STUDY OF PRODUCTION AND QUALITY CONTROL METHODS AT IGLOO ICE CREAM LTD.

AN INTERNSHIP REPORT BY

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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 **"Study of Production and Quality Control Methods at Igloo Ice Cream Ltd.,"** has been submitted by **Minhaj Hossain** to the Department of Nutrition and Food Engineering at Daffodil International University. It has been accepted as a partial fulfillment of the requirements for the B.Sc. in Nutrition and Food Engineering and has been approved for its format and contents.

EXAMINING COMMITTEE

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DECLARATION

I'm writing to let you recognize that I did this project with the guidance of **Md. Harun-Ar Rashid, Assistant Professor,** Department of Nutrition and Food Engineering at Daffodil International University. I also state that neither this project as well as any part of it has been submitted for a degree or diploma anywhere else.

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ACKNOWLEDGEMENT

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EXECUTIVE SUMMARY

This report provides a comprehensive overview of my internship experience at Abdul Monem Limited, namely inside the Igloo Ice Cream & Milk Unit Quality Assurance & Production Department, as well as its collaborative interactions with other departments. The present report delineates the various activities and responsibilities undertaken, as well as the encountered problems, during the course of my internship. Additionally, it highlights the information and skills acquired throughout this professional experience. The internship was placed at Abdul Monem Limited's Igloo Ice Cream and Milk Unit throughout the year 2022. I have acquired a comprehension of the processes involved in the creation of various ice cream varieties, as well as the methods employed for assessing their quality. The manufacturing or production of this product is carried out in accordance with a flow diagram developed by their proprietary factory. To ensure quality control, physical, chemical, and microbiological testing are mostly conducted. The primary objectives of this article are to enhance production and quality control processes and to ascertain the specific health risks and hazards related to the Igloo Ice Cream and Milk Unit. The focus of my paper centers around the manufacturing of ice cream products that adhere to safety standards and have been certified by Igloo Ice Cream Ltd. During the initial 20-day period, I underwent observation at Abdul Monem Limited within the Igloo Ice Cream & Milk Unit. This encompassed many departments such as Quality Assurance, Production, Milk, Chocolate, Cone Biscuit, and Plastic sections. Over the course of the following ten days, I engaged in a comprehensive observation of several departments inside Igloo Ice Cream Ltd., including the engineering unit, ETP plant unit, general store unit, administration and distribution unit, as well as the raw materials receipt procedure. The study provides comprehensive information regarding the organizational structure, sanitation practices, sanitary facilities across various industries, and the procurement of certified raw materials. Incorporate the procurement of raw materials, prioritize the implementation of safety measures during the manufacturing process, and conduct a thorough quality assessment of the final product prior to its introduction into the market. Within the context of the Igloo Ice Cream & Milk Unit, an examination of Abdul Monem Limited's quality assurance and safe production processes has been undertaken. During my internship at Abdul Monem Limited's Igloo Ice Cream & Milk Unit, I gained practical experience in quality control, production management, and compliance with regulatory regulations. Additionally, I acquired an understanding of the significance of effective collaboration and communication. In general, the internship at Abdul Monem Limited's Igloo Ice Cream & Milk Unit Quality Assurance and Production Department provided a valuable opportunity to get practical experience in a professional setting.

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Background

Ice cream is a delightful confectionery delicacy that follows a process of pasteurization and homogenization, resulting in the combination of diverse dairy constituents. A delectable delicacy that is internationally acknowledged, created by blending milk, condensed milk, butterfat, and cream. Moreover, the formulation of the mixture includes stabilizers, emulsifiers, colors, aromatic compounds, and sweeteners. In certain instances, additional components such as fruits, nuts, colored sugar, and candy pieces are used into ice cream with the intention of achieving a particular flavor character. After the introduction of air, the mixture is subsequently put into a freezer. The occurrence of overrun, characterized by the introduction of air, has a direct influence on the density and texture of ice cream. The removal of air from ice cream would result in a material that closely resembles a hardened ice cube. Following this, the packaging container is then filled with the ice cream. The fourth aspect concerns the expeditious achievement of a holding temperature below -13°F (-25°C) for ice cream. Ice cream products demonstrate a considerable degree of variation; however, they can be generically categorized into two main classifications: Plain Ice Cream and Composite Ice Cream.

1.2 History

The historical roots of ice cream can be traced back to the time of the Roman Empire, with claims suggesting that Nero Claudius Caesar played a notable role in its development. According to historical records, it has been suggested that Nero employed a practice of sent workers to mountainous areas with the purpose of procuring snow. This snow was afterward blended with a variety of fruits and liquids to produce a delectable frozen dessert known as flavored ice cream. The introduction of sherbet to Italy during the 16th century is commonly attributed to Marco Polo. It is believed that further alterations to the formulation of sherbet led to the development of ice cream. England is commonly acknowledged as one of the early pioneers in the creation of ice cream, maybe predating or contemporaneously producing this dessert with the Italians. From the late 1700s to the mid-18th century, the eating of dessert in America was primarily restricted to persons belonging to upper socioeconomic strata. The ice cream industry had substantial growth throughout the early 1900s as a result of breakthroughs in steam power, refrigeration, homogenizers, and freezing technologies. These technological developments significantly enhanced the production and efficiency of ice cream.

CHAPTER 2

COMPANY

2.1 Company Information

Abdul Monem Limited (AML) is a well-established industrial company in Bangladesh, recognized for its significant magnitude of business. The company comprises a diverse range of industries, including beverage manufacturing, sugar refineries, consumer goods, real estate, and building materials, among various other sectors.

The establishment of AML was attributed to the efforts of Abdul Monem, a notable individual within Bangladesh's private sector of industrial enterprises. The establishment of the firm took place in 1956 under the leadership of Abdul Monem, a proficient civil engineer. The group currently consists of approximately 20 distinct firms. Moreover, it established one of the earliest and most extensive private economic zones in Bangladesh. The company has received formal authorization to undertake the bottling of Coca-Cola products inside the geographical boundaries of Bangladesh.

2.2 Mission

The recognition of a company's core purpose can be achieved by analyzing its mission statement. The mission statement is a mechanism for expressing the core ideas, values, and goals of the company. Igloo is committed to providing products of superior quality and positioning itself as a prominent brand by fostering consumer trust, in line with its overarching goal of "THE WORLD OF GREAT TASTE." This implies a tendency to engage in critical examination and evaluation of established methodologies, in addition to the creation of innovative entities, while simultaneously ensuring the production of high-quality goods. Igloo frequently develops innovative ice cream assortments and flavors to accommodate the ever-evolving desires of its customer base. In conclusion, it can be considered that Igloo's strategic approach is centered on the cultivation and development of relationships with its consumers.

2.3 Vision

The departed managing director of Abdul Monem Limited expressed the following comment posthumously: I had a goal of establishing a corporate enterprise that would captivate society via its unique characteristics and ultimately serve as a model for other commercial ventures. The adherence to societal norms and values is a fundamental and distinguishing characteristic. Igloo, a subsidiary of Abdul Monem Limited, operates based on a comparable principle. Igloo is well recognized as a prominent company in the nation, renowned for its exceptional standing that can be ascribed to its unwavering dedication to a fundamental principle.

CHAPTER 3

MANUFACTURING PROCESS

3.1 Production

The Igloo Ice Cream Company maintains a standard mixture for all varieties of ice cream, except Ice-lolly and Dudh Malai.

The formula for the general mixture is as follows:

- Water
- SMP
- Sugar
- Stabilizer
- Emulsifier
- Cream EMDI
- Vegetable Fat
- Butter or Coconut oil
- Liquid Glucose

To ensure proper mixing, all of these ingredients should be used in the order listed:

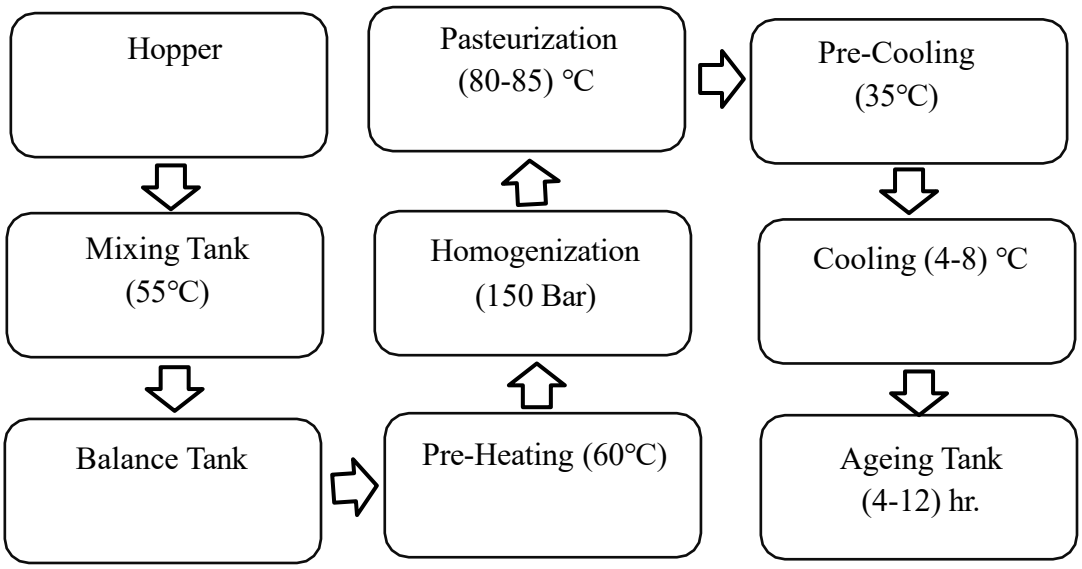

Fig 3.1: Mixing Flow chart

3.2 Function of Ingredients

3.2.1 SMP in Ice Cream Mix

The combination of skim milk powder and egg yolks positively contributes to the production of ice cream that possesses a desirable texture characterized by a high degree of richness, smoothness, and creaminess. The protein present in skim milk powder contributes to the stability of emulsions without the addition of fat. This occurs through the absorption of a significant portion of the excessive water present in the formulation of the ice cream.

3.2.2 Function of sugar in ice cream

While sugar adds a pleasant sweetness to ice cream, it serves an additional purpose instead of having its primary function. The sugar content maintains control over the volume of ice formation during the freezing process. Consequently, the ice cream will possess a suitable consistency for effortless scooping and pleasurable consumption.

3.2.3 Function of Emulsifiers in Ice Cream

An emulsifier is a compound that facilitates the homogenization of two immiscible liquids. For example, the addition of an emulsifier can facilitate the homogenization of insoluble liquids within a container, such as the combination of water and oil. Egg yolks and mustard are two instances of substances that function as emulsifiers. An emulsifier is characterized by a hydrophilic head that shows a preference for water, and a hydrophobic tail that exhibits a preference for oil. The hydrophobic tail selectively interacts with the oil phase, while the hydrophilic head specifically associates with the watery phase. The emulsifier is positioned at the interface between air/water or oil/water, effectively stabilizing the emulsion through the reduction of surface tension.

3.2.4 Function of Stabilizer and Emulsifier in Ice Cream

Stabilizers, often in the form of polysaccharides, are a group of compounds that increase the viscosity of the non-frozen portion of water, effectively preventing its movement within the product. Consequently, the consistency of the ice cream makes it more challenging to masticate. In the absence of stabilizers, the unbound water molecules would rapidly disperse, leading to the formation of ice crystals and resulting in a gritty and frosty texture of the ice cream. In the context of ice cream production, the inherent qualities of natural milk stabilizers and emulsifiers, such as milk proteins and phosphates, have shown the ability to yield exceptional ice cream products. However, the addition of supplementary stabilizers and emulsifiers may offer some advantages. Emulsifiers play a crucial role in the production of ice cream with enhanced attributes such as improved stand-up or melt resistance, a more refined body, and a smoother texture following the extrusion process. Mono- and diglycerides, together with polyoxymethylene sorbitan monooleate (polysorbate-80), are often employed emulsifiers in the production of ice cream. Furthermore, milk possesses inherent emulsifying components that aid in the production of ice cream. The aforementioned components encompass citrates, phosphates, and milk proteins. Due to the high lecithin content present in egg yolks, they possess the capability to function as emulsifying agents. Stabilizers serve a crucial role in conferring ice cream

with firmness, imparting a soft texture and enhancing its resistance to melting. However, excessive utilization of stabilizers can result in undesirable consequences such as the development of a sticky texture, insufficient melting properties, and difficulties in releasing flavors. The major function of stabilizers is to maintain the texture of the product by reducing the adverse effects of heat shock that may occur during the processes of storage and distribution.

- ✓ Effect on texture
- ✓ Effect on body characteristics
- ✓ Effect on whipping and overrun retention
- ✓ Effect on melting rate and properties of the melted product
- ✓ Effect on sandiness
- ✓ Effect of stabilizer during aging

3.2.5 Function of EMDI in Ice Cream

The procedure of selectively extracting enzyme-modified components involves subjecting milk proteins and lipids to regulated conditions in the presence of enzymes, therefore enhancing an enzymatic reaction. When employed, this methodology increases and enriches the overall taste and sensory characteristics of the constituent, resulting in a more complex and superior food production outcome. Through the utilization of this particular approach, the production of dairy products results in flavors that exhibit an intensity ranging from 15 to 30 times more than that of conventional dairy-based food processing preparations. This occurrence can be attributed to the extraction of flavor-enhancing compounds from dairy products, resulting in a reduction of their uniqueness and intensity. EMDI contains a variety of dairy products, such as cheese, butter, cream, and ghee.

3.3 Ice cream production floor unit:

- ❖ Machines
- ❖ SL 600
- ❖ Big Drum/Choice Fillers
- ❖ Roll 27
- ❖ Comet C2
- ❖ FM 6000

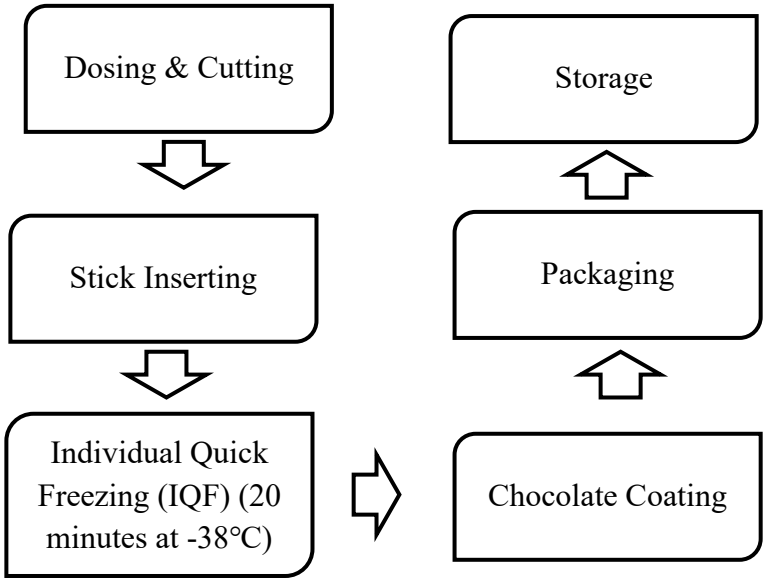

Fig 3.2: SL 600 (Production flow chart)

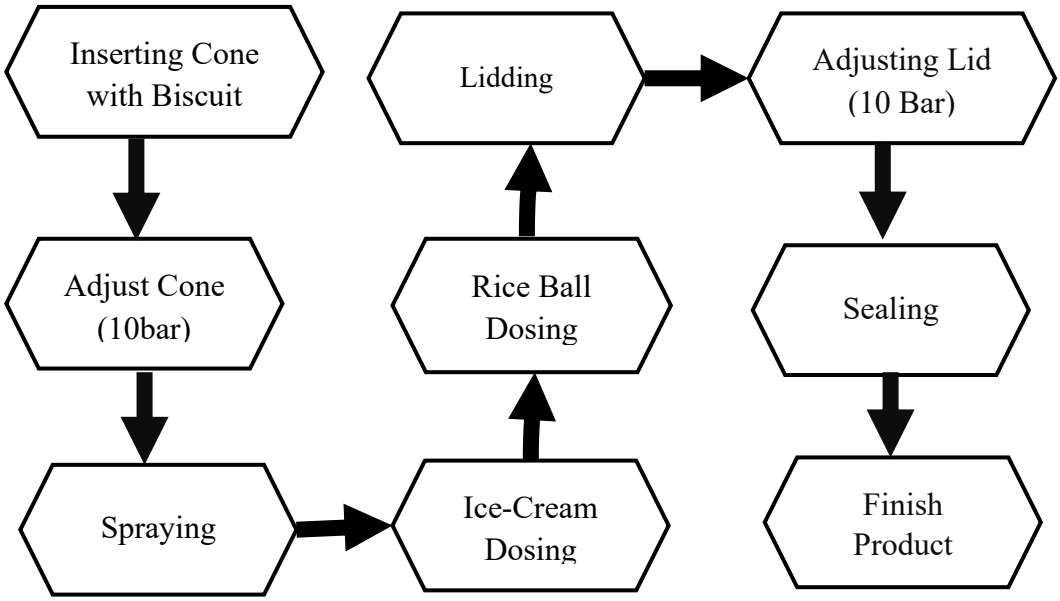

Fig 3.3: Big Drum/ Choice fillers (Production Flow Chart)

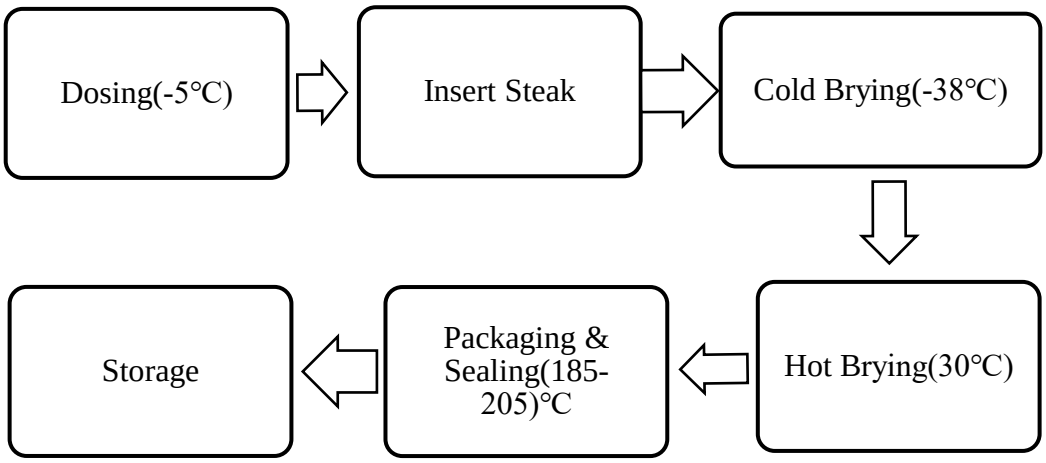

Fig 3.4: Rollo 27 (Production Flow chart)

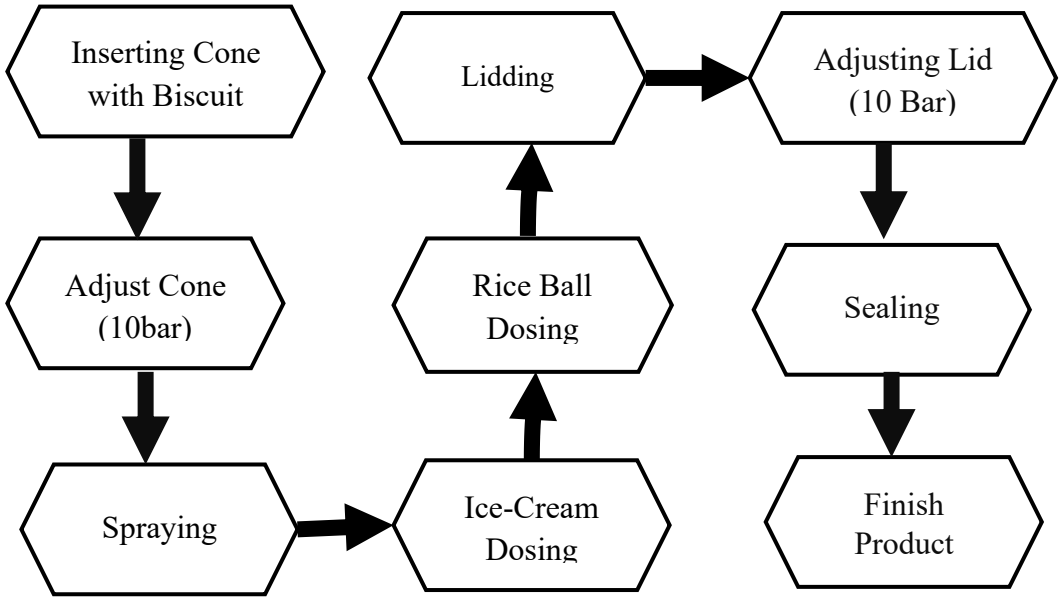

Fig 3.5: Comet C2 (Flow Chart)

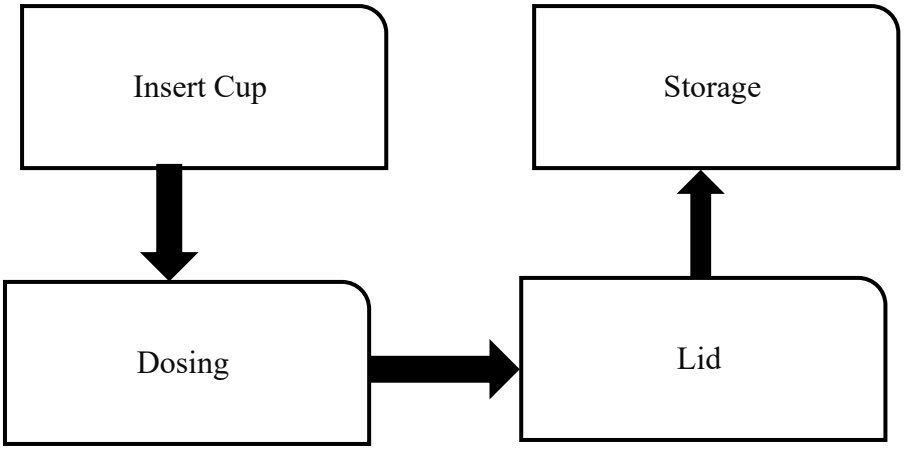

Fig 3.6: FM 6000

3.4 Chocolate Units

Igloo Ice Cream Company Limited incorporates a variety of seven distinct varieties of chocolate in the production of its different ice cream products. At the chocolate production facility, the integration and development of milk chocolate, cocoa butter-based chocolate, and hazelnut-infused chocolate are carried out.

In this context, sunflower and butter oils are utilized in the production process to create both dark and milk compound chocolate. The ice cream produced by Mega and Igo brands includes a toffee covering and nougat core that is sourced from international suppliers.

- **Light Chocolates:** Used in Choc bar,
- **Choc-bar Insta Spray Chocolate:** Used in Cone Item
- **Hazelnut Chocolate:** Used in Macho
- **Dark compound Chocolate:** Swiss choc
- **Milk compound chocolate:** Almond Split
- **Toffee Coating:** Mega
- **Nougat Centre chocolate:** Ego
- **Ripple Chocolate sauce:** Double Sunday, Belgium Cone, Swiss choc. Single Sunday.
- **Mango ripple:** Double Sunday melody, Ambrosia
- **Straw ripple:** Double Sunday sparkle, Ripple cake, Mega Macho
- **Caramel ripple:** Double Sunday choc combo, buffer scotch

3.5 Biscuit Units

3.5.1 Ingredients:

- Flour
- Sugar
- Soya oil
- Starch
- Salt
- Sodium Meta (preservatives)
- Vanilla powder (Flavor)
- Lecithin (stabilizer)
- Caramel color
- Water

3.5.2 Machine

- **Walter:** Capacity 10000/hr.
- **Cone Baking Machine:** 12500/hr.

Cone Baking Machine: 23600/hr.

CHAPTER 4

QUALITY ASSURANCE

4.1 Overview

The degree of excellence or customer acceptance is measured by quality. The user's acceptance of a product can be determined by the range of product qualities that are considered significant. The authentic definitions of quality encompass purity, strength, flavor, color, size, and development.

In addition to quality control, quality assurance includes the implementation of quality controls and processes to address problems and failures. The implementation of quality control measures ensures the attainment of a superior end product at each stage of the production process. According to ISO designations, quality assurance is a comprehensive set of planned and essential measures aimed at building sufficient confidence that a given product or service will meet the predetermined quality requirements. In the food business, quality control is characterized by a smaller scope compared to quality assurance. To mitigate the potential hazards associated with food safety and maintain high-quality standards, supplementary measures are implemented along the inspection, testing, and monitoring protocols of quality control programs. The concept of assurance refers to an individual's belief in their abilities, skills, and knowledge. The various functions within a system are interconnected and interdependent, creating an overall and integrated whole.

4.1.1 Job Responsibilities of Quality Assurance

- Maintain the quality of raw materials and finished goods.
- Summarize test runs to assess composition, amount, and quality.
- Calculate formulas, production-specific variables, or percentages.
- Establish and enforce quality standards for production.
- 5: Identify and sample any health issues or undesired added items.
- Generate test results reports, charts, and graphs.
- Maintain high-quality products and services over time.
- Food packaging.
- Maintain company quality records and manuals.
- Identify and document key factors causing quality loss and non-conformance.
- Ensure accurate check sheet completion and address noncompliance if necessary.
- Schedule and participate in an external quality audit.

4.1.2 Machine Instruments in the Igloo Q/A Department

- Centrifugation Machine
- AML/MLP/L-01
- PH meter
- Viscosity meter
- Water Bath
- Moisture Analyzer
- Refractometer
- Screw Gauge

4.1.3 Purified Water Parameter for Ice Cream

- PH: 6.5-8.5
- Total Hardness as CaCO3(mg/l): 300
- Iron(mg/l): 0.3
- TDS (mg/l): 500
- Calcium(mg/l): 75
- Sodium(mg/l): 200
- Copper(mg/l): 1.0
- Manganese(mg/l): 0.5
- Mercury(mg/l): 0.001
- Arsenic(mg/l): 0.01
- Lead(mg/l): 0.01

4.2 Tests in the Q/A Department

4.2.1 Moisture Analyzer/TS Reader

The machine's primary function and description are to follow the BSTI standard, which specifies that an ice cream mix must possess a minimum solids content of 36%. The instrument quantifies the overall concentration of solid substances in a given liquid sample. The confirmation is received when it signifies their state of readiness. The thermogravimetric method is used.

Procedure:

- Place 0.5gm of milk on aluminum foil in a moisture analyzer to measure TS.
- Press the start button, and the reading appears after a while.

4.2.2 Viscometer

The purpose and explanation of the apparatus: The term "viscosity" is used to denote the resistance to motion shown by most fluids. Viscosity arises when there is relative motion between the layers of a fluid. Therefore, the viscosity of different items varies based on the specific characteristics of each substance. Within the laboratory setting, an analog viscometer was employed to carry out the experimental procedure.

Procedure:

- Place milk samples under the viscometer.
- Choose a spindle from 1-7 based on product density.
- Set the viscometer speed and wait for the reading.
- Multiply the reading by the fraction to get product viscosity.

4.2.3 Titration

Machine Function and Description

Titration is a quantitative analytical technique used to determine the concentration of an unknown solution using a solution with a known concentration. During the reaction, a burette is used to deliver the titrant, a known concentration solution, into a specified volume of the analyte, an unknown concentration solution. The concentration of the unknown drug can be determined by measuring the amount of titrant used. In general, an indication is used to indicate the completion or end of a response.

Types of titrations:

- ❖ Acid-Base
- ❖ Complexometric Titration
- ❖ Precipitation Titrations
- ❖ Redox Titration

Procedure:

- Took a sample of 10 ml
- Put in two drops of phenolphthalein.
- Place the NaOH on a burette (as an unknown solution).

4.2.4 GSM of Igloo Paper Carton

The weight of paper is quantified in grams per square meter (GSM). As the GSM (grams per square meter) increases, there is an associated rise in the weight and thickness of the paper. GSM paper presents a range of weights, hence offering suitability for various applications.

There are four types of paper cartons in the Igloo.

- ❖ SS carton - 255*192*128
- ❖ Ply Big - 225* 150* 155
- ❖ Ply mini - 225*150*100
- ❖ Ply small - 255*150*137

NB: [The duplex part must be 300 gm², the linear part 150 gm², and the media 125gm², these are the maximum limits of the paper]

Procedure:

- Prepare the paper from the sample
- Find out the amount the sample weighs.
- Then, count the paper's area and use a method to figure out the amount it is.

4.2.5 Water Hardness

Procedure:

- Take a sample of 100 ml of water.
- Add 1/2 drop of EBT.
- Put 2/3 of a drop of buffer solution where EBTA is in the burette.
- Carry out titration

4.3 Milk Tests

4.3.1 Fat Determination of Milk

Procedure:

- Start with a butyrometer.
- Get 10 ml of 95% sulphuric acid.
- Combine 5g of sample and 2ml of amyl alcohol together.
- Put the sample in the center and spin it at 1100 rpm for 5 minutes. This is called the "Gerber" method.
- The result can be seen through the butyrometer after 5 minutes.

4.3.2 CLR Test of Milk

The lactometer is used for the purpose of determining the quantity of water present in milk. The operational mechanism of this system is based on the principle of milk's specific gravity.

Procedure:

- Take some milk and put it in a test tube.
- Put the tip of the meter in the test tube.
- The milk gets less clean as the bulb goes deeper into the milk. If the needle is at the red mark, the milk is rich and pure.

4.3.3 AML /MLP/L-01

First, use CIP to clean the machine. Take 40°C warm water for CIP, and the machine will take 1% SU-157 on its own. After that, wash it once more.

Procedure:

- ❖ Take any brand of store-bought milk for the Milk Test. The temperature of the sample must be 50°C, and then it must be cooled until it is 35°C. Take into consideration the reading in MLP.

4.3.4 Alcohol Test of Milk

Procedure:

- The amount of chemical and sample must be the same, so use 2 ml of ethyl alcohol and 2 ml of sample.
- Give it a shake to mix it.
- If the solution turns into crystals, the drink has too much alcohol.

4.3.5 H2O2 test in milk

Procedure:

- Take a 5ml sample and put 10 drops of V2O5 in it.
- Give it a few shakes.
- If it turns pink, it is positive for H2O2. If the color stays the same, it is not tampered with.

4.3.6 Formalin Test in Milk

Procedure:

- Pour 4-5 drops of formalin tester into a teaspoon of milk.
- If the color turns purple, it is positive for formalin. If the color turns pink or doesn't change at all, it is negative for formalin.

4.3.7 Salt Test

Procedure:

- Take a sample of 3 ml of milk.
- Add 3/4 drop of K2CrO4. The color of the milk will change from white to brown.
- Put 1 ml of AgNO3 in it and shake it again. If the color stays brown, it's a Negative. And if it goes yellow, it means the test was successful.

4.3.8 Starch Test

Procedure:

- Take 5 ml of the sample and boil it.
- Bring it to the normal temperature, which is between 25 and 30°C.
- Add two or three drops of iodine solution. If the color changes to blue, it means the starch is positive, and if it stays the same, it means the starch is negative.

4.3.9 Soda Test

Procedure

- Take 10 ml of the sample and give 10 ml of (95%) ethyl alcohol.
- Add two-thirds of a drop of rosalic acid. If the color comes out pink, it's a positive indicator. If the color stays the same, it's a negative sign.

4.3.10 SMP Test of Milk

Procedure:

- Centrifuge a 50ml sample for 5 min at 1500 rpm or 2/3 times at 1100 rpm.
- Milk separation will be confirmed; throw cream.
- Centrifuge again after adding 1ml acetic acid.
- Discard the upper half after centrifugation. Wash the lower sediment with distilled water.
- Add 2 ml phosphomolybdic acid and shake vigorously.
- Water bathe it for 15 minutes. Blue is positive, green is negative.

4.3.11 SNF Test of Milk

Procedure:

- SNF stands for "solid, no fat." "Richmond's Law" was used to make preparations for this test.

4.4 OIL Tests

4.4.1 BR and RI Test of Oil

Procedure:

- To begin, combine vegetable oil with Ethyl Alcohol and incorporate a small quantity of phenolphthalein.
- Add KOH to a burette for measurement.
- Use the formula to find out how acidic the product is and how much free fatty acid it has.
- Put the sample in the "Butyro Refractometer" and look at what the BR and RI numbers say. For vegetable oil, BR must be less than 40 and RI must be between 1.45 and 1.50.

4.5 Food Microbiology

4.5.1 BDS Standard for Microbiology

The bacterial count must be under 1 lac. Total coliform should not exceed 10 per gram, and phosphate should be negative.

4.5.2 In-House Standard

- Salmonella must not be there.
- Mold made of yeast (less than 10 CFU per gram)
- Most of the time, Coliform, Salmonella, Yeast, Milk Microbe, and drinking water tests are done. IGLOO Ice Cream Ltd.'s food microbiology is regularly tested with bacteria tests.

4.6 Effluent Treatment Plant

ETP is used to clean up the wastewater from factories, where chemicals and dyes are used to clean up the water.

4.6.1 Objectives:

A wastewater treatment facility is used to clean up wastewater and make it safe for the environment. This is done to protect the environment from the harm that wastewater can cause.

4.6.2 Standard ETP Parameters

- **Dissolved Oxygen -** DO 4.5-8.5 ppm
- **Biological Oxygen Demand -** BOD 50 ppm

4.6.3 Total Dissolved Solids

- **TDS -** Max. 2100 ppm
- **Chemical Oxygen Demand -** COD 150 ppm
- **Acidity / Alkalinity -** pH 6-9

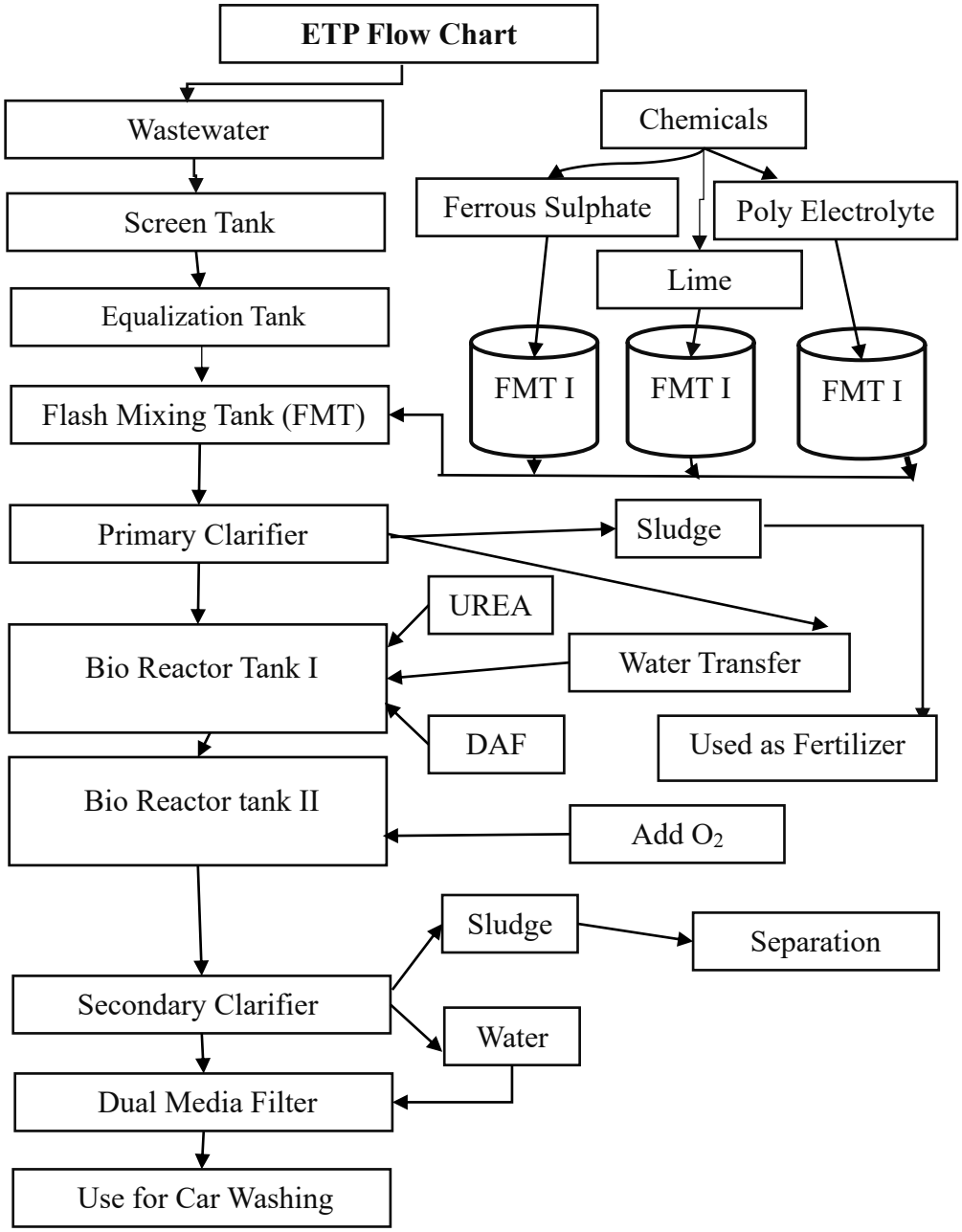

Fig 4.1: ETP flow chart

CHAPTER 5

MECHANICAL ENGINEERING

5.1 Boiler

Boilers are what make steam. In a steam system's generation part, a boiler is used to heat up a supply of feedwater and make steam. Energy is released when fossil fuels are burned or when waste heat from a process is let out.

5.1.1 Boiler Machine Mechanism

- Water flows into the water softener. NaCl is used in a water softener pump to make the water less hard, as Mg and Ca make the water.
- Then it goes to the hot water tank. The temperature of the feed pump is between 45°C and 50°C.
- The water then goes through the pump to the boiler.
- It comes to the "water level indicator gram" by way of the feed pump. Only 25% of the water in the boiler turns into steam.

5.1.2 Types of Boilers:

- ❖ Fire Tube
- ❖ Water Tube

5.1.3 Fire Tube Boiler Structure and Mechanism

- The boiler is horizontal.
- The fire is inside the machine, and the water is outside the machine.
- The steam pressure is 79 psi.
- The steam started at 69 psi.
- The fire is burned by a blower fan that gives air at 2900 rpm.
- The fan stays on for 60 seconds before the boiler is used to get rid of old gas through the chimney.
- An ignitor stick connected to the stove's pilot line acts as a match and goes through the stove's main fire tube. The stick that starts the fire stays on for 10 seconds.
- A 14000V fire starts near a generator.
- A servomotor helps turn the fire down or up.
- The top has two safety buttons.
- If there is too much steam, it has to go through the safety valve and out the chimney.
- Steam is kept in the steam hider.
- The Blowdown valve stays at the bottom of the boiler. When the water gets too thick, it pushes the water out and lets new water in.
- Water turns into steam at 212.5°C.
- The boiler's steam temperature is 200°C
- If the scale is kept on the boiler, the boiler's capacity will go down. Because of this, "fire amine" is used in hot water tanks in amounts of 500gm.

5.2 Power Plant of Igloo Ice-cream Industry

- The industry uses energy from a 6 MW power plant.
- These lines went to the server room, where they were used for different electrical tasks.
- In the server room, those limes were put in different piles for different uses of energy.

5.3 Refrigeration

The refrigeration concept is built on top of the second law of thermodynamics. The second rule of thermodynamics states that heat must be moved from a body with a low temperature to a body with a high temperature. This means that some external operations must be done. This outside process is done with the help of a generator

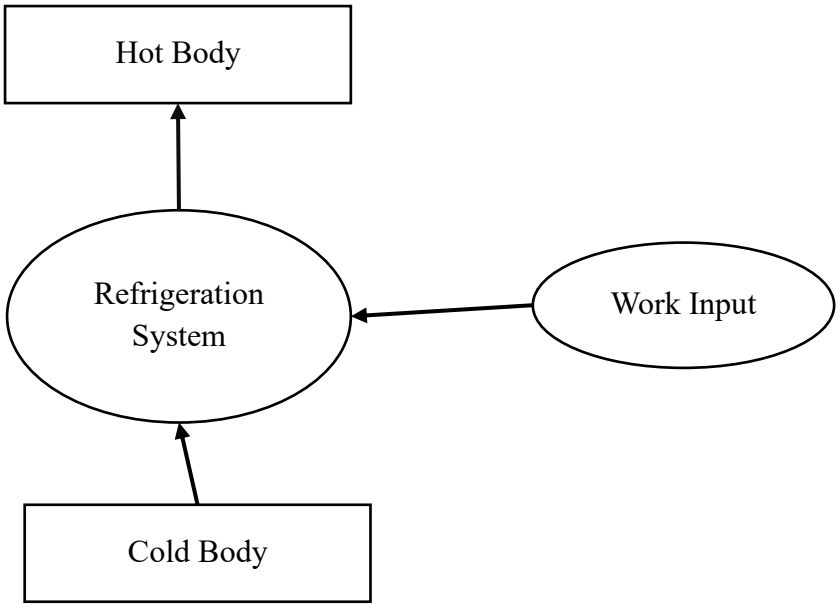

Fig 5.1: Refrigeration System

5.3.1 Importance of Refrigeration in the Dairy Industry:

Most dairy products go bad quickly, so cooling is a basic requirement for making and storing milk and milk products. Here is a list of places where you need cooling. The first thing that needs to happen in the dairy industry is that milk needs to be cooled down at the source level. To stop the growth of microorganisms and keep the number of germs in milk and milk products low, milk must be cooled quickly to between 2 and 3 °C. Before using a batch pasteurizer or an HTST machine to handle milk, it must be cooled. Chilled water or something else must be used to cool the milk. Refrigeration is needed to make things like butter, ice cream, and other foods. Depending on what is being stored, cold storage must keep a low temperature. Milk and milk products must be kept at a low temperature. For example, milk is kept at a temperature of 3 to 4°C and ice cream at -38°C. Refrigerated vehicles are needed to keep the quality of different goods while they are being moved. Low-temperature storage is needed both when a product is being shipped and when it is at the customer level. A refrigeration system is an important part of the dairy business. There are many kinds of refrigeration systems. They change in size, design, use, cooling capacity, minimum temperature needed, etc. However, the 'vapor compression refrigeration' theory, which is used in most of this equipment, is a standard one. A refrigerator system is made up of four main parts: the compressor, the condenser, the expansion valve, and the evaporator.

Refrigerator Cycle

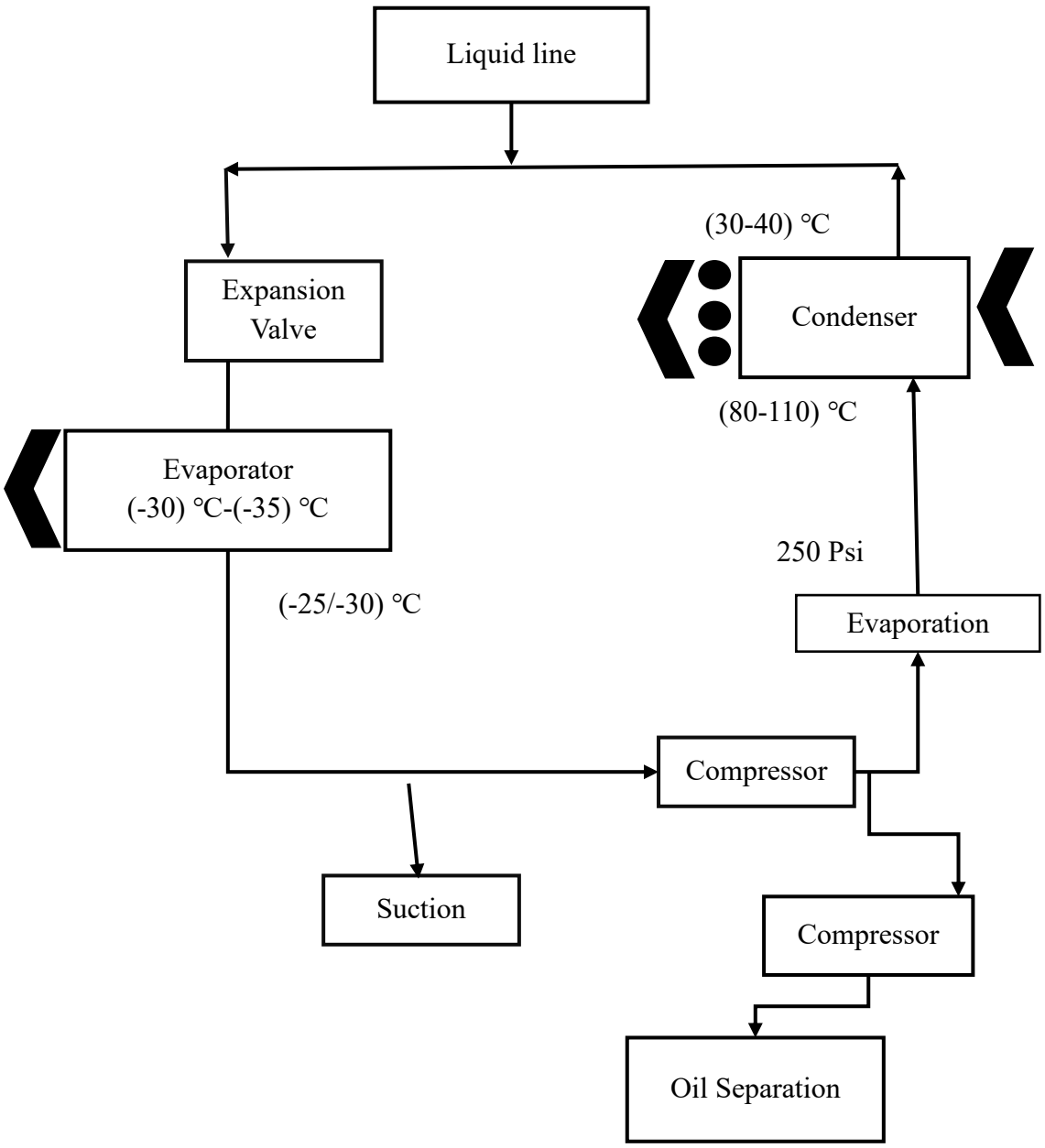

Fig 5.2: Refrigeration cycle

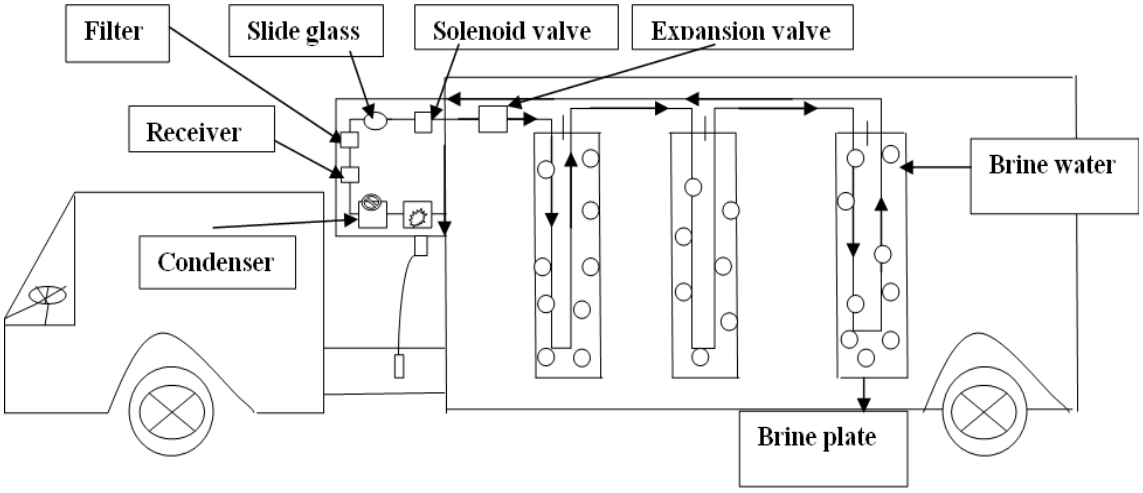

Fig 5.3: Refrigerated Van Refrigeration System

5.3.2 Refrigerated Van Refrigeration System

- Compressor
- Condenser
- Receiver
- Filter
- Slight Glass
- Solenoid valve/coil
- Thermostatic Expansion valve
- Brine plate / Evaporator coil
- Glycol/Brine Solution.
- Insulated Box

[N.B: The temperature should be -35°C to -40°C]

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CHAPTER 6

MILK UNIT

6.1 Igloo dairy

It generates between 8000 and 10,000 liters.

6.1.1 Objective

Skimmed milk, pasteurized milk, yogurt, and butter oil are manufactured and processed in compliance with international standards.

6.1.2 Product produced by milk unit

- Fresh milk (white milk)
- Flavored Milk
  - Chocolate milk
  - Mango milk
- Yogurt
  - Sweet curd
  - Sour curd
- Ghee

Milk Pasteurization Flow Chart

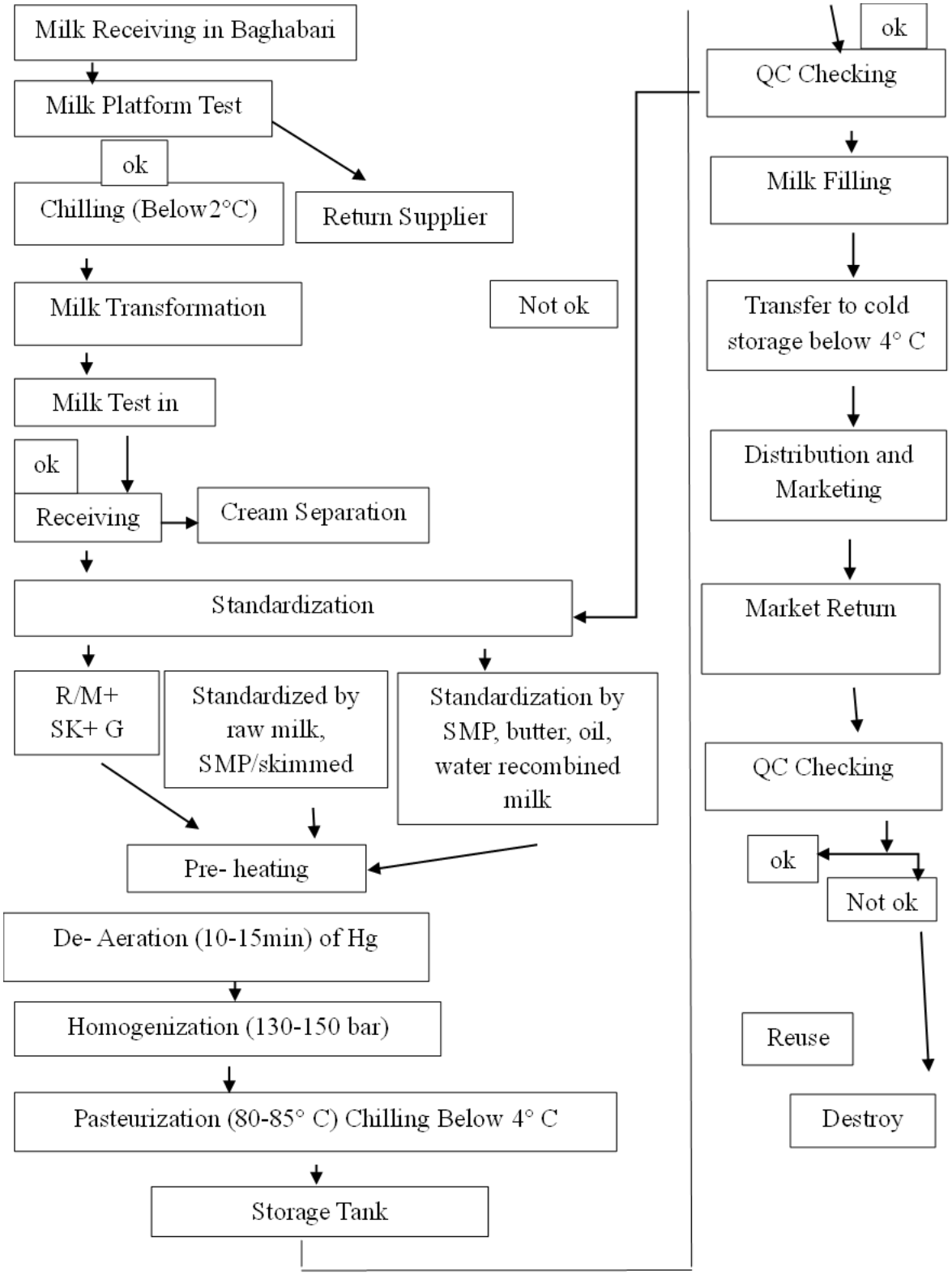

Fig 6.1: Process Flow Chart of Pasteurized Milk (White)

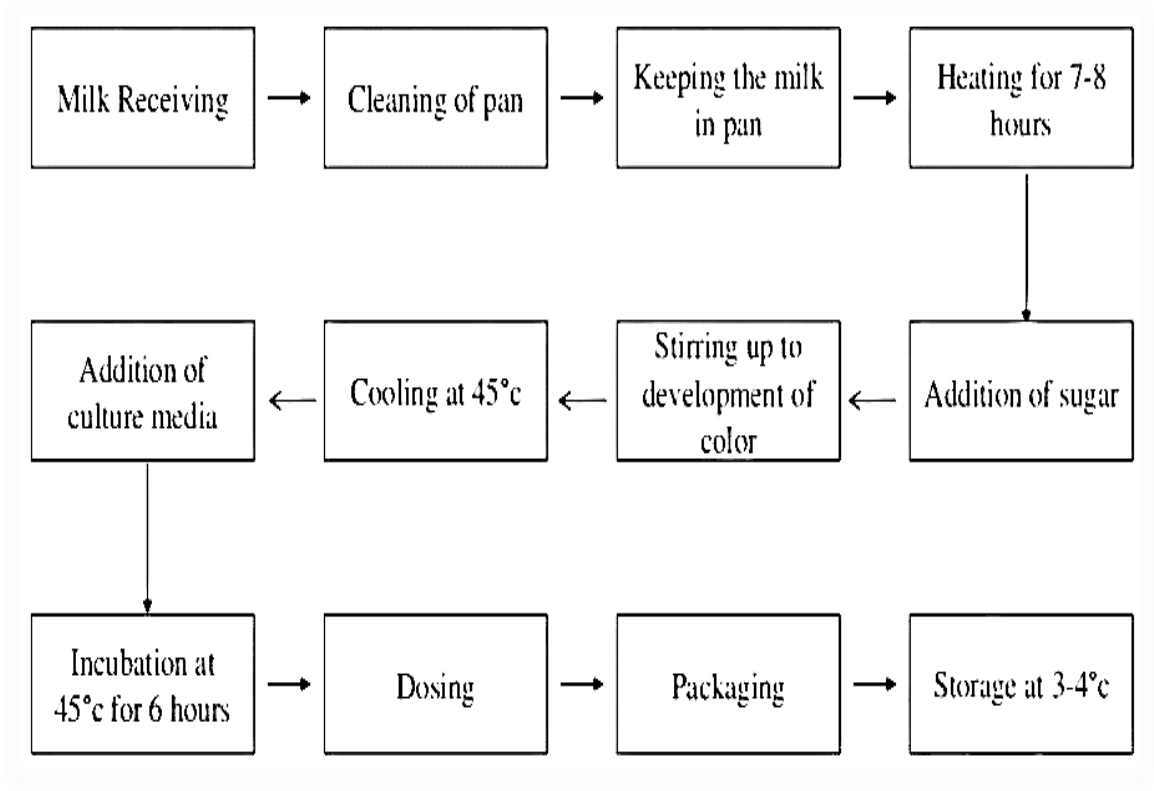

Fig 6.2: Yogurt Processing Flow chart

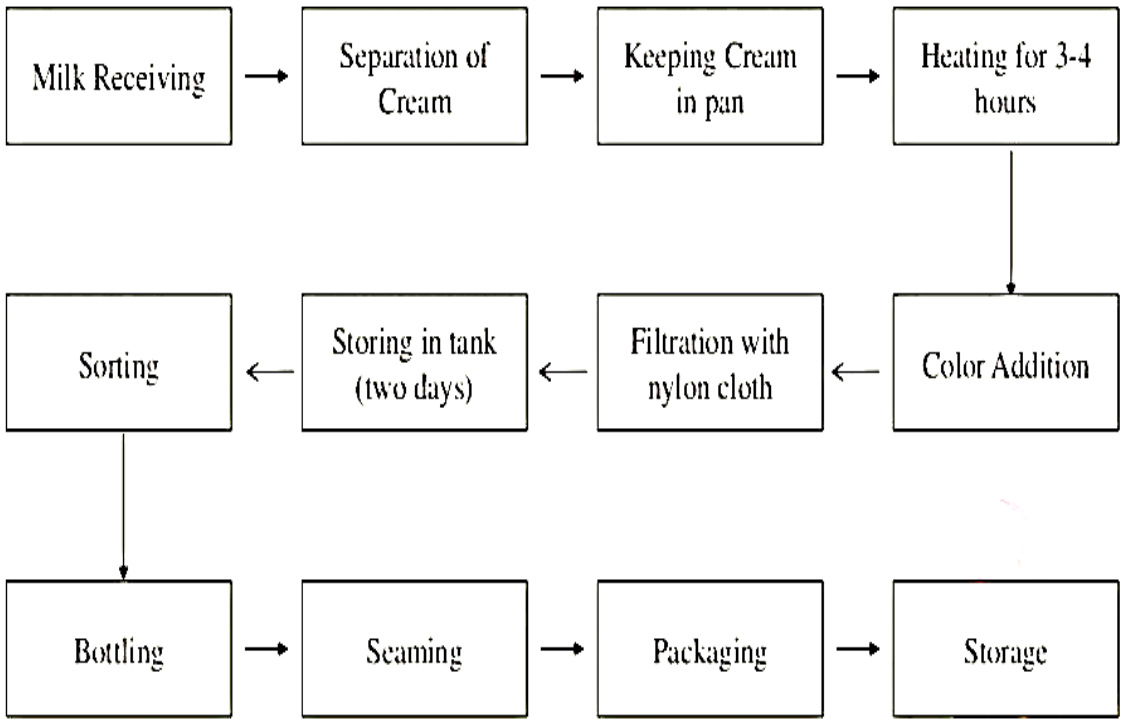

Fig 6.3 Ghee Processing

CHAPTER 7

PLASTIC UNIT

7.1 Plastic Unit

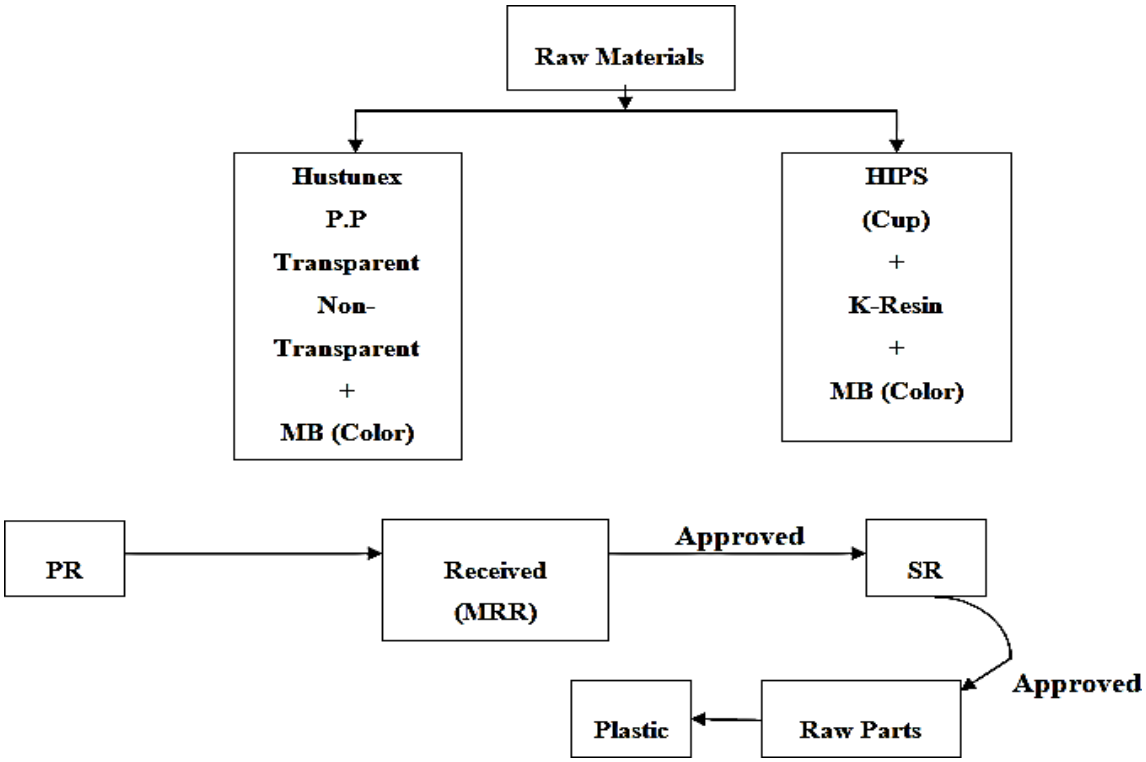

Fig 7.1: Flow chart of raw material selection process

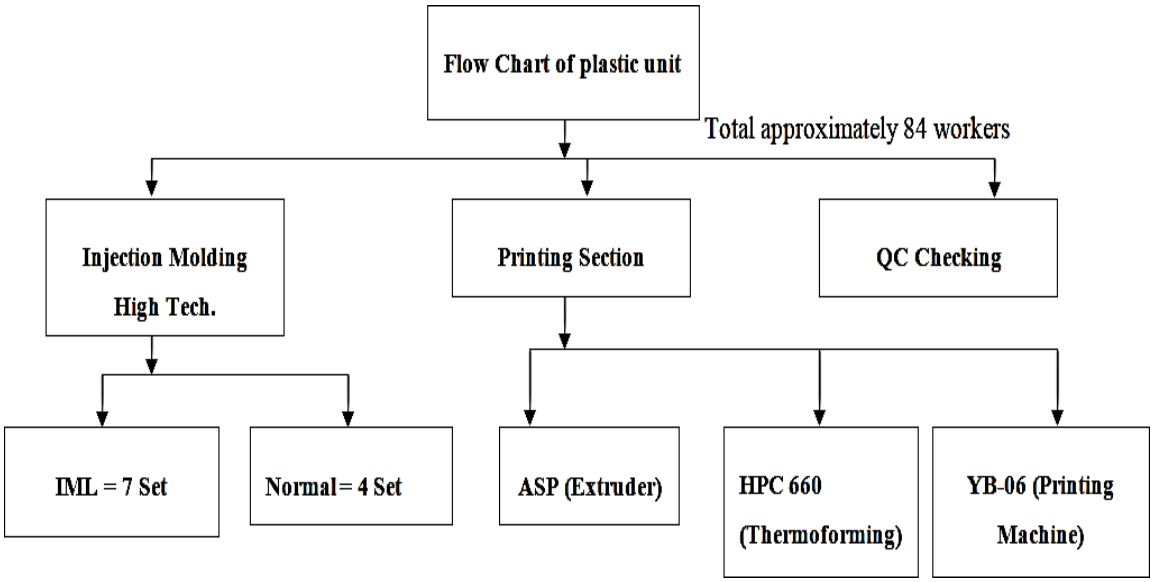

Fig 7.2: Flow Chart of Plastic Unit

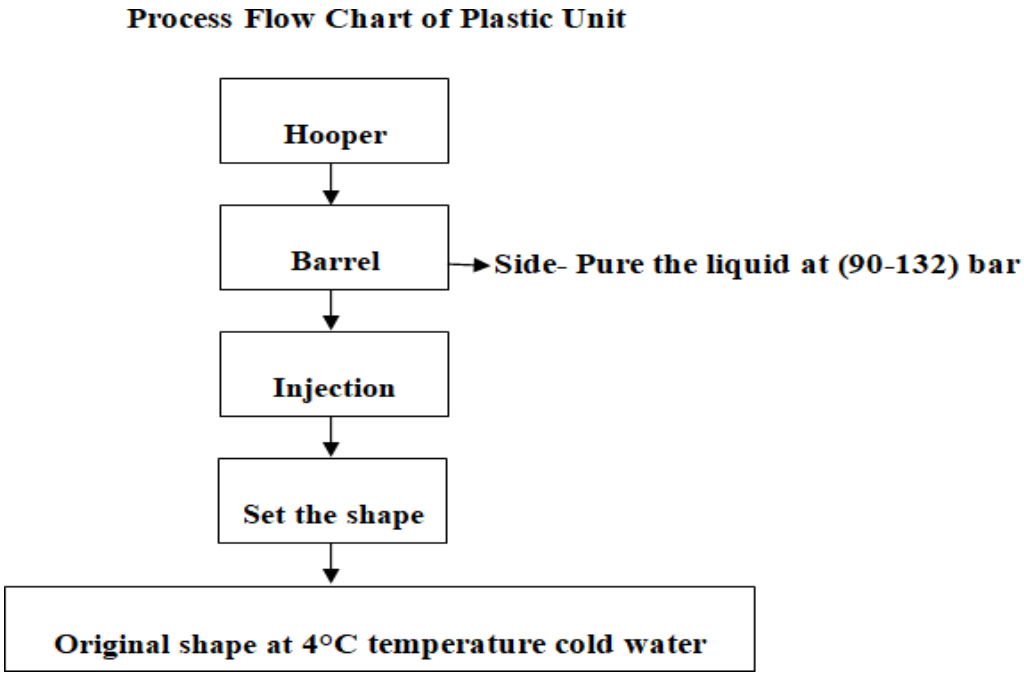

Fig 7.3: Process Flow chart of plastic Unit

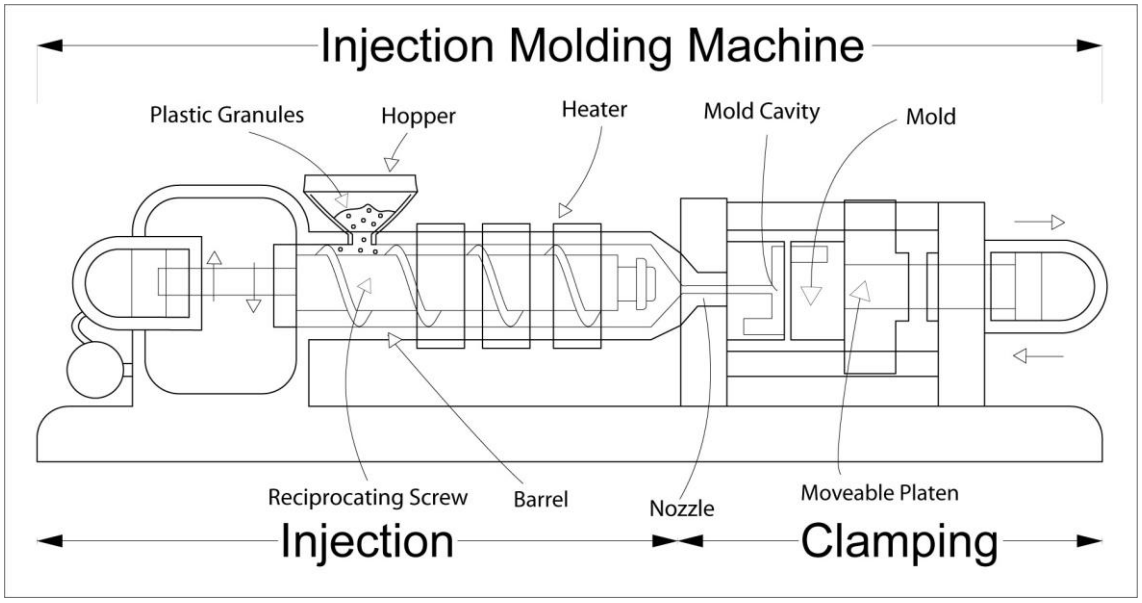

Fig 7.4: Injection Molding Machine

CHAPTER 8

MISCELLANEOUS

8.1 General store

The majority of items were held at a temperature range of 10-11°C, while a small number of items were stored at -10°C.

- Mango Flavor
- Toffee Flavor
- Cocoa Paste
- Vanilla Flavor
- Blueberry fruits
- Kismis Caramel liquid
- Strawberry Flavor
- Roasted almond split
- Mango Flavor
- Vanilla paste Almond nut
- Paste Nut
- Wheat cream
- Caking Gel
- Cheesecake base
- Pineapple slice
- Mirror Gel Cassata mix fruits
- Red cherry
- Rice ball
- Chocolate chips
- Vanilla Flavor
- Chocolate Flavor
- Kulfi Flavor

8.2 Distribution & Administration

Responsibilities can include:

- Helping purchasing managers set up processes for just-in-time inventory
- By linking computer systems with sources and coming up with the best systems for reordering,
- Making sure equipment is safe
- Making sure that goods are shipped safely (for example, perishables are shipped in a cool place)
- Working with suppliers to find the best ways to package, store, and label products to make inventory handling and storing more efficient.
- Putting strategies and procedures into action and keeping an eye on them to make sure that all products, both incoming and outgoing, come and leave on time
- Keeping an eye on forecasts and the flow of information
- Keeping track of processes and making changes to plans
- Staff training for people who receive, store, test, or release things
- Making and implementing safety and security plans for warehouses
- Looking at the vehicles, storage, and equipment and making plans for any repairs or replacements that are needed.
- Promoting a culture centered around quantification and evaluation.

CHAPTER 9

CONCLUSION

This internship report presents a thorough examination of the activities of Igloo Ice Cream and Milk Unit, emphasizing the organization's commitment to delivering dairy and ice cream products of exceptional quality. Igloo maintains rigorous standards across its production processes, quality assurance methods, and distribution strategies to ensure customer satisfaction and promote safety. The paper further underscores the crucial importance of engineering and refrigeration in the dairy industry.

9.2 Learning outcome

The internship experience has afforded me valuable insights into the daily operations of a well-established dairy and ice cream manufacturing firm. I have gained a deeper understanding of the various processes involved in the manufacturing of dairy and ice cream products, the application of quality control measures, and the crucial role of engineering and refrigeration in ensuring the quality and safety of the end products. This specific experience has greatly enhanced my comprehension of the dairy industry and the complex dynamics involved in efficiently managing a diverse range of products. Moreover, my comprehension of the importance of quality assurance in guaranteeing the provision of dependable and exceptional food products to consumers has been augmented. Overall, this internship has provided me with valuable practical information and skills that will be beneficial in my future career endeavors in the food industry.

REFERENCES

igloobd.com. (2023, 5 30). *About Us* . Retrieved from igloobd.com: https://igloobd.com/about-us

PLAGIARISM PERCENTAGE RESULTS

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