Production and Manufacturing process in PRAN Agricultural Marketing Co. Ltd

An Internship Report By

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ID: 191-34-191

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

Supervised By

Mr. Juwel Rana

Supervisor, Senior Lecturer

Department of Nutrition and Food Engineering

FACULTY OF ALLIED HEALTH SCIENCE (FAHS)

DAFFODIL INTERNATIONAL UNIVERSITY

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LETTER OF TRANSMITTAL

Date: 17th March, 2023
To
Dr. Nizam Uddin
Associate Professor & Head In-Charge
Department of Nutrition and Food Engineering
Faculty of Allied Health Sciences
Daffodil International University

Subject: **Submission of Internship report.**

Dear Sir,
It is a great delight and honor for me to have the opportunity to submit Internship report titled "***Production and Manufacturing process in PRAN Agricultural Marketing Co. Ltd.***" as a part of the fulfillment of Nutrition and Food Engineering (NFE) program curriculum. I have prepared this report based on the acquired knowledge during my internship period in Pran AMCL. This report is based on the production and manufacturing process of several Products of that organization.
I therefore, would like to place this report to your judgment and suggestion. Your kind advice will encourage me to perform better planning in future.

Sincerely Yours,

……
Irtiza Saiful Prome
ID: 191-34-191
Department of Nutrition and Food Engineering
Daffodil International University

DECLARATION

This Dissertation entitled "***Production and Manufacturing process in PRAN Agricultural Marketing Co. Ltd***" is being submitted to the Department of Nutrition and Food Engineering, Faculty of Allied Health Sciences, Daffodil International University, Bangladesh as a part of partial fulfillment of the requirements for the degree of Bachelor of Science in Nutrition of Food Engineering. The entire report based on the knowledge and skills that I have acquired in my internship period and did not submit before in support or an application for another degree or qualification of this university or any other institution.

Submitted by

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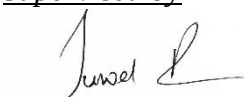
Supervised by



Mr. Juwel Rana
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ACKNOWLEDGEMENT

First, I wish to express my gratefulness to the almighty ALLAH for giving me the ability and opportunity to perform my responsibilities as an intern and complete the report within the scheduled time.

I am deeply pleased to my Department Head, Dr Nizam Uddin, Department of Nutrition and food engineering, FAHS, Daffodil International University for his whole-hearted supervision during my organizational attachment period.

I am also grateful to Md. Nur Hossain, Manager-QC Pran Factory, Ghorashal. It would have been very difficult to prepare this report without their guidance and helps.

I would like to give thanks to Mr. Juwel Rana (Supervisor), Senior Lecturer, Dept. of Nutrition and Food Engineering. Their sincere guidance and support inevitably helped me to steep the study report.

ABSTRACTS

The PRAN food factory is one of the most well-known and well-liked food factories not only in Bangladesh but also in other nations. Their objective is to do so while maintaining a clean and safe working environment. I was given the chance to complete an internship at PRAN AMCL, which is one of the companies that makes up the PRAN-RFL group. The 13th of September 2022 marks the beginning of my internship, and the 29th of September 2022 marks its conclusion. Also, they ship many different kinds of their made food products all over the world. They operate in a wide variety of markets, some of which include WTP, ETP, RO, Drinking water, CSD, HOTFILL, Beverages, Candy, R&D, and so on. My real-world observations serve as the foundation for this study. PRAN ensures that all of the quality parameters are adhered to with the utmost care, and that the quality of their products is accurately measured across all quality parameters.

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Chapter One

1.1INTRODUCTION

Fig 1.1: Pran AMCL

In 1981, the visionary Major General Amjad Khan Chowdhury held the reins of the organization. He recognized that the favorable growing conditions in Bangladesh presented a fantastic opportunity for his company. Because of this, he was motivated to launch a game-changing company that would revolutionize the food manufacturing industry in the country while simultaneously helping society and its inhabitants. And this is how the PRAN acronym came to be. Later on, in the year 1986, PRAN expanded its activities by joining the agricultural industry through contract farming. In the following year, 1992, PRAN further solidified its place in the industry by opening a food processing factory in Ghorashal.

1.2 MISSION STATEMENT

Both poverty and starvation are forms of evil. With the establishment of successful businesses, it is our intention to provide opportunities for employment, as well as to foster a sense of respect and dignity among our countrymen.

1.3 VISION STATEMENT

Improving Livelihood.

1.4 SLOGAN

PRAN means life, and we stand for the taste of life.

Fig 1.2 : ID CARD

Chapter Two

2.1 WATER TREATMENT PLANT

At first the water was collected from underground springs. All of this contained a variety of microorganisms, dust, animal feces, dirt from the drain, and other contaminants. Thus, these waters are not suitable for human consumption and need to go through a number of processing stages before they can be consumed. The water treatment plant (WTP) at AMCL (Agricultural Marketing Company Limited) consists of numerous stages, and these are the ones that are listed below:

- *Under Ground Tank*: The process of mixing Sodium Hypochlorite and a little amount of chlorine (between 2 and 3 parts per million) with water is referred to as the chlorination of water. It is particularly significant since it aids in the destruction of microorganisms that pose a threat to life, including bacteria, viruses, and any others.
- *Tank for Raw Water*: Before moving on to the ultimate stage of water treatment, this step involves storing the water.
- *MGF* is an abbreviation for multi-grade filtration, which is also known as sediment filtration. The MGF is able to remove physical particles such as iron, raw, dust, and so on. It is effective against particles of a size of up to 50 microns.
- *Activated Carbon Filter*: An activated carbon filter will remove chlorine from the water by utilizing carbon and stone.
- *Filtration with a Softener*: A filter with a softener is used to make water less hard. Every twelve hours, the softener filter needs to be calibrated with salt, and then water is added when the resin has been activated. Every 1000 liters of water should have 300 kg of salt added to it.
- In this stage, the primary or primary objective is to remove impurities from the water such as small particles and salt using a cartridge filter. It is effective against particles with a size of up to 5 microns. This water goes through a process called reverse osmosis filtration before being used in the production of juice, drinks, and beverages, as well as carbonated soft drinks.

Fig 2.1: Braver Drink CSD

Fig 2.2: Tamarind Drink

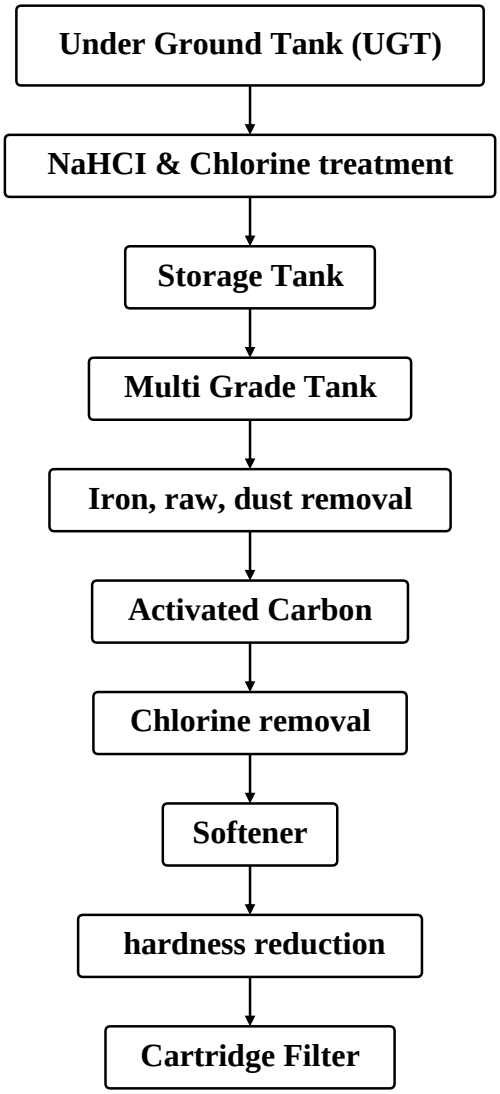

Fig 2.3: Water Treatment Plant flow chart

2.2 DRINKING WATER

After leaving the WTP, the water goes via a plant that employs the process of reverse osmosis. The RO water is held in reserve tanks, each of which has a capacity of 15000 liters and is stored in two separate tanks. Following its departure from the RO water tank, the water is subjected to ultraviolet radiation before being combined with a variety of other chemicals. These chemicals include Sodium Chloride (NaCI), which is added at a rate of 0.35 kilograms per one hundred liters of water; Magnesium Sulphate (MgSO4), which is added at a rate of 7.5 kilograms per one hundred liters of water; and Sodium bicarbonate (Na2CO3), which is added at a rate of 9 kilograms per one hundred liters of water. Following that, the water is passed through a pair of cartridge filters, the first of which removes bacteria and particles measuring 2 microns in size, and the second of which removes bacteria and particles measuring 3 microns in size. After that, a concentration of 0.2 to 0.4 parts per million of ozone is added to the water, and the water is filtered before being used again. After the water has been filtered, it is transferred to the filling portion after going through the strainer. The water that comes from this area is used to fill bottles, and any water that is lost during the bottling process is put into a reserve tank that the RO system has.

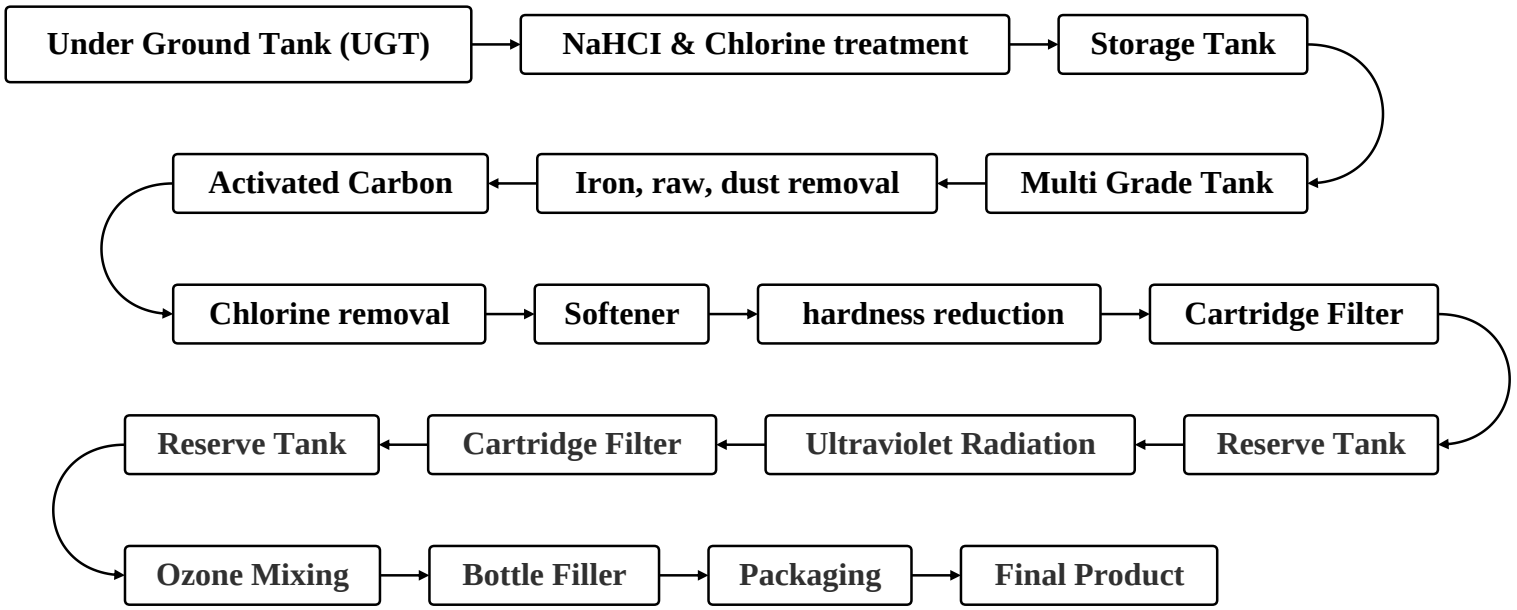

Fig 2.4: Drinking Water production flowchart

2.3 SYRUP PREPARATION

Before being put into the sugar-dissolving tank, the water goes through reverse osmosis (RO) filtration and then is heated in a heat exchanger to a temperature of 98 degrees Celsius, give or take two degrees. Both the temperature of the Sugar Dissolving Tank, which should be maintained at 85 degrees Celsius plus or minus 2, and the brix level of the sugar, which should be at least 60 degrees, are critical factors. As soon as the sugar has been completely dissolved, the syrup is placed in a raw syrup tank that has a capacity of one thousand gallons. After that, the syrup goes through a sieve on its way to the freezing chamber, which is where the dust and other particles that are insoluble are removed. After that, it is routed through the heat exchanger and the reserve tank so that the syrup can be stored to its maximum capacity. This syrup is utilized in the production of a wide variety of beverages, such as hot filling and beverages in general, and is one of the ingredients.

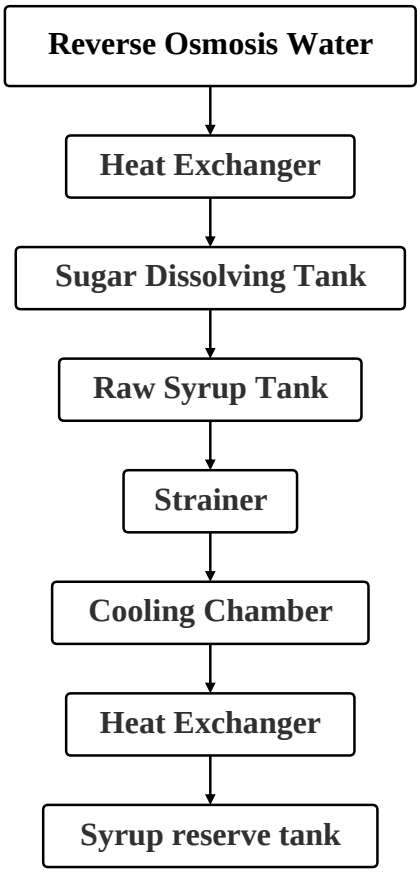

Fig 2.5: Syrup preparation

2.4 CSD RAW MATERIALS

Double Dozer and Braver, two of PRAN's most well-known carbonated soft beverages, are both simply referred to as Braver. AMCL's 8000-liter containers of power energy beverages contain a variety of ingredients, including food color (Sunset Yellow), flavor, and food coloring (Sunset Yellow). Some of the components that go into this product are things like sodium benzoate, trisodium citrate dehydrate, BP anhydrous caffeine, and citric acid anhydrous. The degree brix must be maintained because it differs between the products that are meant for the local market and those that are exported. The degree of brix in the local market is 18, while the degree of brix in products destined for export is 12. These chemicals are finally put to use in the product preparation process after first being completely mixed together in the chemical mixing tank. In the mixing tank, the ingredients Caffeine BP Anhydrous, Sodium Benzoate, Tri-sodium Citrate Dehydrate, and Citric Acid Anhydrous were mixed together. After that, the contents of the mixing tank were transported to the final dissolve tank.

2.5 CARBONATED SOFT DRINK

- Chemical Mixing Tank: All of the chemicals are combined and blended in this tank before being placed in the final syrup reserve tank. This occurs before the chemicals are stored.
- Blending of the Final Syrup Reserve: During this stage, you will combine all of the components, such as taste and food color (sunset in yellow). You will also need to use RO water, and the ratio between those two components should be 5:1.
- Heat Exchanger: The product has successfully completed the heat exchanger and is prepared to move on to the next step when it reaches 85 degrees Celsius.
- Buffer Tank: This tank is responsible for ensuring that the product is maintained at the ideal temperature.
- The Integration of Carbon Dioxide: Right before the process of really filling the products, carbon dioxide is added to them. In order to maintain the gas volume at its current 4.4 PSI level, carbon dioxide is being blended at a pressure of 75-79 PSI.
- Heater: The products have to be heated to 38 degrees Celsius before being stored at room temperature. This step is required before storing the items.
- Using the air blower, any remaining moisture on the product's exterior is removed using this process.
- Labels: Labeling is necessary since it provides information such as the brand name, the nutritional value, the company name, the expiration date, and other pertinent details.
- Coding: The process of coding is one that bears a great deal of importance. Because it comprises production date, expiration date and price.
- Now that they have been wrapped, the products are prepared to be put up for sale or placed in the storage room as necessary. The CSD has been broken down into a total of 24 different components for its final form.
- Finished Goods:The products have developed to the point where they can either be put away for later use or supplied to customers.

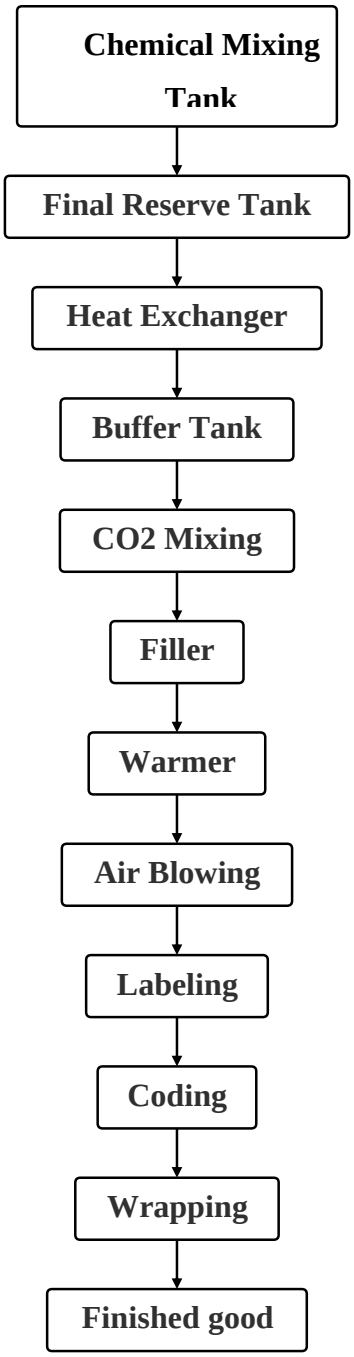

Fig 2.6: Carbonated soft drinks flow chart

2.6 HOT-FILL

Using a method that is similar to sterilization, the hot-fill process is a method that can lengthen the amount of time that products can be stored safely after they have been manufactured. The products themselves, as well as the bottle, cap, or closure that they came in, were sterilized while going through this process. The fundamental component of hot-fill, which is mango pulp, is gathered throughout the season when mangoes are available for purchase. Rajshahi is the best area to go to harvest mangoes and preserve them. The manufacture of the hot-fill beverage includes the utilization of 10–12% mango pulp. Under the "hot-fill" category, some of the available products include PRAN Frooto, PRAN Apple Fizz, Fazlee, and Sundrop. These are just a few examples. Sugar (with a brix level of 66), Sodium Citrate, Aspartame, Food color, Citric Acid, Sodium benzoate, Potassium Meta bisulphate, Pectin, Xanthan Gum, and water are the components that make up this product. Also included is a percentage of the materials.

The chemicals are initially combined in the chemical mixer tank, and after that, they are moved to the ultimate blender for blending. During the Hot fill procedure, different chemicals come from two different tanks and are mixed together. The series of tanks begins with the Blending Tank and continues with the Chemical Mixing Tank as its first two tanks.

- In the Blending Tank, Sugar (66 degrees brix) and Xanthan Gum are mixed together at a ratio of 5:1, with Sugar 5% and Gum 1%, for fifteen to twenty minutes at a temperature of fifty-five degrees Celsius.
- Chemical Mixing Tank: During this stage, the chemicals Sodium Citrate, Aspartame, Food color, Citric Acid, Sodium benzoate, Potassium Meta Bisulfate, and Pectin are combined and stirred for a period of five minutes. This step is part of the chemical manufacturing process. After the chemicals have been combined, they are put into the same tank as the mango pulp in order to undergo the final stage of the blending process.

Process

- The Final Blending: This tank is used to keep all of the raw ingredients, chemicals, and pulp, and it is blended for an hour. The tank is also used for the final step of the blending process, which is the Final Blending.
- The mixer, having first been combined in the final blending tank, then passes through the pasteurizer at a temperature of around 98 degrees Celsius, give or take a few degrees either way.
- During the homogenization process, the product is rotated at a speed of 190–200 revolutions per minute (rpm) for a total of two minutes.
- Pasteurizer: At this stage, the pasteurization process is completed at 98 degrees Celsius, plus or minus 2, in two minutes. Before the bottle can be filled, the filler stipulates that it must first be washed at a water pressure of 2.5 kg. After that, the filling process must take place at a temperature that ranges from 70 to 80 degrees Celsius.
- The air blower is responsible for removing any moisture that was present on the surface of the product at this step.
- Labeling is required because it must have the brand name, the nutritional value, the company name, and the expiration date, among other pertinent information. Labeling is also required because it must contain the brand name.
- The process of coding is a very important part of computer science. Because it contain manufacture date, expiration date and price.

- Once they have been wrapped, the products are either ready to be put on the market or ready to be stowed away in the storage room. The CSD has been broken down into a total of 24 different components for its final form.
- Finished Products are goods that have been manufactured to their full potential and are prepared for distribution or storage.

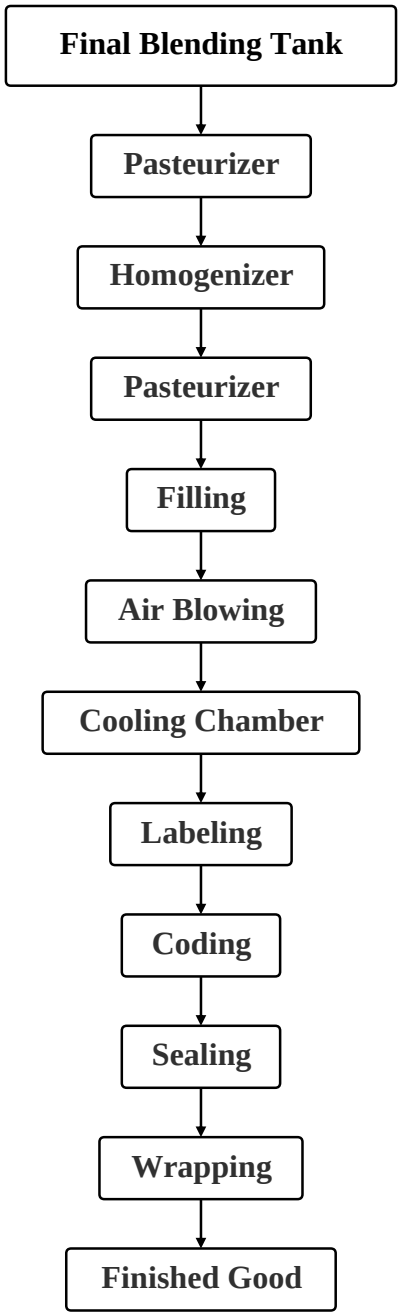

Fig 2.7: Hot fill production flowchart

2.7 PRAN LITCHI DRINK

When we think about beverages, the first thing that springs to mind is the PRAN Company Litchi Drink, which is a litchi-based beverage. This is because the PRAN Company Litchi Drink is so widely consumed. Other popular beverages in PRAN include Drinko (available in

three flavors), PRAN Apple drink, Tamarind drink, and many others. The beverages produced by the PRAN Corporation are also exported internationally. Products sold on the local market and those sold internationally may include different ingredients.

Sugar, flavor, xanthan gum, and citric acid are the ingredients that are combined in the blending tank. Pectin 1:5 Sugar, Potassium Sorbet, Sugar, Ethyl Maltose, and Aspartame are the ingredients that are mixed together in the stabilizer tank at temperatures between 80 and 85 degrees Celsius for twenty minutes.

Process:

- The Final Blending Tank: All of the tanks' products, including the ingredients, the stabilizer tank, and the milk dissolving tank, are stored in the final blending tank.
- Pasteurizer: After combining all of the ingredients in the final blending tank, the mixer is put through the pasteurizer for 30 seconds at a temperature between 96 and 100 degrees Celsius.
- Homogenizer: Within 15 seconds and at a rotational speed of 220 revolutions per minute, products are homogenized.
- Pasteurizer: At this stage, the pasteurization is carried out in a pasteurizer at a temperature ranging from 96 to 100 degrees Celsius for 30 seconds.
- Filler: After that, the items were filled at a temperature between 32 and 32 degrees Celsius.
- The bottle containing the product must have a cap on it.
- The products need to be sterilized before moving on to the next stage before moving on to the next stage.
- Chilling: The products need to be chilled to between 35 and 40 degrees Celsius.
- The air blower is used during this stage to remove any moisture that may be present on the items.
- Labeling: Labeling is required since it includes the brand name, the nutritional value, the company name, the expiration date, and other relevant information.
- Coding is really important, and coding is highly crucial. Because it contains production date, expiration dare and price.
- Packaging indicates that the products are now ready for sale or storage in the appropriate facility. The drinks are packaged in bundles of six or twelve units each.
- Completed Goods: These are products that are complete and ready for distribution or storage.

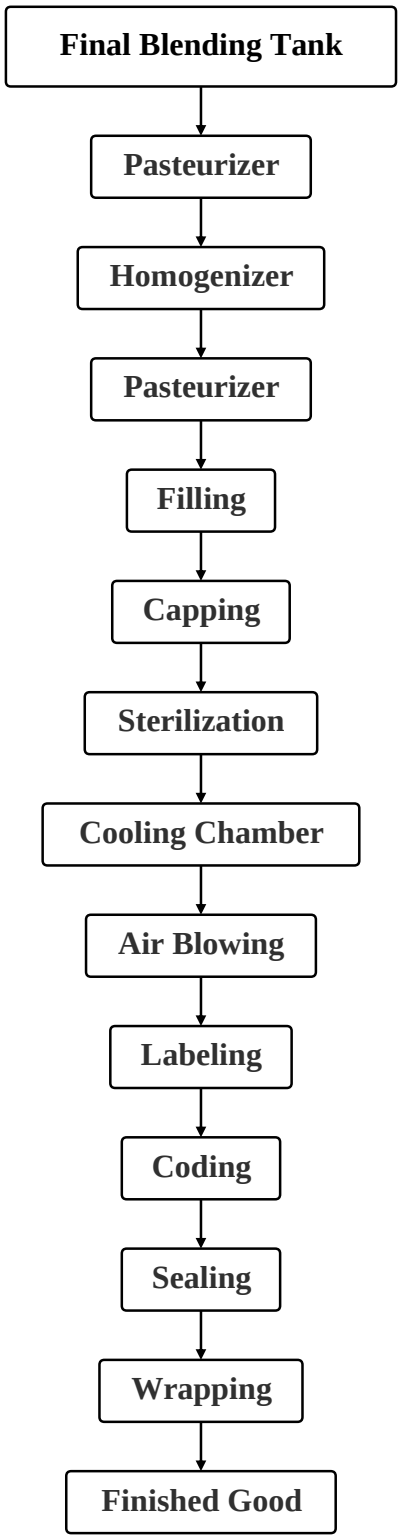

Fig 2.8: Pran Litchi Drink production flowchart

2.8 CONFECTIONARY PRODUCTION

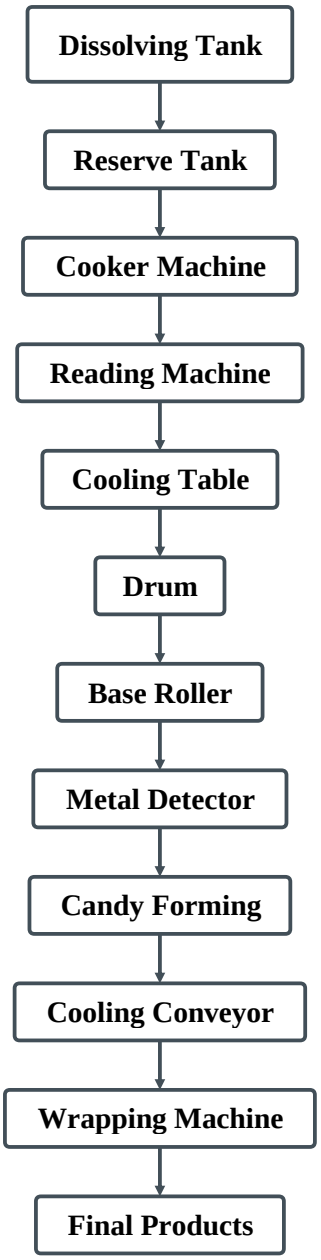

Fig 2.9: Confectionary production flowchart

1. Tank for Dissolving: After 40 minutes, water, sugar, and glucose are all dissolved in this tank while the temperature is between 108 and 112 degrees Celsius.
2. Reserve Tank: The temperature for adding color in this part is 78 degrees Celsius.
3. Cooker Machine: Cook all ingredients at 145-150 degree Celsius in 5-6 minute.

4. Drum: Taste, Citric Acid/Buffer Lactic Acid Everything pertaining to the chemical and flavor is combined in the drum.
5. Cooling Table: In this step, you will let the mixture cool at 13.5 degrees Celsius for one to two minutes, and then you will add the Telcom powder.
6. The Reading Machine: This device pops any bubbles that may be present.

7. Base Roller: In this phase, the bases are rolled, and you will also add Seasoning Green Mango.
8. Candy Molding: This section includes instructions for molding candy.
9. Metal Detector: This instrument can determine whether or not the base contains any traces of metal.
10. Cooling Conveyor: This device is used to keep the temperature of the candy between room temperature and the desired temperature.
11. Wrapping Machine: The candy can be wrapped in a variety of ways, depending on its size and form.
12. Finished Goods: The products have reached the point where they are ready to be stored or distributed.

Chapter Three

3.1 QUALITY CONTROL TESTS

The process by which a corporation evaluates the quality of its products and, if necessary, takes steps to improve that evaluation. Doing quality control can be accomplished in a variety of ways, including defining benchmarks, testing products, and examining manufacturing procedures. All of this is done so that substantial deviations in a product may be monitored.

3.2 DRINKING WATER

Experiment Name	**Standard**	**Instrument**s
Chlorine	0.0-0.01ppm	Spectrophotometer
Iron	</= 0.05 ppm	Spectrophotometer
TDS	</= 150 ppm	TDS meter
pH	6.5-7.5	pH meter
Hardness	</= 50 ppm	Titration method

3.3 HOT-FILL LINE

Experiment Name	**Standard**	**Instrument**s
Acidity	0.23	Titration method
Homogenization	190-200rpm	Monitoring system
Brix	12.8	Refractometer
Pasteurization	98 +/-2 degree Celsius	Monitoring System

3.4 CARBONATED SOFT DRINK (CSD)

- Bottle Analytical Test: Top load test- 28-29 kg mm. Base clearance- 1.74 mm. Cork- 15-20 lbs.
- Gas Volume Test: The gas inside the bottle is 4.4 PSI.
- Syrup Brix: 61-degree brix syrup is used in production. But the final brix is used in production which is standard local 18 & export 15.

3.5 DRINK LINE

Experiment Name	**Standard**	**Instrument**s
Homogenization	190-200 rpm	Monitoring System
Pasteurization	98 +/-2 degree Celsius	Monitoring System
TDS	20 maximum	TDS meter
pH	5.7-6.2	pH meter
Hardness	5 maximum	Titration method

Chapter Four

4.1 CONCLUSION

During my internship at the Pran Agricultural Marketing Co. Limited, I was able to increase both my knowledge and my skill set in the areas of production and quality (AMCL). PRAN is the Bangladeshi acronym for the country's rapidly expanding food industry. PRAN is currently widely used in a great number of different nations. I have obtained both theoretical and practical knowledge and abilities in a variety of processes, including the production of carbonated soft drinks, hot-fill, confectionery processing, and others. The majority of my time was spent on the assembly line. Because the outputs of the various production lines are distinct, the cleaning procedures that accompany them are also distinct. I was able to learn about the machinery and watch each phase of the production process as well as the quality control section. I also watched the temperature in the room where the raw components were stored, as well as the process of shortening, mixing, maturing, and storing the finished product. The shelf life of a product, also known as its self-life, is determined by its packaging. PRAN creates their own food packaging items and uses their own food goods in their operations. They make use of high-quality packaging materials such as low-density polyethylene, polypropylene, high density polyethylene, and aluminum foil for the packaging of their products.

Fig 4.1: Group photo with Qc Officers