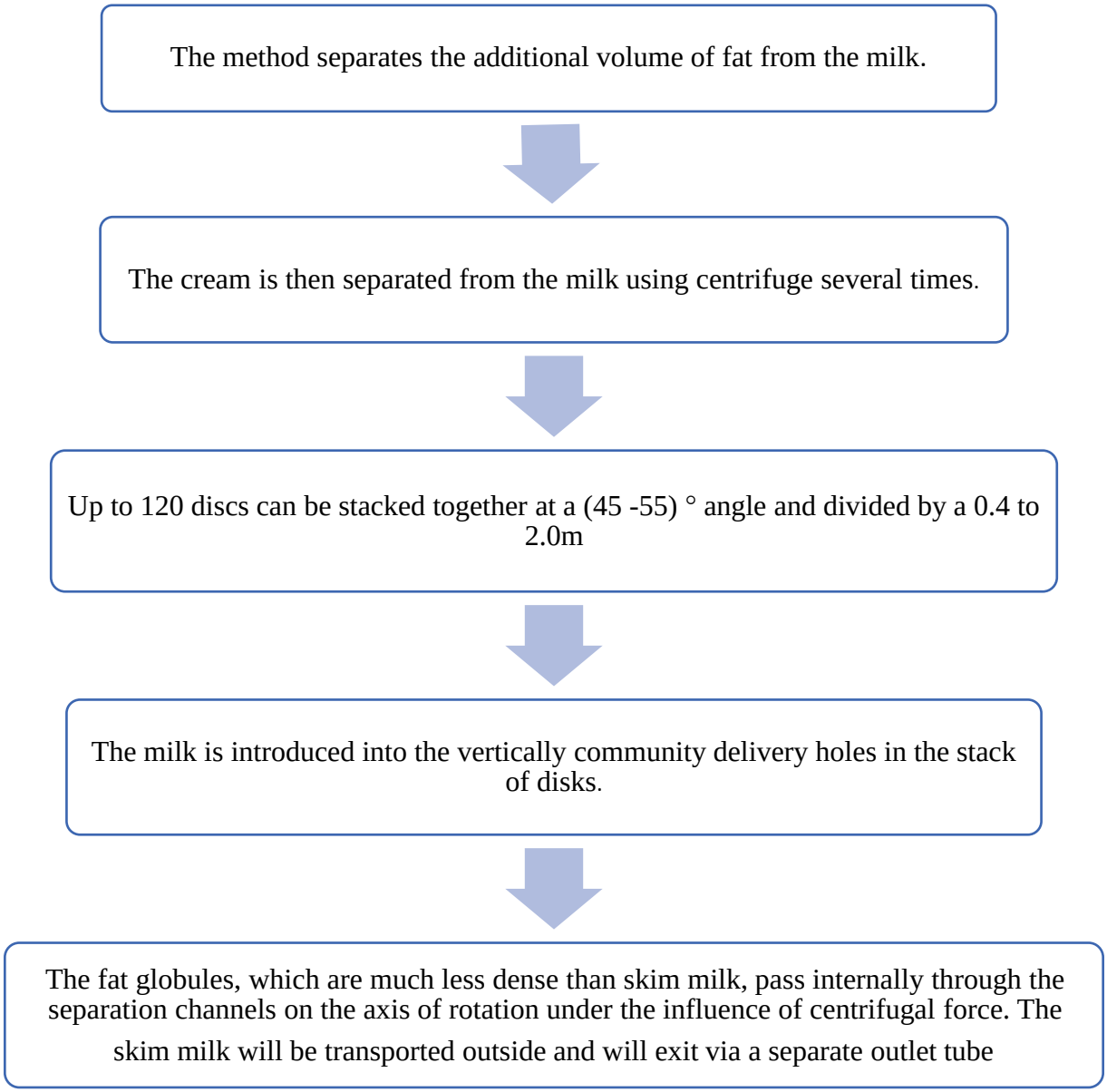

Figure 2: Separation process

2.4 Standardization of milk

When the fat content of raw milk is removed, the product loses the optimal ratio that we need. After separation, the streams of skim and cream must be recombined to a defined fat content in order to maintain the regular ratio. This can be accomplished by changing the cream outlet's throttling valve; if it is fully closed, all milk will be discharged through the skim milk outlet.

Standardization process flow chart:

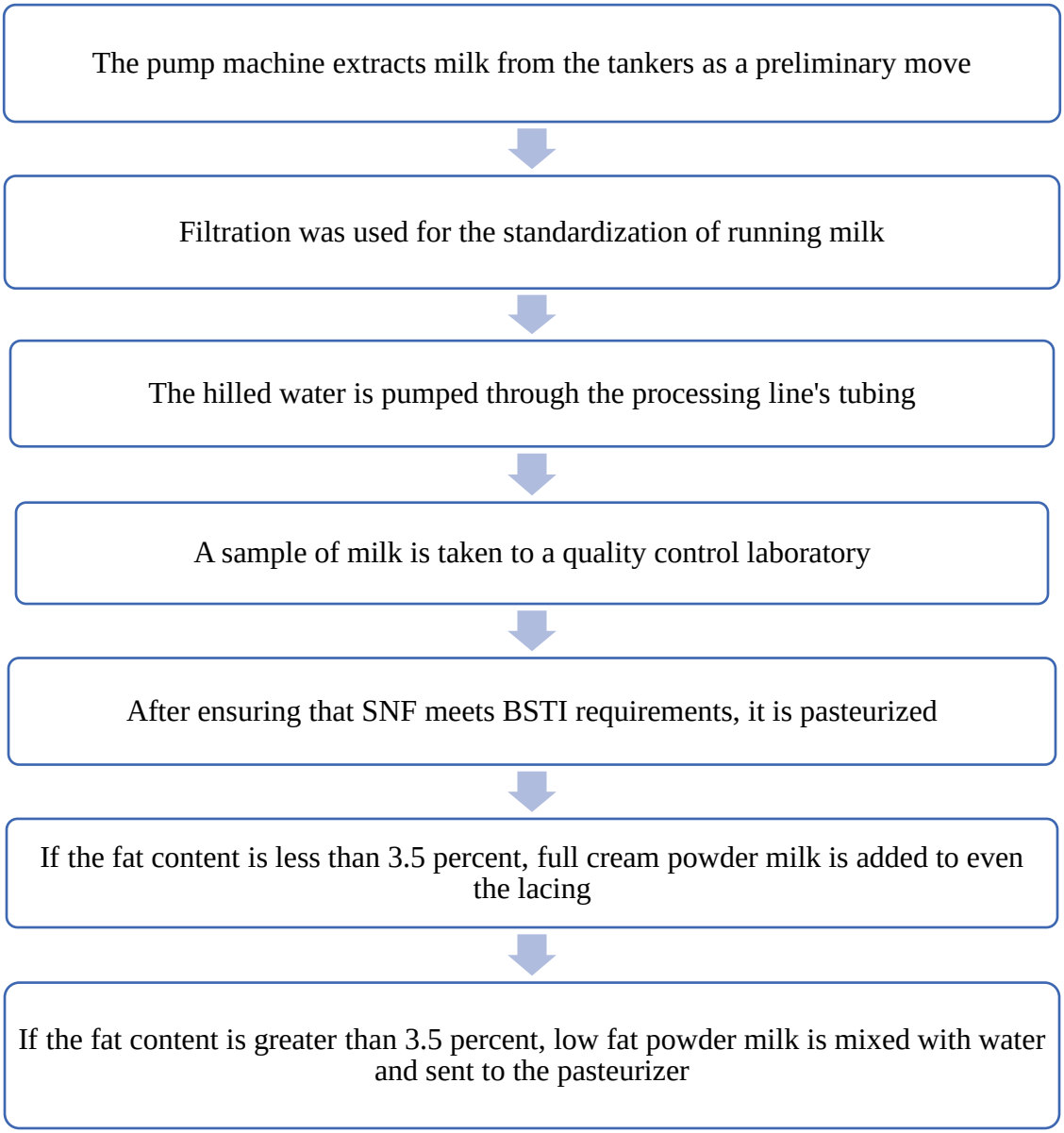

Figure 3: Standardization process

2.5 Pasteurization process

In the pasteurization process, there are two different processes.

Vat pasteurization is a method of treating raw milk to eliminate harmful bacteria and pathogens while preserving its quality. In this process, the raw milk is heated to a temperature of 150°F (66°C) and then held at this temperature for a duration of 30 minutes.

High-temperature short-time (HTST) pasteurization is another method of treating raw milk to ensure its safety and extend shelf life. In this process, the raw milk is rapidly heated to a higher temperature of 161°F (72°C) for a very short duration of only 15 seconds.

Pasteurizer:

Upon closer inspection, the pasteurizer is identified as a heat-exchanging system that follows a specific sequence. The raw milk undergoes heating, holding it for a brief period, and then cooling it. In the MILK VITA industry, a plate heat exchanger is utilized for pasteurization purposes. The raw milk passes through this heat exchanger, where hot water on opposite sides of the plates raises the milk's temperature to a minimum of 72°C. The resultant product is known as pasteurized milk, indicating that it has undergone the pasteurization process.

Figure 4: Pasteurization unit

Pasteurization process flow chart:

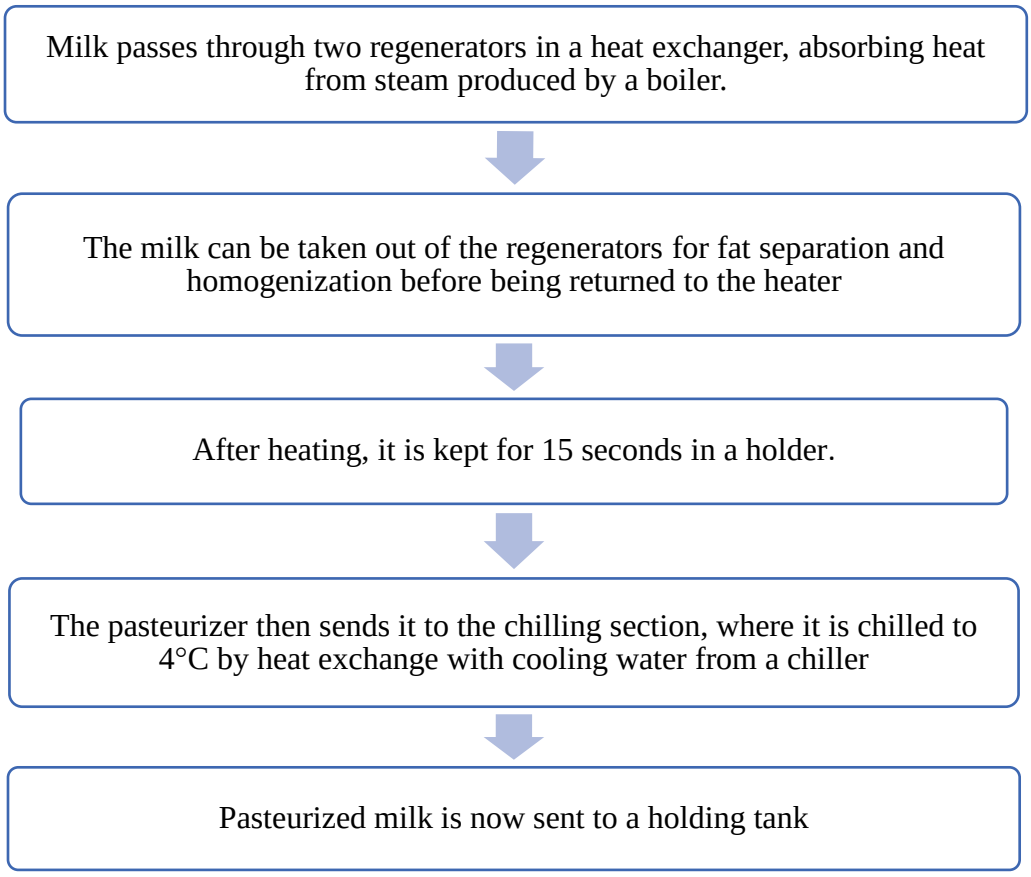

Figure 5: Pasteurization process

2.6 Formulation of different milk products

Table 2.2: Formulation of different milk products

Ingredients	**Ice -cream**				**Chock bar**	**Flavored milk**		
	Chocolate	**vanilla**	**Mango**	**straw berry**		**Chocolate**	**Vanilla**	**Mango**
Std. milk	59	59	59	59	__	52.30	57.66	57.66
Cream (40%)	19	20	20	20	15	__	__	__
Sugar	16	15	15	15	15	9.0	8.0	8.0
S.M.P	5.26	5.05	5.05	5.0	12.66	4.05	3.8	3.8
Stabilizer	0.50	0.50	0.50	0.50	0.50	0.20	0.20	0.20
Cocoa powder	1.50	__	__	__	__	0.70	__	__
Color	0.083	EY: 0.011	EY: 0.033	0.1	EY: 0.04	0.008	0.008	0.033
Flavor	__	0.34	0.20	0.83	0.34	__	0.34	0.20
Water	__	0.36	0.21	0.42	0.32	34.7	29.9	30.1

2.7 Flavored milk process flow chart:

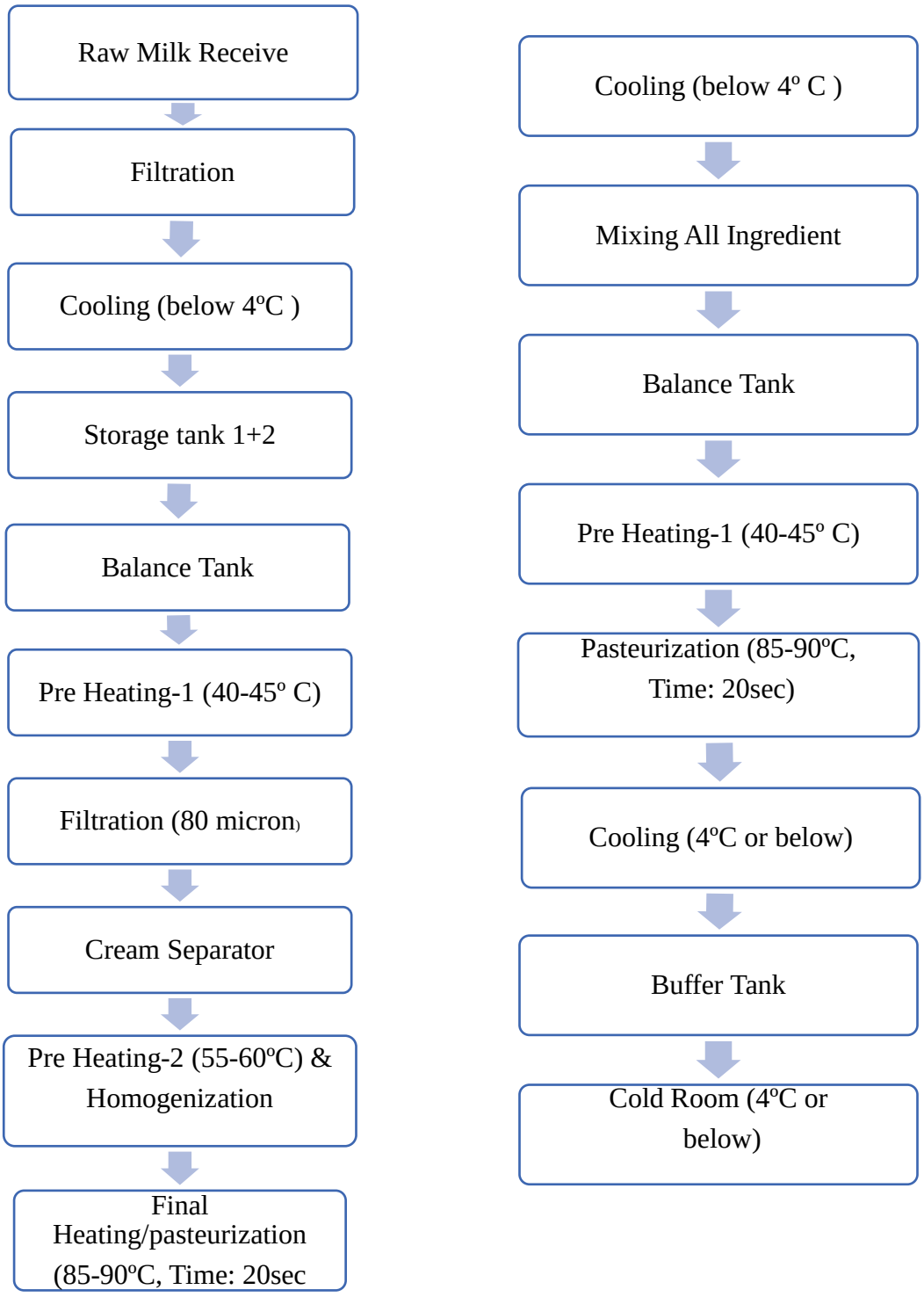

Figure 6: Flavored milk process

2.8 Production of sweet and less sweet Curd:

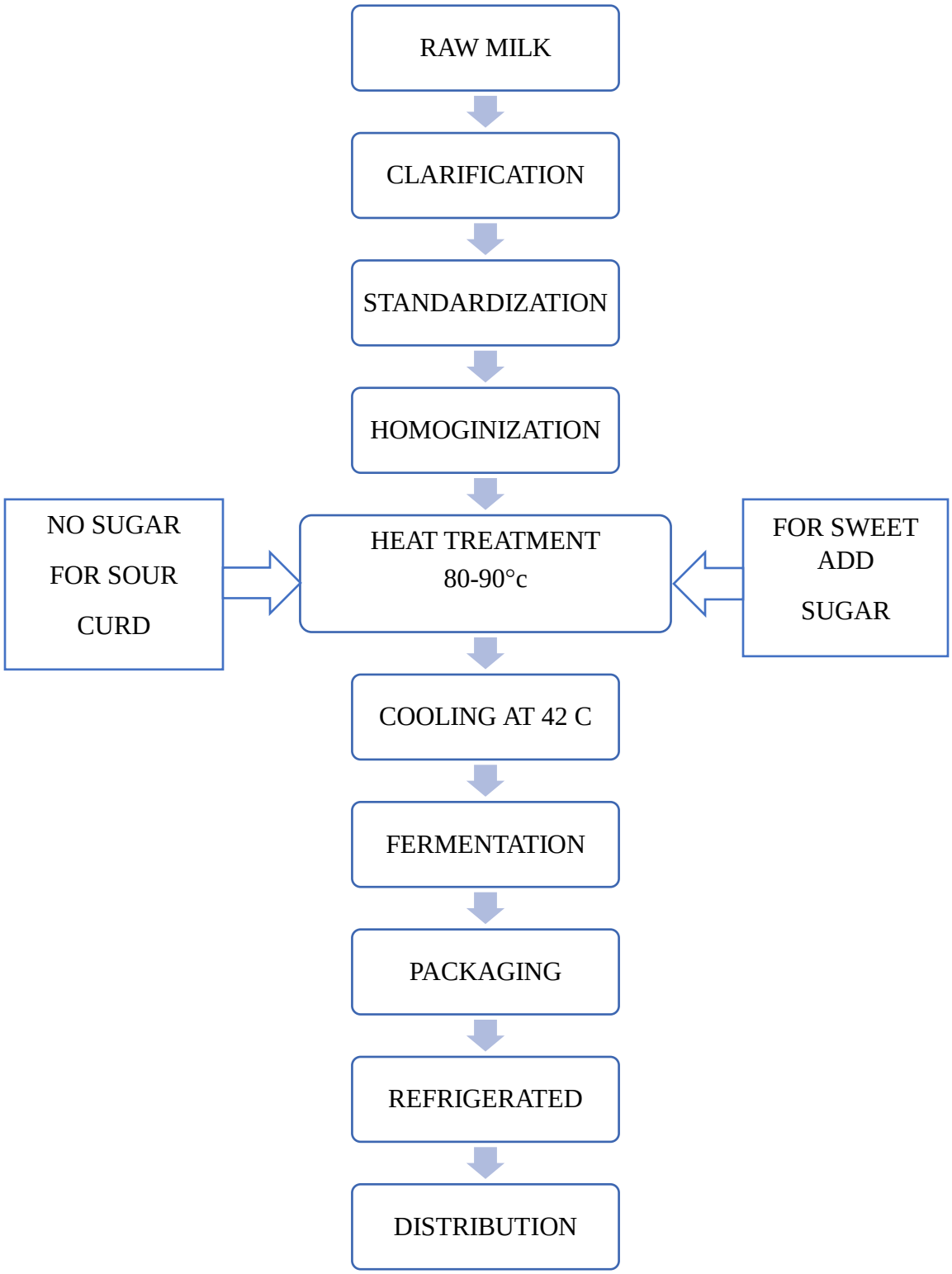

Figure 7: Process of sweet and less sweet Curd

2.9 Formulation of Labang and Matha

Table 2.3: Formulation of Labang

Sl. No	Ingredients	Ingredients %	Fat %	CLR	Quantity Kg
01	Whole milk	626 Liter		28.6	643
02	Sour curd				617
03	Sugar	9%			55.5
04	Salt	0.7%			4.3
05	Treated Water	15%			92.59
06	Total mix				769.25
07	Xanthan gum	0.03%			0.23
08	Total input				769.68

Table 2.4: Formulation of Matha

Sl. No	Ingredients	Ingredients %	Fat %	CLR	Quantity Kg
01	Whole milk	104 Liter		28.6	
02	Sour curd				100
03	Sugar	7%			7.0
04	Salt	0.6			0.6
05	Bit salt	0.25%			0.25
06	Treated Water	17%			17
07	Xanthan gum	0.03%			0.03
08	Total mix				124.85
09	Total input				124.88

2.10 Production of Labang and Matha:

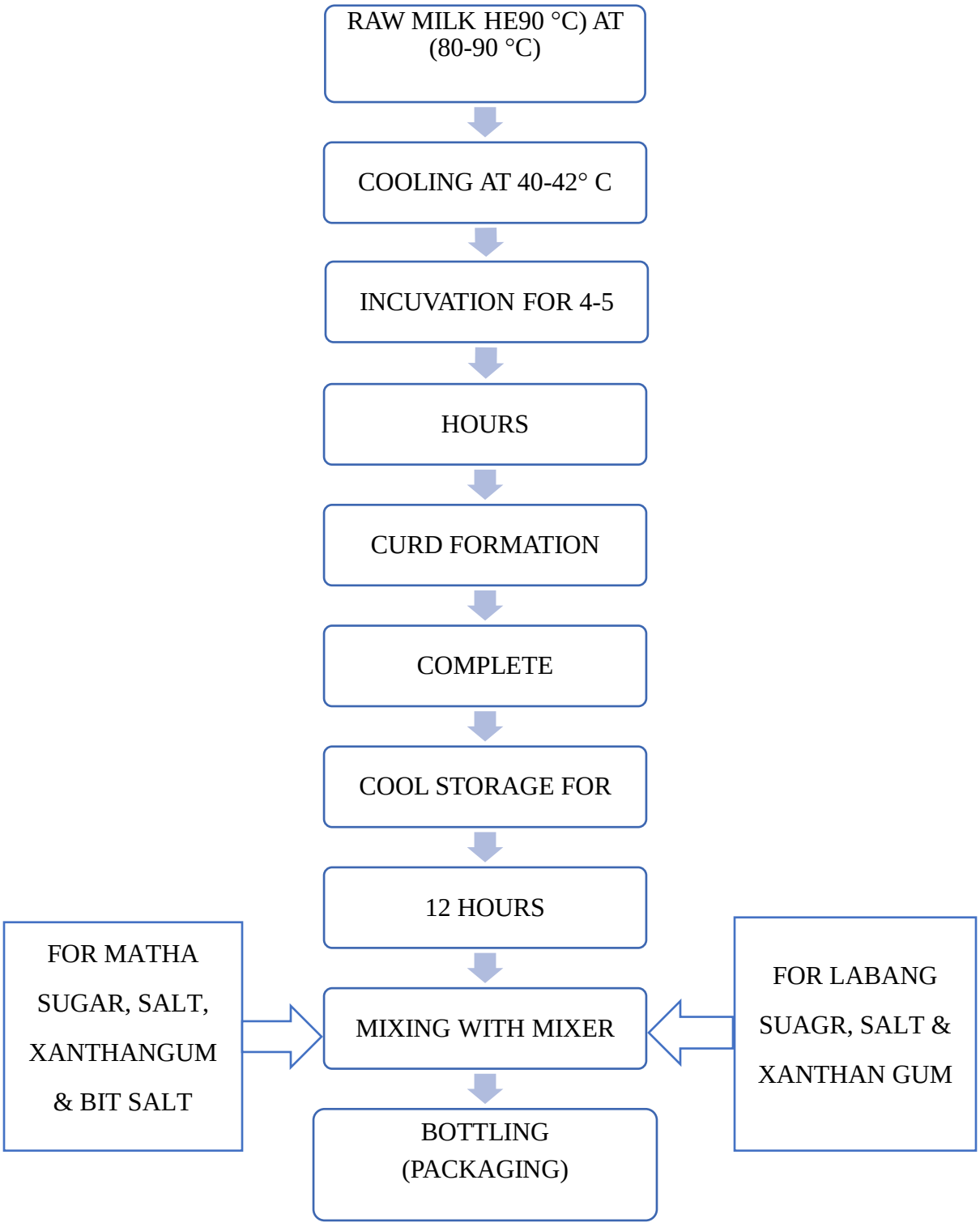

Figure 8: Processing of Labang and Matha

2.11 Production of Ice cream:

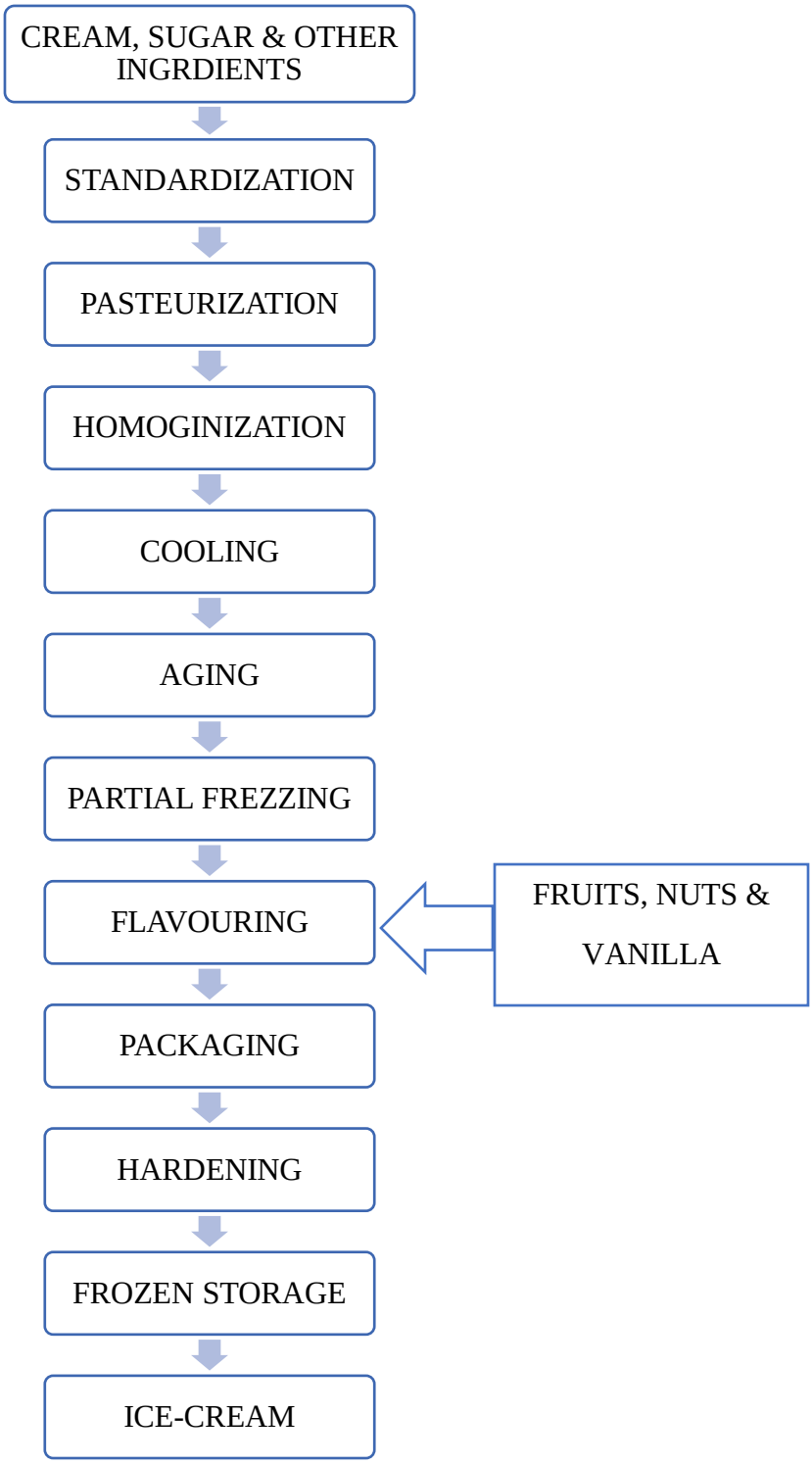

Figure 9: Ice cream processing

2.12 Production of Roshgolla:

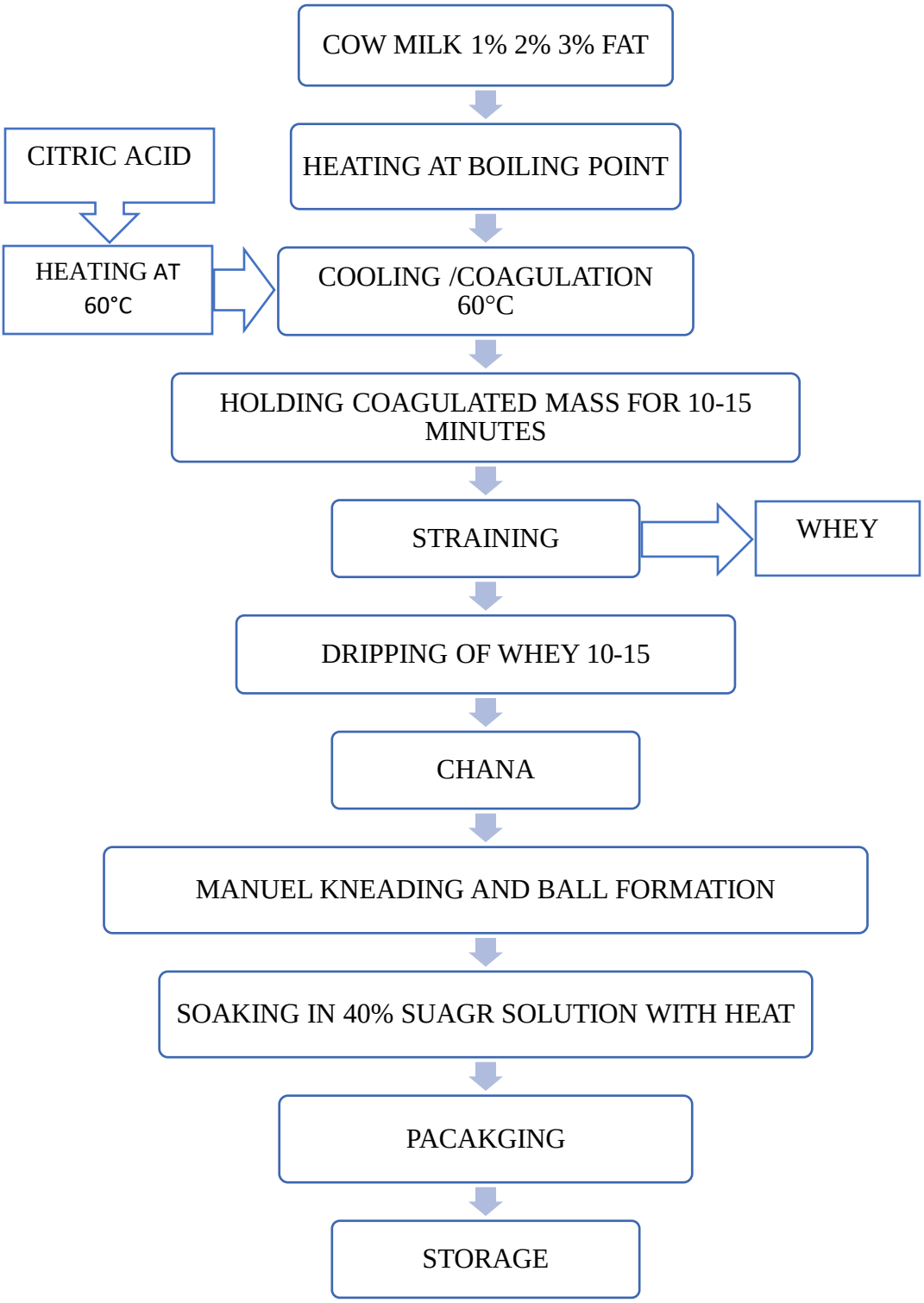

Figure 10: Processing of Roshgolla

2.13 Production of Roshomalai:

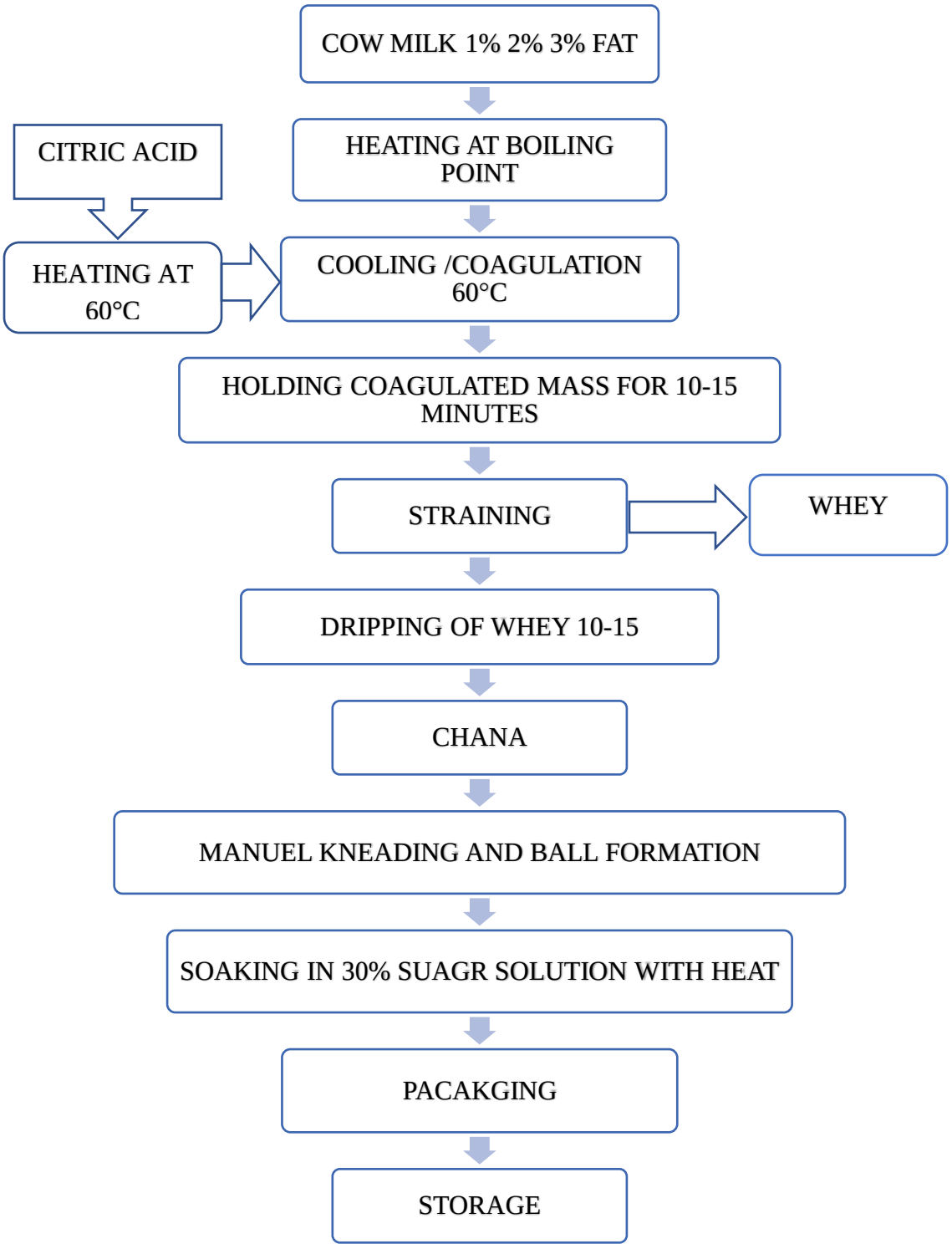

Figure 11: Processing of Roshomalai

CHAPTER 3

QUALITY CONTROL OF LIQUID MILK

3.1 Quality Control of liquid milk

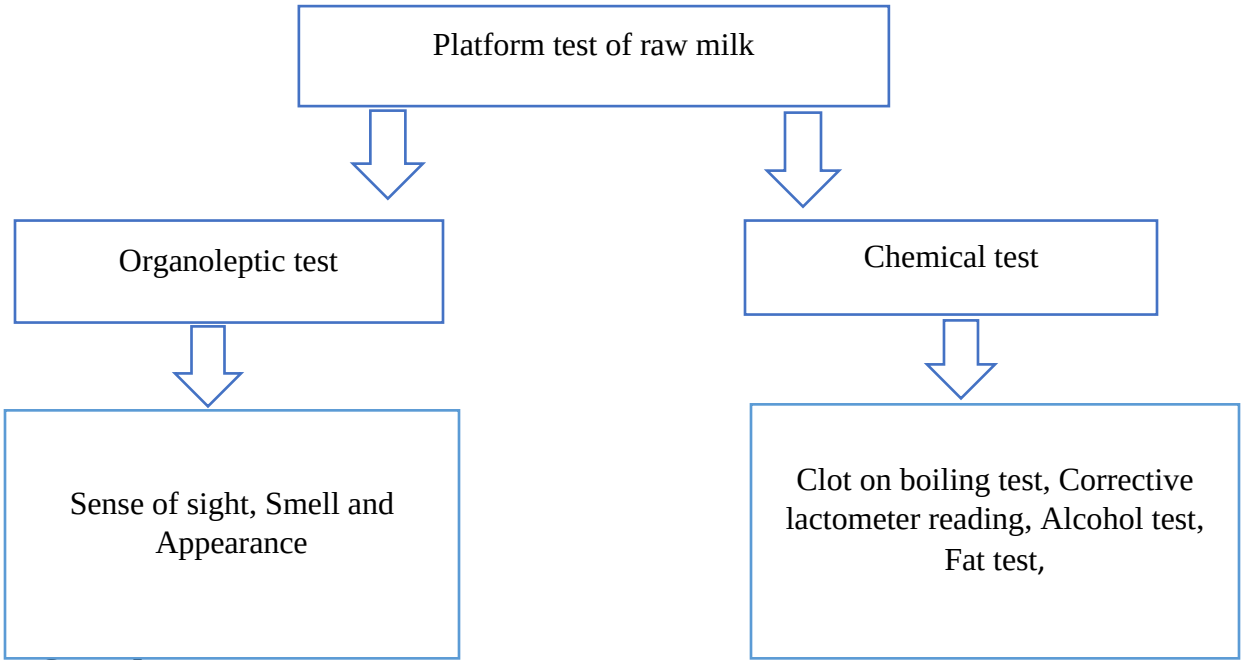

Figure 12: Platform test of raw milk

At the milk-receiving platform, the organoleptic test is conducted to swiftly identify and separate poor-quality milk. This assessment does not require any specific equipment, chemicals, or reagents. Instead, the milk checker relies on their keen senses of vision, smell, and taste to carry out the evaluation effectively.

Procedure:

• Begin by unsealing a milk tanker.

• Swiftly collect a sample of milk and assess its odor.

• Observe the appearance of the milk inside the tanker.

• Inspect the cleanliness of both the can lid and the milk container.

3.2 Clot on Boiling Test (C.O.B)

Chemicals / Equipment Required:

1. Need a test tube to begin.
2. Then need a Spirit Lamp also.

Procedure:

1. In a test tube, 5 mL of milk was taken.

2. Heated the test tube for 2/5 minutes in a spirit lamp.

Result: what we get after observation.

3.3 The Alcohol Test

Chemicals / Equipment Required:

1) Test tube

2. Ethyl alcohol

Procedure:

1. To begin, fill a test tube with 3 mL of milk.

2. Then I added 2ml ethyl alcohol and gave it a good shake for a few minutes.

What we got as a result of the test.

3.4 The Fat percentage of milk test

Chemicals / Equipment Required:

1. Sulfuric Acid 93%

2. Amyl Alcohol 75% (as an indicator)

3. Butyrometer

4. Centrifuge machine

Procedure:

1. Place 10 mL of sulphuric acid into the butyrometer.
2. Utilize a 10.75 ml pipette (specifically for the Garber method) to add 10.75 ml of milk to the butyrometer.
3. Introduce 1 mL of amyl alcohol and shake the mixture vigorously.
4. Centrifuge the butyrometer for 5 minutes.
5. Top up the butyrometer by adding a few drops of water until it is filled.

   What we get in the butyrometer as a result.

3.5 Corrective lactometer reading test (CLR)

There is a particular gravity for milk. The density of milk changes from average to abnormal when it is tainted with water, other chemicals, or foreign particles, or when all wrongdoings are committed. The lactometer test is used to identify changes in density in adulterated milk as well as to standardize the consistency of milk.

Procedure:

1. Gently mix the milk sample and pour it into a measuring cylinder with a capacity of 300-500 ml.
2. Carefully lower the Lactometer into the milk-filled cylinder. Take note of and record the Lactometer reading (°L) just above the milk's surface.
3. If the milk temperature differs from the calibration temperature, adjust the Lactometer reading accordingly. Add 0.2°L for each degree Celsius above the reference temperature and subtract 0.2°L for each degree Celsius below the calibration temperature.

Table 3.1: Corrective lactometer reading

Sample	Milk temperature	Lactometer reading	Correction	True reading
No.1	17	29.2	-0.6	28.6
No.2	20	28.6	Nil	28.6
No.3	25	27.6	+1.0	28.6

CHAPTER 4

CLEAN IN PLACE (CIP)

4.0 Clean in place:

Cleaning of the dairy plant's internal surfaces, such as pipelines, boats, and reserve tanks, to prevent contamination of the processed product.

CIP at milk vita:

In Milk Vita, Clean-In-Place (CIP) is a crucial aspect of their quality control measures. Regular cleaning of all milk processing equipment is necessary after several months. CIP is essential in the dairy industry to uphold rigorous hygiene and safety standards. The effectiveness of cleaning and sanitation of milk contact surfaces in Milk Vita is influenced by various factors, including the nature of the contamination, surface microtopography, passage straightness, compatibility of cleaning agents, application methods, application speed, and penetration rate into a biofilm. These factors are standardized to ensure efficient cleaning and sanitation processes.

Cleaning solution in CIP:

Milk Vita used the NaoH solution to clean surface and processing pipelines, reserve tanks, vessels, and VAT production equipment with hot water.

Cleaning procedure:

As per the Dairy Practice Council (1993), the cleaning method employed at the Dhaka dairy factory involves the following steps:

1. Dissolve the appropriate quantity of a well-balanced heavy-duty alkaline circulation cleaner in cold water within a bucket, resulting in a cleaning solution with a causticity concentration ranging from 0.7 to 1.0 percent.

2. Pour the prepared cleaner directly into the surge tank.

3. Circulate the alkaline cleaning solution at a temperature of 175°F for a duration of 30 to 45 minutes.

CHAPTER 5

CONCLUSION

Bangladesh Milk Producers Co-operative Union Ltd. (BMPCUL) stands as a prominent cooperative organization in the country's dairy sector. I am grateful for the opportunity to be a part of this organization, where mentors have been genuinely supportive. They have given me ample opportunities to share my ideas and insights concerning different aspects of the production and quality control division. I believe this experience will prove invaluable in the real world. The entire journey has been highly educational and practical, as it exposed us to various stages of dairy production and quality control in different industrial settings.

REFERENCE

Bangladesh Milk Producers Co-operative Union Limited (BMPCUL) (n.d.). *Dairy Processing Industry*. Milk Vita. http://www.milkvita.org.bd/