AN INTERNSHIP REPORT ON

STUDY ON PRODUCTION AND QUALITY CONTROL OF DAIRY PRODUCTS AT BANGLADESH MILK PRODUCERS' CO-OPERATIVE UNION LIMITED [MILK VITA] "DHAKA DAIRY PLANT"

Submitted To,

Dr. Nizam Uddin

Associate Professor & Head

Department of Nutrition & Food Engineering.

Faculty of Allied Health sciences.

Daffodil International University.

Supervised By,

Juwel Rana

Lecturer (Senior Scale)

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Submitted By,

Md. Rabiul Awal

ID: 191-34-174

Department of Nutrition and Food Engineering.

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Daffodil International University.

Date of Submission: 19 January 2023

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LETTER OF TRANSMITTAL

Date: 19 January 2023

To

Dr. Nizam Uddin

Associate Professor & Head

Department of Nutrition & Food Engineering

Faculty of Allied Health sciences

Daffodil International University

Subject: Submission of internship report.

It is a great pleasure and honor for me to have an opportunity to submit an internship report as a part of the Nutrition and Food Engineering (NFE) program curriculum. I have prepared this report based on the acquired knowledge during my internship period at Bangladesh Milk Producers' Co-operative Union Limited (Milk Vita). It is a great achievement to work under your active supervision. This Report is based on, a study on the production and quality control of dairy products at Bangladesh Milk Producers' Co-operative Union Limited [milk vita] "Dhaka dairy plant".

I have got an opportunity to work in Bangladesh Milk Producers' Co-operative Union Limited (Milk Vita-Mirpur section 7). In the department of "Production and Quality Control" for 60 days, under the supervision of Md. Mahmud Rajib Hasan, Deputy Manager (Production) [Dhaka Dairy Plant]. First of all, I have gained knowledge about the organizational culture of a prominent producing organization in the country. Secondly, the project allowed me to develop a network in the corporate environment.

I therefore, would like to place this report to your judgment and suggestion. Your kind advice will encourage me to perform better planning in the future.

Sincerely Yours,

……

Md. Rabiul Awal

ID: 191-34-174

Department of Nutrition and Food Engineering.

Faculty of Allied Health Science.

Daffodil International University.

LETTER OF AUTHORIZATION

Date: 19 January 2023

To

Dr. Nizam Uddin

Associate Professor & Head

Department of Nutrition & Food Engineering

Faculty of Allied Health Science

Daffodil International University

Subject: Declaration regarding the validity of the internship report.

This internship report is entitled knowledge and extension the practice of "Studies on Production and Quality Control of dairy products at Bangladesh milk producers' co-operative union limited [Milk Vita] "Dhaka dairy plant". It was submitted to the Department of Nutrition and Food Engineering, Faculty of Allied Health Science, Daffodil International University, Ashulia, Dhaka, Bangladesh.

This study was fully concerned with the department and faculty members.

Sincerely Yours,

……

Md. Rabiul Awal

ID: 191-34-174

Department of Nutrition and Food Engineering.

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Daffodil International University.

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LETTER OF RECOMMENDATION

I am pleased to certify that the internship report on the Production and Quality Control of dairy products, At Bangladesh Milk Producers' Co-Operative Union Limited [Milk Vita] "Dhaka Dairy Plant". Conducted by Md. Rabiul Awal, bearing respectively ID No: 191-34-174 of the Department of Nutrition and Food Engineering has been approved for presentation and Defense/viva voice.

I am glad to certify that the facts and conclusions contained in the report are the genuine work of Md Rabiul Awal. I strongly recommended the report presented by Md Rabiul Awal for further academic recommendations and defense or viva-voice. Md Rabiul Awal bears a strong moral character and a very pleasant personality. It has indeed been a great pleasure working with him.

I wish him all success in life.

……

Juwel Rana

Lecturer (Senior Scale)

Department of Nutrition and Food Engineering.

Faculty of Allied Health Science.

Daffodil International University.

CERTIFICATION OF APPROVAL

This is to certify that the Internship report on the Production and Quality Control of dairy products, At Bangladesh Milk Producers' Co-Operative Union Limited [Milk Vita] "Dhaka Dairy Plant". Conducted by Md. Rabiul Awal, bearing respectively ID No: 191-34-174 of the Department of Nutrition and Food Engineering. Worked under my guidance on his internship project, and he has completed this report and has been approved for presentation and Defense/viva voice.

I am glad to hereby certify that the data and findings presented in the report are the authentic work of Md Rabiul Awal and he bears a strong moral character and a very pleasant personality.

I wish him all success in life.

…….

Dr. Nizam Uddin

Associate Professor & Head

Department of Nutrition & Food Engineering.

Faculty of Allied Health sciences.

Daffodil International University.

ACKNOWLEDGEMENT

In the preparation of this report, I would like to acknowledge the encouragement and assistance given to me by some people. First, I would like to express my gratitude to almighty Allah for enabling me the strength and opportunity to complete the report in the times successfully. I am taking this privilege to deliver my gratefulness to every people who are involved with me in every phase of my life. I am grateful to my parents, teachers, and my friend without whom I cannot be here. Without the support of my parents, teachers, and my friend, I could not be able to achieve my objectives and goals. I am deeply indebted to my Supervisor Mr. Md. Juwel Rana, Lecturer (Senior Scale), Department of Nutrition and Food Engineering, Faculty of Allied Health Science, Daffodil International University for his whole-hearted supervision during my organizational attachment period. I am encouragement taking this privilege to deliver my gratefulness to every people who are involved with me in every phase of my life. My Deep regard and sincere thanks to the honorable Head, of the Department of Nutrition and Food Engineering, Dr. Nizam Uddin for this kind cooperation and to accept this, Degree. I am very grateful to Sheikh Nadir Hossain Lipu, Chairman of Milk Union for permitting us to carry out this internship in this organization. I am also grateful to Md. Mahmud Rajib Hasan, Deputy Manager (Production) [Dhaka Dairy Plant]. I am also grateful to Md. Alimun Nabi, Manager, Administration of Milk Union. It would have been very difficult to prepare this report up to this mark without their guidance I would like to express my warmest thanks to Nutrition and Food Engineering Faculty members for their countless inspiration and encouragement during student life. Finally, I wish to express immense gratitude & humbly convey my heartfelt respect to the Chairman of Milk Union.

Executive Summary

The Internship was conducted at Bangladesh Milk Producers' Co-Operative Union Limited. [Milk Vita] "Dhaka Dairy Plant" from 29th September to 29th November 2022. I have learned the production procedure of different types of dairy products as well as their quality control. They follow some process for making or producing this product. They have their plant-designed flow diagram. They mainly perform physical, chemical, and microbiological tests for quality control. The major objective of this report is to identify the actual production process flow and also quality measurement to ensure quality control. My report is based on the production of milk and its byproducts and assurance of quality measurement. I observed and worked in milk production for 15 days and byproduct production for 15 days and work in the quality control unit for 30 days. The report contains information about the organization itself, the process flow of each product, and the laboratory test.

CONTENTS

Chapter

<u>One</u>

Introduction

1.1 Introduction

In four years of Bachelor of Science in Nutrition and Food Engineering, I got an opportunity in my last semester to work at Bangladesh milk producers' co-operative union limited "Dhaka dairy plant [Milk Vita]" as a part of my internship program. The duration of my internship was two months, six days a week. Milk Vita is one of the top milk producer organizations in Bangladesh regulated by the government. The divisions are – HR and Admin, Quality Control, Research and Development, Production, Electrical, Mechanical, Store, Distribution, Accounts, Vat, Civil, Resources, Hygiene, and so forth.

As a student of Nutrition and Food Engineering at Daffodil International University, ten students got the opportunity to complete their internship in two months. My concern was Production Department & Quality Control Department which encompassed the following activities.

- Maintain all quality management parameters following the defined criteria.
- Make certain that the spirit of innovation and development is preserved.
- Understanding of item costing and production.
- Maintain quality control parameters as per specification in Bangladesh Standard.
- Ensure quality of production.
- Knowledge of product costing.
- Prepare & submit necessary reports required by the management.
- They always focus on product quality, not on the advertisement.
- They achieved national and international certificates like BSTI, ISO, and HACCP.

1.2 Aim of The Internship

Internships provide an opportunity for students to link theory with practice and further serve as a temporary labor pool for those agencies that have committed to participate in the internship program. The department fulfills its mission of preparing students for significant professional and managerial positions in all sectors. Relevant professional development topics and workshops are discussed every day.

- The Internship Provides a student with a practical real-world experience in the public, private or nonprofit sectors.
- Students develop important public administration skills which cannot be taught in the classroom.
- These experiences vary from working on special projects for the interning agency to learning about the human motivation process in a complex organization.
- A student to compare theoretical ideas learned in the classroom with the world of work regarding public administration experiences.
- Permits a student to apply the technical skills learned in the classroom to the real world. public, private, or no, nonprofit administrative problems.
- Know about the organization's environment and its policy.
- This is the best education system for knowing and learning hand to hand.

Chapter Two

Description of The Organization.

2.1: History of Milk Vita

In 1946, the Late M. Mukhlesur Rahman Pioneer of Dairying in Bangladesh a Dairy Plant with a capacity of 2,000 liters per day was established at Lahirimohanpur, Pabna (presently Sirajganj) with the target to send milk products to Calcutta (India) market that was within the easy rail communication system. After the partition, Eastern milk Products Limited, a private company purchased this dairy in 1952 from the original owner. In 1965, the first milk producers' co-operative was formed under the name Eastern Milk Producers' Co-operative Union Limited (EMPCUL) through Government patronization over the plant at Lahirimohanpur, which has been taken a special step (1973-1978) by The Father of nation Bangabandhu Sheikh Mujibur Rahman for the poverty alleviation and to enhance the milk production in the country.

The dairy plants were owned and operated by the Eastern Milk Producers' Co-operative Union Ltd. along with the other two existing dairies**. The nomenclature of the organization was changed to Bangladesh Milk Producers' Co-operative Union Ltd. In 1977 keeping its Brands name of products the same, MILK-VITA.

Bangladesh Milk Producers' Co-operative Union Ltd. popularly known by its brand name Milk Vita, was established by the Bangladesh Government in 1973, immediately after the liberation war, based upon the recommendation by UNDP/FAO and DANIDA in the pattern of AMUL, India. It was initiated as a development project of the Government titled "Co-operative Dairy Complex" to ensure fair prices for the poor, landless, and marginal milk-producing farmers of rural Bangladesh and on the other hand to provide the city dwellers with a regular supply of fresh and hygienic milk and milk products at a reasonable price. The scheme had the proposal of establishing dairy plants in the milk surplus areas already identified as Pabna, Tangail, Manikganj, and Faridpur. Pion The Government started the implementation of the program in its First Five-Year Plan (1973-78). The plants were to operate through a collection of milk by a network of milk producers' cooperative societies in milk-shed areas. The project envisages the purchase of milk from individual farmer members of the primary milk producers' societies, twice daily, and the transport of this milk to rural dairy plants of Tangail, Manikganj, and Faridpur by a combination of various methods of transportation. After preliminary processing at the rural plants, milk is to be transported to Dhaka in insulated road milk tankers for processing, packing, and marketing

of pasteurized Liquid Milk and Milk Products. Milk collected at the Baghabari ghat Plant from its surrounding societies is to be converted into Butter, Powder Milk Ghee, etc. All the products, however, are to be marketed through Dhaka Marketing Unit. The Head Office is named "Dugdha Bhaban" of the organization. Milk Vita is a service-oriented as well as a commercial organization. It is the biggest and only co-operative-based milk industry in Bangladesh. Following the co-operative's acts & rules it is lead by itself. It's a profitable organization. Despite various limitations, it is trying hard to gain self-sufficiency in the dairy sector.

** There was another dairy plant, ASTO Dairy at Dhaka run by the National Co-operative Marketing Society which was amalgamated with the EMPCUL in 1973 (Eastern Milk Producers' Co-operative Union Limited).

2.2: DESCRIPTION OF THE ORGANIZATION

Bangladesh Milk Producers Co-operative Union Limited is one of the largest national-level cooperative organizations in Bangladesh. In Bangladesh, Milk vita is the parent company that produces liquid milk and other dairy products.

The main objectives of the Establishment of Milk Vita were

- To increase small farmers' family income in rural milk pockets by moving the remunerative year-round cash market for milk to the cooperative system.
- Assurance of support facilities for village livestock production activities.
- To ensure that the metropolitan population has a sufficient supply of hygienic milk and dairy products.
- Creating single-purpose primary Village Milk Producer Co-operative Societies in rural areas for underprivileged and landless people.
- Villagers are receiving training in milk production and productivity enhancement technologies, as well as a cooperative management structure.
- Establishing self-sustaining livestock support and advisory services, as well as credit schemes for livestock.
- Milk collection systems are being installed.
- Organizing milk-inappropriate marketing schemes are appropriate, such as urban Milk Distributor Cooperatives.
- Commercializing the apex Milk Union at the secondary stage.
- Coordinating and planning the cooperative dairy business, including developing a National Cooperative Dairy Development Plan.

2.3: PRODUCT PRICES OF MILK VITA

Serial No.	Product Name & Packet Size	Consumer Price (Rs.)
1.	**Standardized Pasteurized Milk-** 1-liter packet	80.00
	½ liter packet	45.00
	¼ liter packet	25.00
	200 ml packet	20.00
	Bulk liter (25 Liter)	69.50 Per liter
2.	**Pasteurized Toned Milk**- 1-liter packet	65.00
	½ liter packet	40.00
3.	**Flavor milk**- 200ml: Packet	25.00
4.	**Labang-** bottle: 500ml	65.00
	Bottle: 250ml	35.00
5.	**Matha**- Bottle:200ml	30.00
6.	**Cream-** per kg	450.00
	Butter- 500 grams (packet)	500.00
	200 grams (packet)	230.00
	100 grams (packet)	120.00
	Bulk (1 kg)	950.00
	Bulk (5 kg)	4700.00
	Bulk (10 kg)	9200.00
7.	**Butter-** 500 grams (packet)	500.00
	200 grams (packet)	230.00
	100 grams (packet)	120.00
	Bulk (1 kg)	950.00
	Bulk (5 kg)	4700.00
	Bulk (10 kg)	9200.00
8.	**Ghee-** 5 kg Tin cans	7500.00
	900 g Tin cans	1420.00
	400 g Tin cans	650.00
	200 grams Tin cans	350.00
9.	**Nani Powder**- 1 Kg Packet	750.00
	500-gram packet	375.00
	400-gram box	260.0
	In bulk per kg (25 kg)	650.00
10.	**Non-Nani Powdered Milk-** 1 Kg Packet	650.00
	500-gram packet	325.00
	Bulk per kg (25 kg)	520.00

Serial No.	Product Name & Packet Size	Consumer Price (Rs.)
11.	**Chocolate**- 20-gram packet	15.00
12.	**Ice cream**- 2-liter box	400.00
	1-liter box	235.00
	½ liter box	125.00
	Cup 100ml	25.00
13.	**Choco bar** -48 ml (Single pack)	25.00
14.	**Lolli's**- 48 ml (Single pack)	12.00
15.	**Rosmalai**- 1 liter box	400.00
	½ liter box	200.00
16.	**Sweet curd / Dodhi**- 1 liter box	210.00
	½ liter box	120.00
	100ml Single cup	25.00
17.	**Sour curd**- 1-liter box	175.00
	½ liter box	100.00
	100ml Single cup	25.00
18.	**Rasgolla**- 1 kg box	350.00
	500-gram box	175.00
19.	**Chana Sondesh**- 1 kg box	550.00
	500-gram	280.00
20.	**Para sondesh**- 1 kg box	530.00
	500-gram box	270.00
21.	**Cheese**- 400 grams box	450.00
	200-gram box	230.00
22.	**Cake**- 500 g Fruit Cake	175.00
	500-gram plain cake	165.00
23.	**Special Cake**- 400 g Fruit Cake	170.00

Chapter Three

Production Procedure.

3.1: PRODUCT DESCRIPTION OF MILK VITA (Dhaka Dairy Plant)

The following milk and dairy products are produced in Milk Vita (Dhaka dairy plant) on daily basis:

1. Standardized Pasteurized Milk.
2. Pasteurized Toned Milk.
3. Flavored Milk (Chocolate)
4. Ice cream. Vanilla and Mango Flavor. (Choco-bar, ice lolly, Cup, and container).
5. Curd / Dodhi (Sweet and sour)
6. Labang
7. Matha
8. Sweetmeat (Rasmalai & Rasgolla),
9. Para sondesh, and Chana sondesh.

3.2: primary Process flow of Milk vita.

Raw Milk Receiving Dock at the Chilling Plant.

↓

Platform Test & Adulteration Test.

↓

Receiving at Chilling Vat

↓

Chilling

↓

Qualitative and Quantitative Test of Chilled Raw milk

↓

Loading in Road Milk Tanker for Transport to the Process plant

↓

Platform Test

↓

Unload (Filtration with 3µ mash filter)

↓

Received Chilled Milk in Receiving Vat of processing Plant for Using Produce different Types of Milk Products.

3.3: Process Flow of Standardized Pasteurized Milk:

Ingredients: Raw Milk, SMP, and Treated water.

Milk Sampling by Planzaring from Road milk Tanker

↓

Platform Test + Adulteration Test (COB, Alcohol, Soda, Formalin, Uria)

↓

Unloading (Receiving Vat)

↓

Quantitative Test of Milk (Fat, CLR, SNF, Salt, Sugar)

↓

Standardization (Adding SMP and Water)

↓

Pasteurization (85℃~ 95℃ for 20 sec)

↓

Homogenization (1500 rpm)

↓

Colling (Between 4℃~6℃ within 20sec)

↓

Storage / Stock Batch Vat (with continuous homogenization)

↓

Qualitative & Quantitative Tests (Fat, CLR, Per-oxidase, Hydrogen peroxide, Microbial Test)

↓

Filling and Packaging (On line Quality Check)

↓

Storage (Below 4℃)

(Ready for distribution and consumption)

3.4: Process Flow of Pasteurized Toned Milk:

Ingredients: Raw Milk, SMP, and Treated water.

Milk Sampling by Planzaring from Road milk Tanker

↓

Platform Test + Adulteration Test (COB, Alcohol, Soda, Formalin, Uria)

↓

Unloading (Receiving Vat)

↓

Quantitative Test of Milk (Fat, CLR, SNF, Salt, Sugar)

↓

Standardization (Adding SMP and Water)

↓

Pasteurization (85℃ ~ 95℃ for 20 sec)

↓

Homogenization (1500 rpm)

↓

Colling (4℃ ~ 6℃ within 20sec)

↓

Storage / Stock Batch Vat (with continuous homogenization)

↓

Qualitative & Quantitative Tests (Fat, CLR, Per-oxidase, Hydrogen peroxide, Microbial Test)

↓

Filling and Packaging (On line Quality Check)

↓

Storage (Below 4℃)

(Ready for distribution and consumption)

3.5: Process Flow of Flavored Milk (Chocolate):

Ingredients: Standardized Pasteurized milk, Flavor, Sugar, SMP, Stabilizer, and Treated Water.

Ingredients Preparation

↓

Mixing Vat

↓

Standardization (Adding SMP and Water)

↓

Pasteurization (85℃ ~ 95℃ for 20 sec)

↓

Homogenization (1500 rpm)

↓

Colling (Between 4℃ ~ 6℃ within 20sec)

↓

Storage / Stock Batch Vat (with continuous homogenization)

↓

Qualitative & Quantitative Tests (Fat, CLR, Per-oxidase, Hydrogen peroxide, Microbial Test)

↓

Filling and Packaging (On line Quality Check)

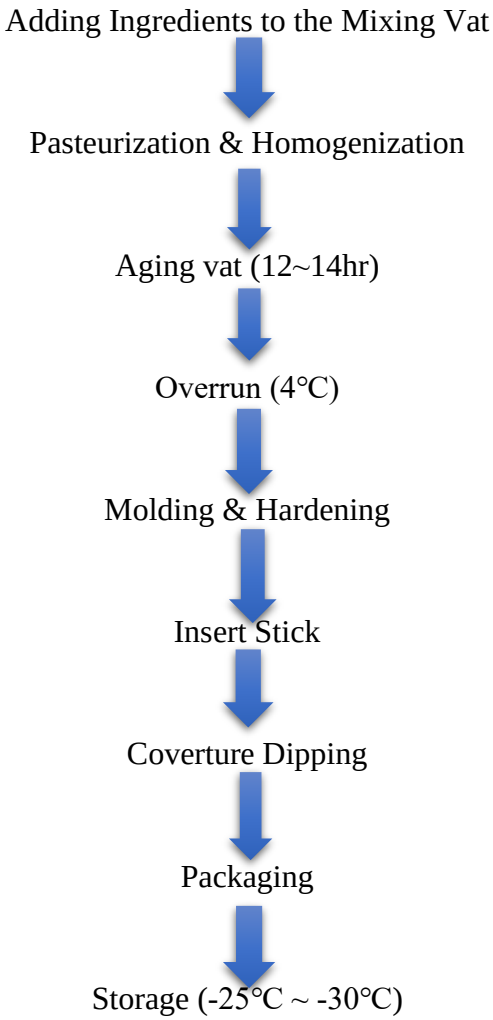
↓

Storage (Below 4℃)

(Ready for distribution and consumption)

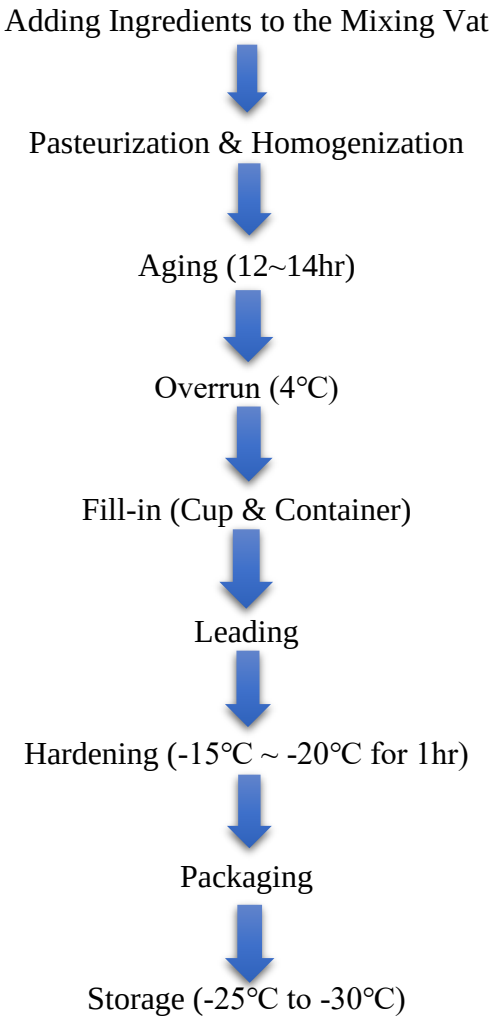
3.6: Process Flow of Ice Cream: (Choco bar)

Ingredients: Standardized pasteurized milk, Butter, Vanilla flavor, Chocolate.



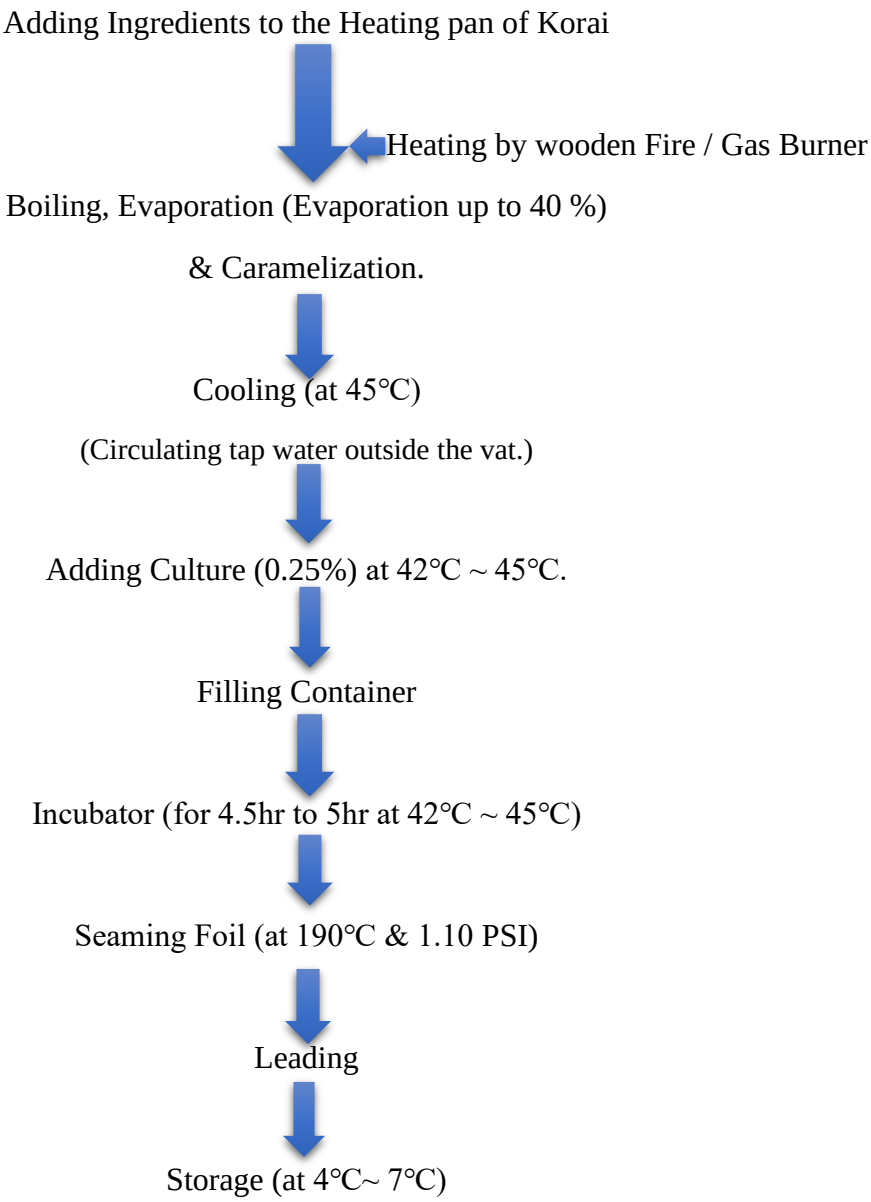
3.7: Process Flow of Ice Cream: (Cup & Container)

Ingredients: Standardized pasteurized milk, Butter, Vanilla flavor.



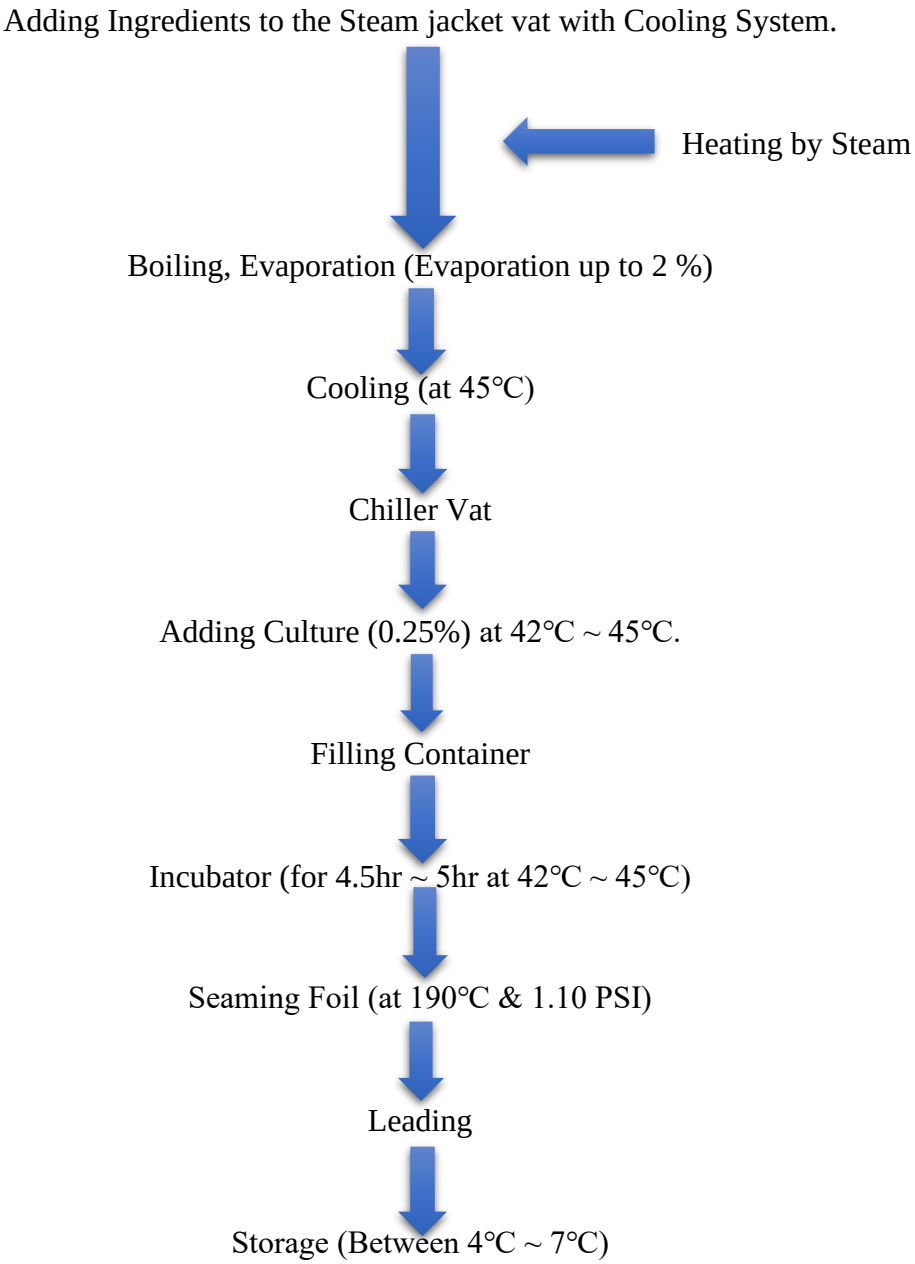
3.8: Process Flow of Sweet Curd/ Dodhi:

Ingredients: Standardized Milk, Sugar, Green Cardamom, Yogurt Culture.



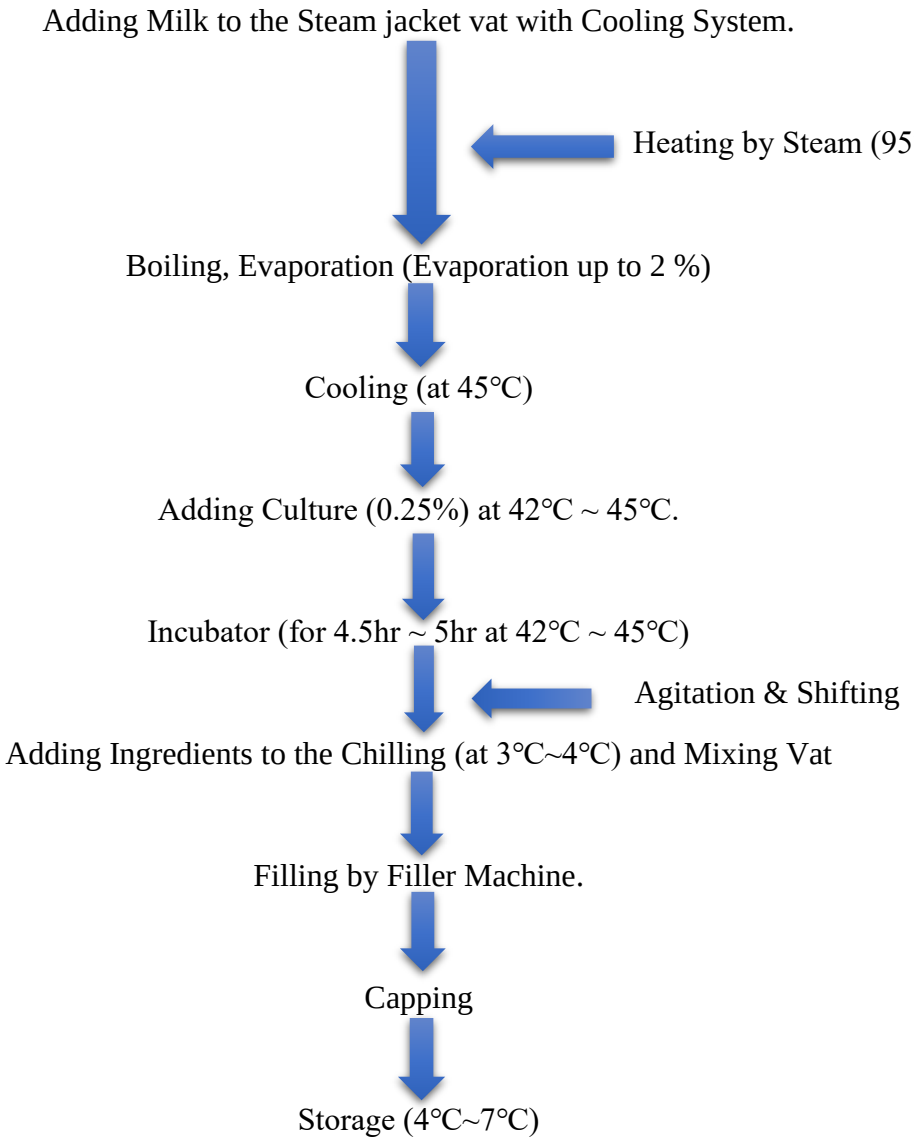
3.9: Process Flow of Sour Curd/ Dodhi:

Ingredients: Standardized Milk, SMP, Green Cardamom, Yogurt Culture.



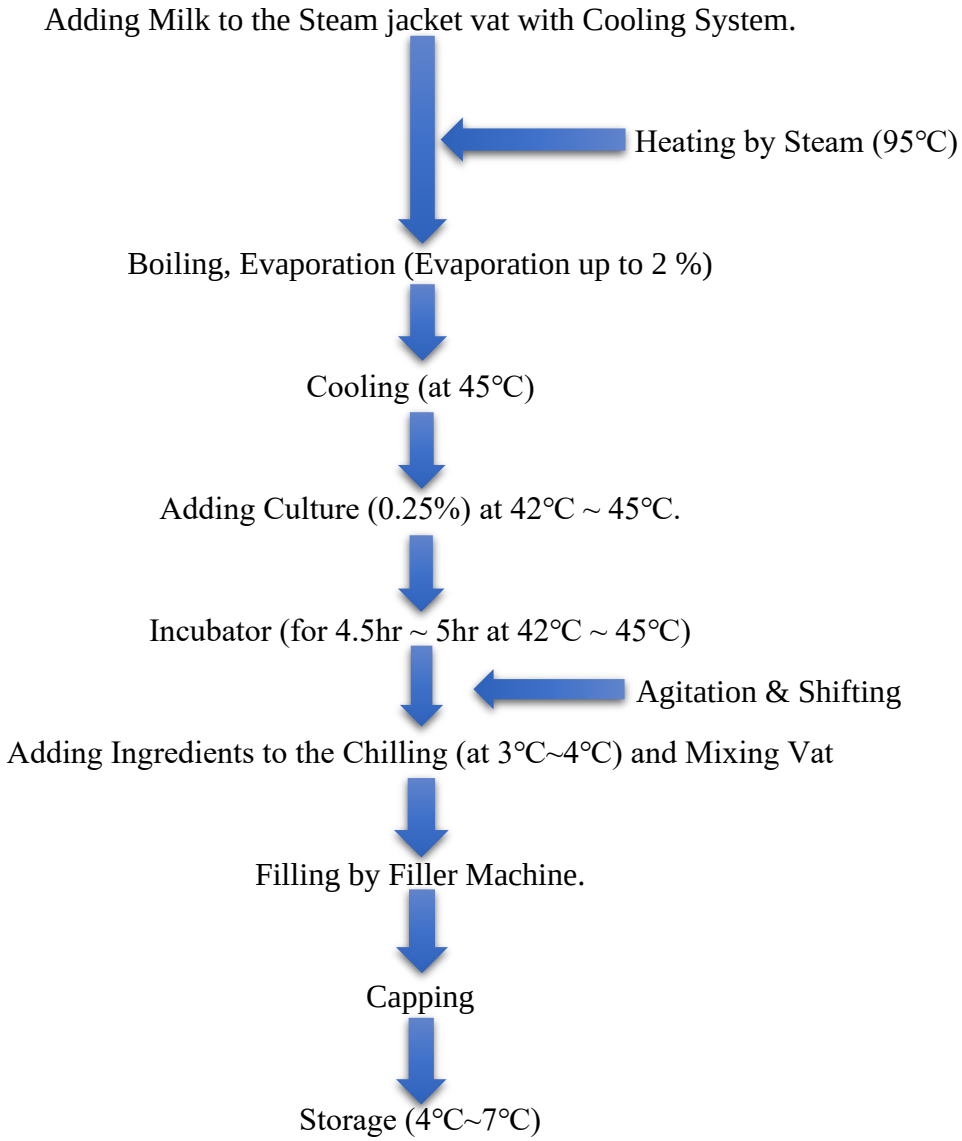
3.10: Process Flow of Labang:

Ingredients: Toned Milk, SMP, Yogurt Culture, Sugar, Salt, Xanthan Gum, and Treated Water.



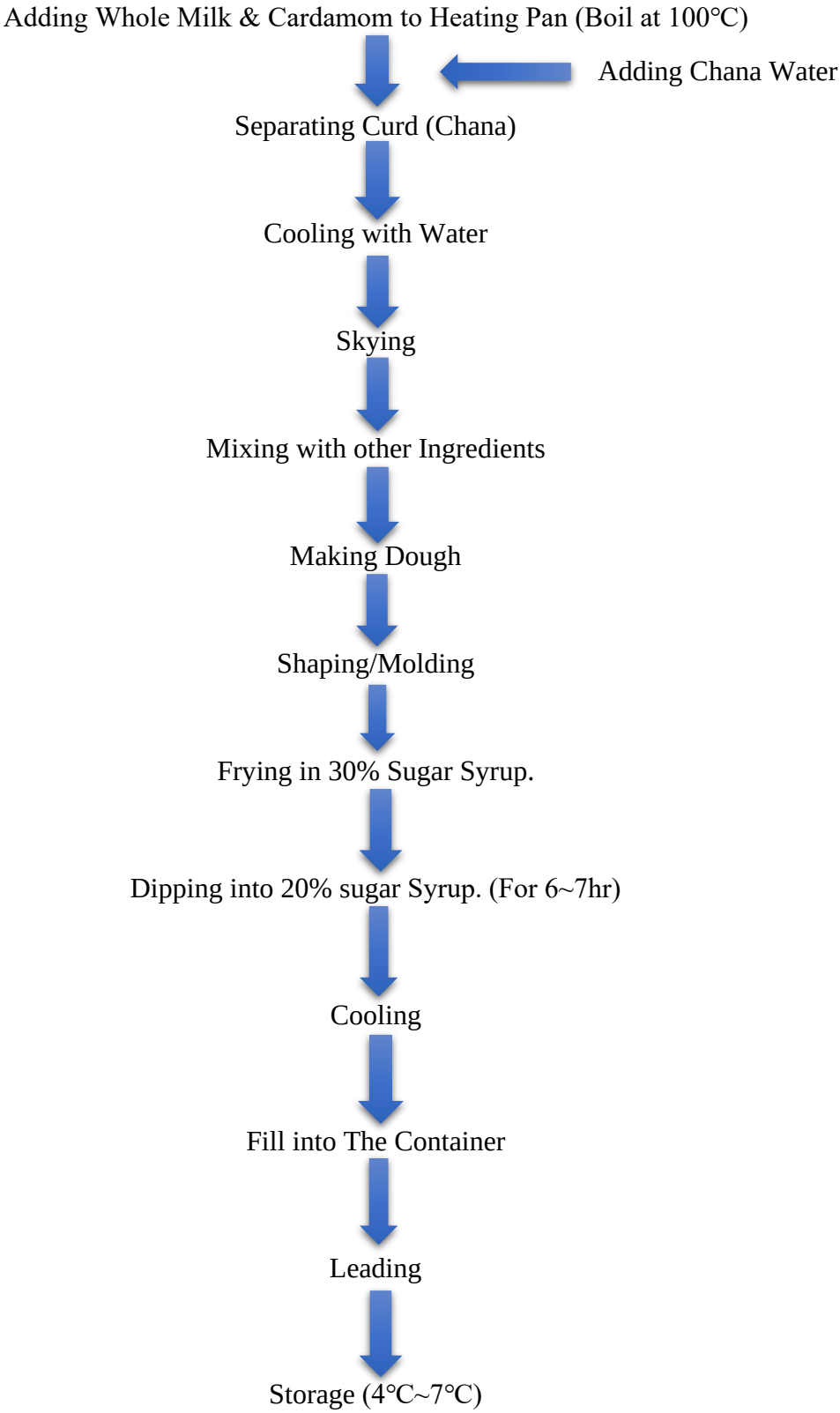
3.11: Process Flow of Matha:

Ingredients: Toned Milk, SMP, Yogurt Culture, Sugar, Salt, Bit Salt, Xanthan Gum, and Treated Water.



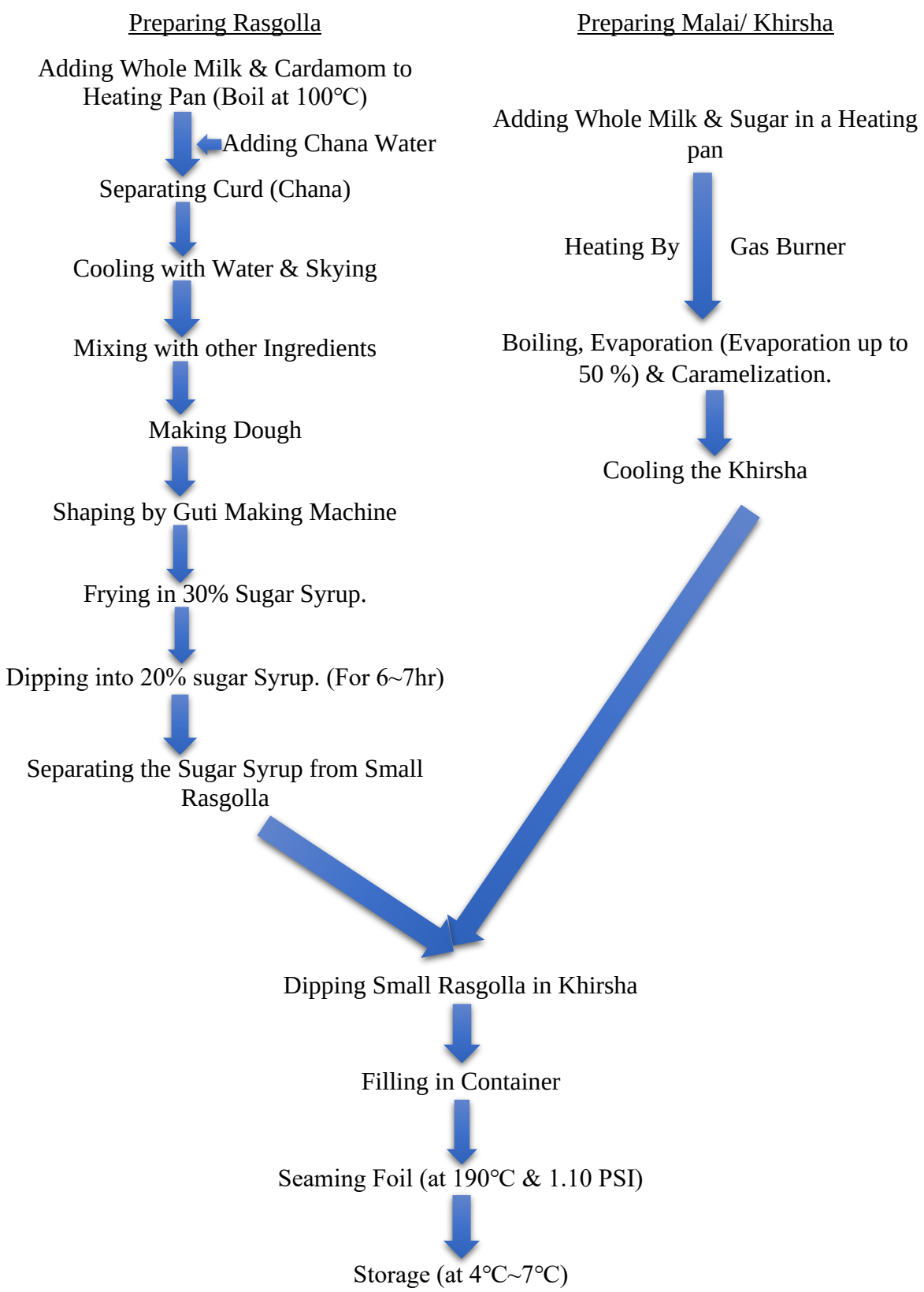
3.12: Process Flow of Rasgolla:

Ingredients: Whole Milk (Chana), Green Cardamom, Sugar, Flour, Baking Powder.



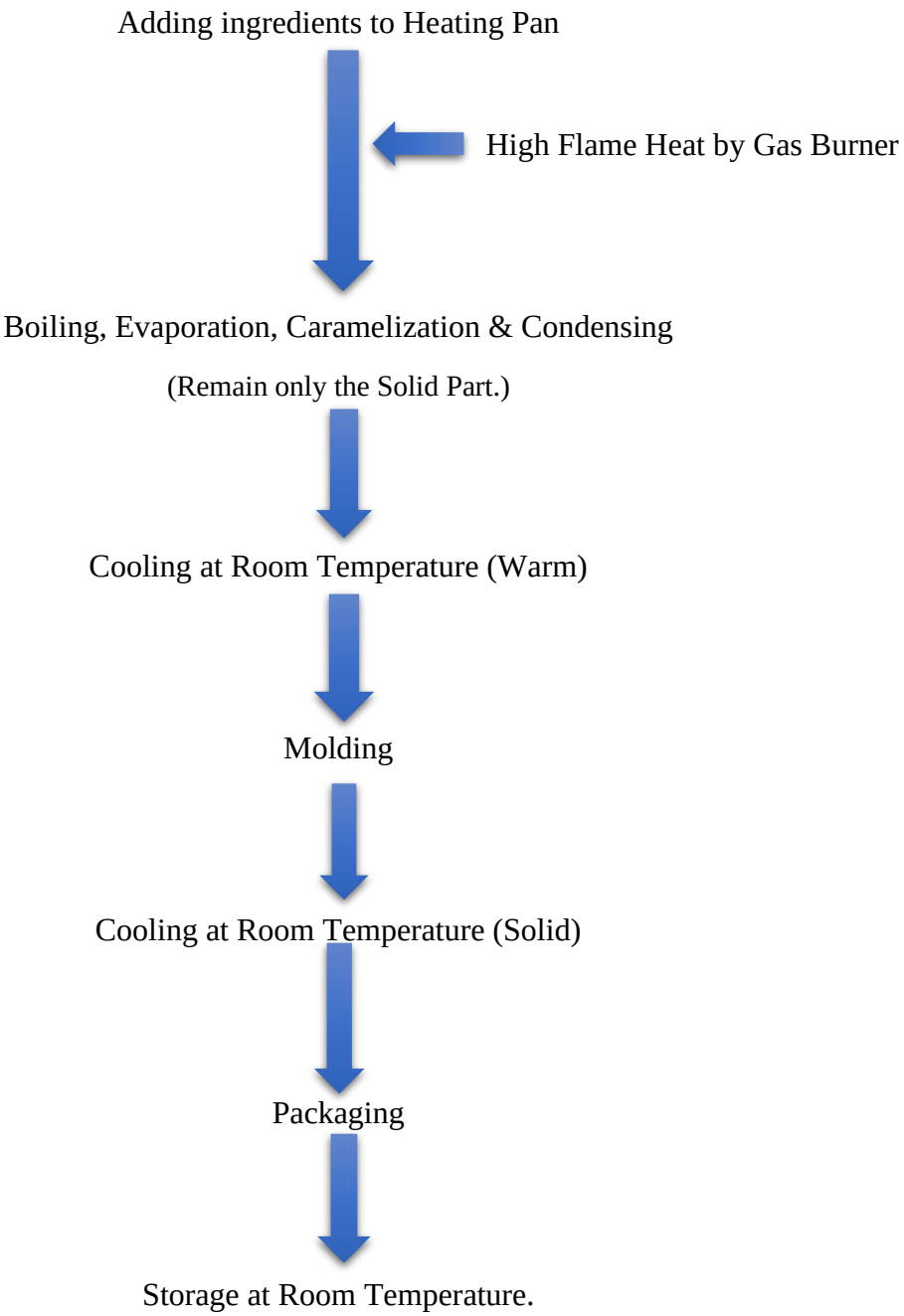
3.13: Process Flow of Rasmalai:

Ingredients: Whole Milk (Chana), Green Cardamom, Sugar, Flour, Baking Powder.



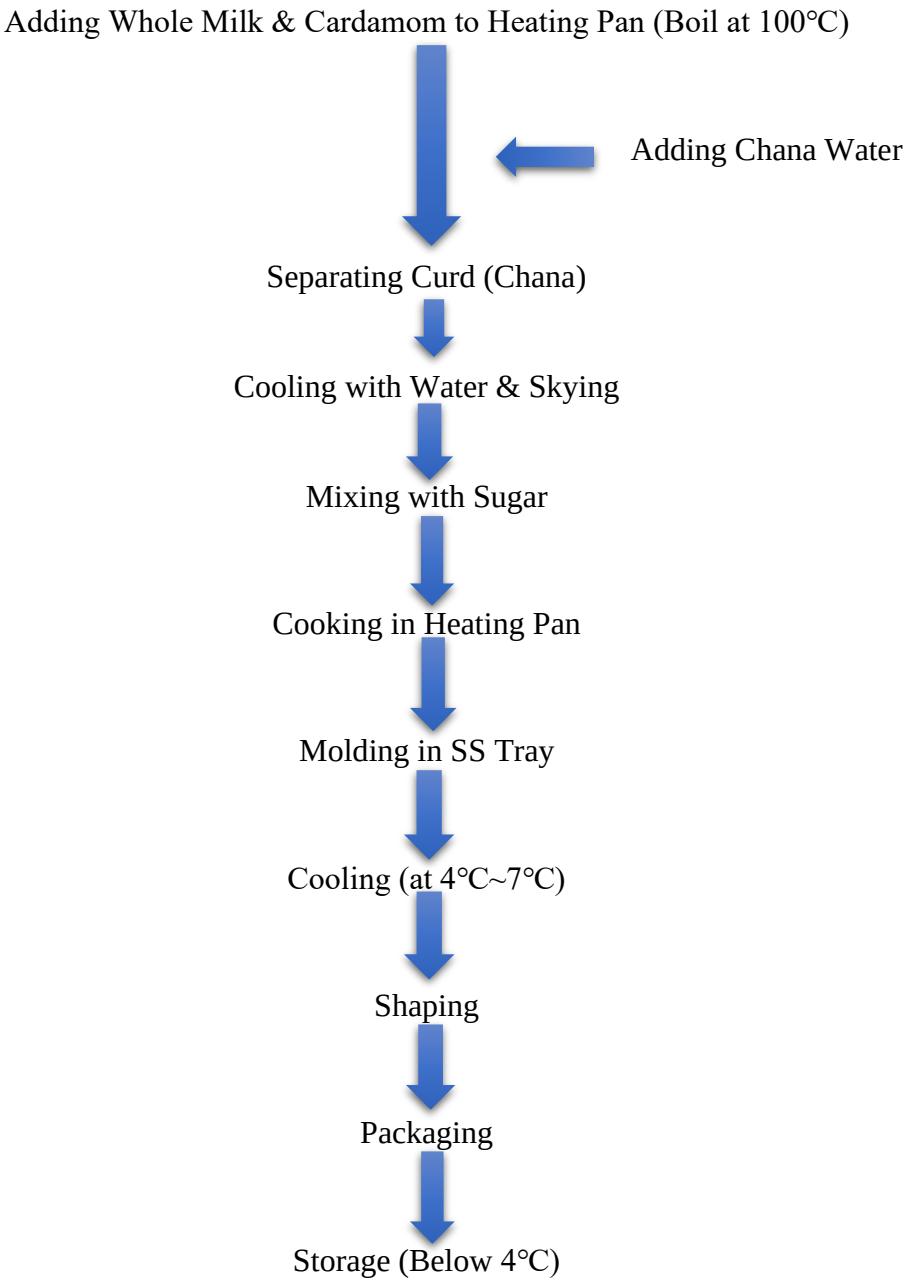
3.14: Process Flow of Pera Sondesh:

Ingredients: Whole Milk (Chana), Sugar.



3.15: Process Flow of Chana Sondesh:

Ingredients: Whole Milk (Chana), Green Cardamom, Sugar.



Chapter Four Quality Control.

4.1: QC of Milk and Dairy Products

Assuring the Quality of milk and dairy products produced in Milk Vita (Dhaka dairy plant) the Following Lab Test is Followed daily:

1. Clot On Boiling (COB).
2. CLR Test (Corrected Lactometer Reading).
3. Fat Test.
4. Alcohol Test.
5. Formalin Test.
6. Soda Test.
7. Acidity Test.
8. Urea Test.
9. Starch Test.
10. Salt Test.
11. Sugar Test.
12. Hydrogen peroxide Test.
13. Peroxidase Test (Pasteurization confirmation test).
14. CFU Test
15. Coliform Test.

4.2: Determination of Raw Milk Freshness by COB Test:

The "clot on boiling test" (COB) is a test done with an inspection of the warmth stability of milk through processing. As raw milk cannot be kept at standard room temperature or even at lower temperatures without preventing it from spoilage, pasteurization is needed. The test is used to determine the heat stability by heating a small sample of milk (1-1.5 ml), sealed in a narrow glass tube, in a thermostatically controlled oil bath, usually at 140ºC for milk of standard concentration or at 120ºC for concentrated milk, until particles of coagulated protein are observed in the following milk.

Procedure:

1. At first take 2ml milk in a test tube.
2. Heat with the Bunsen burner till boiling.

Observation: If the milk clot after boiling then the milk is spoiled and sent to the bi-product section. If the milk is fine then sent it for the next process.

4.3: Observing the Corrected Lactometer reading of Raw Milk by CLR Apparatus:

Lactometer is a hydrometer instrument that is used to check for the purity of milk by measuring **milk's density** usually it works on the principle of gravity of milk which leads to finding out the content of the water in milk or testing the richness of the milk. The correction is calculated as follows. For every 10 °F change in temperature, there is a corresponding change of 1.0 lactometer reading. **After the correction factor, the reading** is known as the corrected lactometer reading.

Procedure:

1. Pour Milk into the CLR tube.
2. Submerge the CLR meter into the tube.
3. Regulate the temperature by passing water outside the tube.
4. The Selected Temperature for the Reading is 20℃.

Observation: After reaching the temperature at 20℃ takes the CLR reading.

4.4: Determination of Fat Percentage in Milk by Gerber method:

Gerber method is also known as Fucoma test. In Gerber's method fat alone is separated from milk by subjecting the milk to digestion by the addition concentrated sulphuric acid and by the process of centrifugation, the fat is separated and measured.

Butyrometer is a measuring instrument used to measure fat content in milk or milk products in general. The method used in the determination is Gerber's method as invented by Swiss chemist Niklaus Gerber.

Procedure:

1. Pour 10ml Sulfuric Acid into a Butyrometer.
2. Pour 10.75ml Milk Sample into the Butyrometer. (That will burn all components except fat)
3. Again, Pour 1ml Amyl Alcohol into the Butyrometer. (That helps to separate the fat)
4. Place the Butyrometer into Centrifuge Machine for 3min.

Observation: Push the cap with the cap locker and observe the fat percentage.

4.5: Determination of Alcohol in Raw Milk.

The alcohol test is used for rapid assessment of the stability of milk for processing particularly for condensing and sterilization. The alcohol test is useful as an indication of the mineral balance of milk and not as an index of developed acidity. The test aids in detecting abnormal milk such as colostrums, milk from animals in late lactation, milk from animals suffering from mastitis, and milk in which mineral balance has been disturbed.

Procedure:

1. Take 2 ml of 68% Ethyl Alcohol into a test tube.
2. Pour 1 ml of Milk into the test tube.
3. Shake it well.

Observation: If the milk is a clot, it indicates alcohol / Impurity of milk.

4.6: Determination of Formalin in Raw Milk.

Formalin is used as an antiseptic, disinfectant, and preservative. It is used as an adulterant in milk **to increase the shelf life for long-distance transportation of milk without refrigeration, saving the supplier a neat packet by cutting electricity costs**. That is highly toxic and causes liver and kidney damage.

Procedure:

1. Take 2mlraw milk into a test tube.
2. Now take 2ml of Formalin Reagent.
   (1ml of 10% ferric chloride + 499ml of 35~38% Hydrochloric acid).
3. Dip the test tube into the water bath for 3 to 4 minutes at 70-80°C.

Observation: If the color changes to Purple-Brown the in indicates the presence of formalin.

4.7: Determination of Soda in Raw Milk.

Adulteration in milk is not limited to dilution with water. Traces of harmful chemicals such as sodium hydroxide (caustic soda), urea, sodium carbonate, and ammonium sulphate are impacting the health of milk consumers. Soda is used for neutralizes the presence of acids in milk. It is used by dairy farmers and milkmen to increase milk's shelf life and conceal

the contents added to it. Excessive consumption of bicarbonate for a prolonged period disturbs the body's functioning. It can cause damage to organs such as the liver and kidneys." In the case of people who consume high-calcium diet or calcium supplements, the use of sodium bicarbonate can cause milk-alkali syndrome, which can lead to kidney stones and failure.

Procedure:

1. Take 2ml Ethyl Alcohol (100%) into a test tube.
2. Then take 2ml raw milk into the test tube and shake well.
3. Now add 2 drops of Rosalic Acid and shake well.

Observation: If the color changes to Deep Pink, then it indicates that the milk sample has soda in it.

4.8: Determination of Acidity in Raw Milk.

Any change in the pH would destabilize the proteins and result in precipitation and gelation. The determination of the acidity of milk is **a rapid measure to understand the stability of milk during heat processing**. Dairy chemists mention two kinds of acidity in milk; **apparent acidity and real acidity**. The real acidity of milk is due to lactic acid. This is never found in milk when it is first drawn from the udder. It is produced by the action of the lactic acid organisms on the milk sugar.

Procedure:

1. Take 9ml raw milk into a beaker.
2. Add 5 drops of Phenolphthalein indicator into the beaker.
3. Take Sodium Hydroxide in a burette.
4. Now titrate the sample until light pink color appears.
5. Calculation: [Burette reading*90(equivalent weight of lactic acid) *0.1N of NaOH / Sample 9ml] *100

4.9: Determination of Urea in Raw Milk.

Urea is a nitrogenous compound formed in the liver. It has a chemical formula of CH_4N_2O. It is also known as Carbamide or Ureophil. This compound is the final end product of protein metabolism. The urea content in raw milk is related to the amount of protein in animal feeding and **allows you to define an adequate diet**.

This analysis also helps to identify any additions of urea in milk, introduced in order to increase, fraudulently, the protein content of milk. The optimal urea content in milk is **between 25 and 35mg/100ml**. A level lowers the 25 mg/100ml indicates that the diet is low in protein. A level greater than 35 mg/100ml indicates that the diet is too high in protein.

Procedure:

1. Take 1 ml sample into a test tube.
2. Then take 1 ml of 1.6% Dimethyl amino benzaldehyde (Urea reagent).
3. Shake well.

Observation: If the color changes to solid yellow then it indicates urea in it. If the color changes to light yellow then there is no urea.

4.10: Determination of Starch in Raw Milk.

Starch is another common adulterant found in milk. Starch is added **to make up the density of milk**. This helps to prevent the detection of extraneous water added to milk. Consumption of starch may cause diarrhea in the human body. It is interesting to note that the middlemen are added starch to synthetic and natural milk **to adjust and or to increase the consistency and viscosity.**

Procedure:

1. Take 2 ml of raw milk into a test tube.
2. Boil the milk with a Bunsen burner and cool it to room temperature.
3. Add 2-3 drops of 1% Iodine solution and shake it well.

Observation: If the color changes to Ash color, then Starch is present in the milk sample.

4.11: Determination of Salt in Raw Milk.

Salt is effective as a preservative because it **reduces the water activity of foods**. The water activity of a food is the amount of unbound water available for microbial growth and chemical reactions.

Procedure:

1. Take 5 ml of 0.134% Silver Nitrate (Salt reagent) into a test tube.

2. Now take 4 drops of Potassium Chromate in it.
3. Add 1 ml of raw milk and shake well.

Observation: If the color changes to yellow then salt is present in the milk, and if the color changes to Brown, then there is no salt in it.

4.12: Determination of Sugar in Raw milk.

In order to increase the carbohydrate content and density of the milk, table sugar is added as an adulterant which also increases the density of milk. Cane sugar or sucrose is added to the milk **to reconstitute its compositional requirement followed by adulteration of extraneous water in the milk**. It imparts role in maintaining the characteristic sweet taste of milk which is usually lost by water adulteration.

Procedure:

1. Take 1 ml of milk into a test tube.
2. Now take 5 ml of 0.05% Resorcinol Solution (Sugar Reagent) and shake it well.
3. Now Boil the Mixture for Exactly 30 sec.

Observation: In 30 sec if the color changes to Dark Red then it indicates the presence of sugar. If the color changes to reddish-white then there is no sugar present.

4.13: Determination of Hydrogen peroxide in Raw Milk.

Hydrogen peroxide is widely used for disinfection purposes by food industry enterprises. Apart from other purposes, it is also used to sterilize the packaging of dairy products. In some countries, hydrogen peroxide is added to milk **as an adulterant for the shelf-life extension**. The high concentrations of hydrogen peroxide used to preserve milk (300–800 ppm), **destroy the enzyme Lacto-peroxidase and thereby preclude the oxidation of thiocyanate**.

The presence of hydrogen peroxide can contaminate the milk. The purpose of the test is **to detect any traces inside the product**. This test also allows checking the possible addition of hydrogen peroxide in raw milk, before pasteurization, to increase its shelf-life.

Procedure:

1. Take 5 ml of Raw milk into a test tube
2. Now take 5 drops of 1% Vanadium Pentoxide (Hydrogen peroxide reagent).
3. Shake it well.

Observation: If the color changes to Reddish-Yellow, then Hydrogen peroxide is present.

4.14: Determination of Peroxidase in Pasteurized Milk.

The persistence of lacto-peroxidase activity in pasteurized milk provides a good indication of the quality of a product, because only a raw milk of good microbiological quality can be put through a mild pasteurization process in order to not inactivate this enzyme. Traditional methods are often qualitative (present/not present) and thus able only to indicate whether the thermal process has been performed. Quantifying lactoperoxidase in pasteurized milk enables instead to determine the nutritional quality of milk. Higher value of peroxidase means that the milk has preserved its original characteristics.

Procedure:

1. Take 5 ml of Pasteurized milk into a test tube.
2. Now take 1 drop of Hydrogen peroxide + 1 drop of Sodium Hydroxide Solution, 2 drops of pera-finayldayamin, and shake well.

Observation: If the color changes to Dark Blue or Ash color, then the milk didn't pasteurize at the proper temperature.

Microbial test of Milk and Dairy products.

1. CFU Test
2. Coliform Test.

4.15: Determination of CFU by Plate count Agar (PCA).

Principle of Plate Count Agar (PCA): Plate Count Agar is also called Tryptone Glucose Yeast Agar or Casein-Peptone Dextrose Yeast Agar. The medium contains an enzymatic digest of casein that provides amino acids, nitrogen, carbon, vitamins, and minerals for the growth of the organism. Yeast extract primarily supplies the B-complex vitamins. Glucose is a fermentable carbohydrate and provides an energy source for the growth of bacteria. Agar is the solidifying agent.

Agar preparation:

1. Suspend 23.5 grams in 1000 ml of distilled water.
2. Heat to boiling to dissolve the medium completely.
3. Sterilize by autoclaving at 15 lbs. pressure (121°C) for 15 minutes.
4. Cool to 45-50°C.
5. Mix well and pour into sterile Petri plates.

Sample Preparation:

1. Take 1 ml sample and 9 ml distilled water into a test tube.
2. Take 1 ml diluted sample from 1st test tube and pour into 2nd test tube with 9 ml distilled water.

Procedure:

1. Take 10 ml sample into a Petri dish and pour plate count agar into it.
2. Cool it and place it in a 38℃ incubator overnight (6 to 8 hr.)
3. Observe the petri dish on a light table.

4.16: Determination of Coliform in the Milk sample.

Coliforms, which are often used to monitor the quality of milk, are not a single species of organism. They are a group of gram-negative rod-shaped bacteria that have similar biochemical characteristics - being able to ferment lactose with the production of acid and gas within 48 hours at 35° C and grow with or without oxygen. They are usually present in small numbers in raw milk, meat, poultry, or other raw foods. The coliform count is simple and easy to conduct, hence it can be used as a hygienic indicator to reflect the general microbiological quality in a routine test. As coliform organisms can be easily killed by heat, these bacteria can also be used as an indicator of heat treatment failure as well as post-heat treatment contamination.

Agar preparation: (Violet Red Bile Agar)

1. Suspend 39.5 grams in 1000 ml of distilled water.
2. Heat to boiling to dissolve the medium completely.
3. Sterilize by autoclaving at 15 lbs. pressure (121°C) for 15 minutes.
4. Cool to 45-50°C.
5. Mix well and pour into sterile Petri plates.

Procedure:

1. Take 5 ml sample into a Petri dish and Violet Red Bile Agar into it.
2. Cool it and place it in a 38℃ incubator overnight (6 to 8 hr.)
4. Observe the petri dish on a light table.

Chapter

Five

Conclusion.

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Conclusion:

Bangladesh Milk Producers Co-operative Union Ltd. (Milk Vita) is one of the largest national-level cooperative organizations in Bangladesh's Dairy sector.

I feel glad that, I have a chance to prepare myself in this organization. Mentors are genuine to us. They have given us sufficient opportunity to attempt to give thoughts regarding various segments of the generation and quality control division. Expectation this experience will be valuable in our reality. I would like to thank my supervisor, Mr. Md. Juwel Rana, Lecturer (Senior Scale), Department of Nutrition and Food Engineering, Faculty of Allied Health Science, Daffodil International University for allowing us to work in this organization as an intern student. The total journey was learnable & very realistic & they taught us many of the new stages of Production & quality control in dairy and dairy products, overall industrial environment.