An Internship Report

On

Quality Control Assurance & Production of Dairy Products

At

Dhaka Dairy Plant (Milk-vita)

Milk-vita road, Mirpur section-7, Dhaka

Submitted To:

Prof. Dr. Md. Bellal Hossain

Head

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Submitted by:

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ID: 151-34-370

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Date of Submission: 20th December, 2018

LETTER OF TRANSMITTAL

Date: 20th December, 2018

Professor Dr. Md. Bellal Hossain
Head
Department of Nutrition & Food Engineering
Daffodil International University.

Subject: Submission of an internship report on Quality Control Assurance & Production of Dairy Products.

Dear Sir,

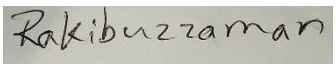
It is a great pleasure and honor for me to have the opportunity to submit Internship report on **Quality Control Assurance & Production of Dairy Products** as a part of the BSc in Nutrition & Food Engineering (NFE) program curriculum.

I have prepared this report based on the acquired knowledge during my internship period in Dhaka Dairy Plant (Milk-vita). It is great achievement to work under your active supervision. This report is based on Quality control & Production of Dairy Products. I have got the opportunity to work in Dhaka Dairy Plant (Milk-vita) in "Quality Control and Production Department" for thirty days, under the supervision of Dr. Khondokar Aminul Islam, Additional General Manager of Dhaka Dairy Plant.

This is the first times this project gave me both academic and practical exposures. First of all I have gained knowledge about the organizational culture of a prominent consumer product producing organization of the country. Secondly, the project gave me the opportunity to develop a network with 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 future.

Sincerely Yours



Md. Rakibuzzaman Sarker
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CERTIFICATE OF APPROVAL

I am pleased to certify that the internship report on production & quality control of dairy products conducted by Md. Rakibuzzaman Sarker, bearing ID 151-34-370 of the department of Nutrition and Food Engineering has been approved for presentation and defense/viva-voce.

I am pleased to hereby certify that the data and findings presented in the report are the authentic work of Md. Rakibuzzaman Sarker I strongly recommended the report presented by Md. Rakibuzzaman Sarker for further academic recommendations and defense/viva-voce. Md. Rakibuzzaman Sarker bears a strong moral character and a very pleasant personality. It has indeed a great pleasure working with him. I wish him all success in life.

Professor Dr. Md. Bellal Hossain

Head
Department of Nutrition & Food Engineering
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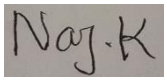

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ACKNOWLEDGEMENT

In the preparation of this report, I would like to acknowledge the encouragement and assistance give to me by a number of people. At first, I would like to express my gratitude to my creator the almighty Allah for enabling me the strength and opportunity to complete the report in time successfully. I am grateful to each and every people who are involved with me in every phase of my life.

I am grateful to my parents without whom I cannot be here. Without the support of my parents, I could not be able to achieve my objectives and goals.

My Deep gratitude and sincere thanks to the honorable Dean, Faculty of Allied Health Science, **Professor Dr. Ahmed Ismail Mostafa** for his kind cooperation and to accept this Degree.

I am deeply indebted to my supervisor **Prof. Dr. Md Bellal Hossain**, Head of Department of Nutrition & Food Engineering, Daffodil International University for his whole-hearted supervision during my organizational attachment period.

I would also like to express my great respect & warmest thanks to my project co-supervisor **Najia Kamrul,** Lecturer of Department of Nutrition & Food Engineering for her whole-hearted help and supervision during my project work and organizational attachment period.

My gratitude goes to entire Nutrition and Food Engineering Department of Daffodil International University for arranging Internship Program that facilitates integration of theoretical knowledge with real life situation.

Moreover, I would also like to express my gratitude to Bangladesh Milk Producers Co-operative Union Limited (BMPCUL), fellows, seniors and colleagues who gave me good advices, suggestions, inspiration and support. I must mention the wonderful working environment and group commitment of this organization that has enabled me to deal with a lot of things.

I also thankful to **Shahriar Ferdhous Bhuyan,** Senior Officer, Quality Control, Dhaka Dairy Plant (Milk-Vita) and **Md. Abdur Rahman**, Senior Officer, Quality Control, Dhaka Dairy Plant (Milk-Vita) for their cooperation during my internship program at Milk-Vita.

At last I also thankful to **Dr. Khondokar Md. Aminul Islam**, Additional General Manager of Dhaka Dairy Plant (Milk-Vita) for his permission to carry out this internship in his organization.

Finally, I wish to express immense gratitude & humbly convey my heart-felt respect to Managing Director of Milk-Vita

Dedicated to my beloved parents

EXECUTIVE SUMMARY

Milk Vita is a trade name for dairy products manufactured by the Bangladesh Milk Producers Co-operative Union Limited (BMPCUL). Established under the co-operative fold, the organization, popularly known as Milk Vita, makes necessary efforts to fulfill the demand for Milk and Milk products of city dwellers by collecting milk from remote places of the country. Presently, Bangladesh Milk Producers Co-operative Union Limited operates in six milk shed areas of the country viz Tangail, Manikganj, Takerhat, Baghabarighat, Rangpur and Sreenagar. It collects milk through networks established by its primary co-operative societies. BMPCUL is the central union of a total of 345 Primary Milk Producer's Co-operative Societies and has a membership of about 40,000 milk-producing farmer-members. To become a member of a rural primary society, farmers have to own a milking cow and have to buy a share of Tk 10.00 and pay Tk 1.00 as admission fee. To maintain membership, a farmer has to supply at least 150 liters of milk in a year.

Members supply milk to societies twice a day on cash payment with a preferential system of weekly basis matched on the market day of each area. The rate of the farmer's milk is decided on the basis of fat and solid non-fat (SNF) percentage. Milk collected from cooperative societies is transported to the nearest plant for preliminary processing and afterwards milk of Tangail, Manikganj, Takerhat and Sreenagar area is brought to Dhaka for the production of liquid milk, cream, ice-cream, flavored milk, and sweet yogurt. Milk collected from Rangpur and Baghabarighat area is processed at Baghabarighat Dairy Plant for Powder Milk, Butter and Ghee (butter oil) production. All products of the organization are marketed under the trade name of "Milk Vita".

This report is based on quality control and production of dairy products of BMPCUL. The first part of the report contains information of the organization itself. The second part of the report contains the raw milk test and quality parameters. The third part of the report contains production of dairy products. The last part contains the concluding part. This research's result that found is much considerable.

CHAPTER-ONE

INTRODUCTION

Introduction

Milk is an ideal food for all kinds of mammals. Milk comes from mammary glands of mammals. Normally raw milk of cow, buffalo & goat found in local market but processed milk are found in grocery shop as packaged milk.

There are various processed milk producer companies are available in Bangladesh. Bangladesh Milk Producers Co-operative Union Limited (BMPCUL) or Milk-vita is one of them. Their purpose is to serve good products to consumer and also develop the local village people. Because local village people earn money by supplying milk in Milk-Vita and thus they are developing their financial situation.

Milk-Vita collect their raw milk from selected local village people by co-operative union. Milk-Vita also provide cows and healthy feed for the cows to the village people to get fresh milk. The village people are bound to supply their milk only to the Milk-Vita.

Milk-Vita test the quality of the milk through organoleptic test by their local experts. Then they chilled the milk and send the milk to their all milk processing plant.

Bangladesh Milk Producers Co-operative Union Limited (BMPCUL) or Milk-vita serve pure products than any other milk-producer company. Their purpose is to consumer satisfaction. They don't looking for more benefits like others.

1.1 Definition of Milk

Milk is a nutrient-rich, white liquid food produced by the mammary glands of mammals. It is the primary source of nutrition for infant mammals (including humans who are breastfed) before they are able to digest other types of food. Early-lactation milk contains colostrum which carries the mother's antibodies to its young and can reduce the risk of many diseases. It contains many other nutrients including protein and lactose.

Milk is also defined as lacteal secretion free from colostrum. Milk is obtained from healthy cows 5 days after and 15 days before parturition.

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Figure: 1.1- Milk

1.2 Origin of the Report

Internship program is an obvious requirement for the student of Nutrition and Food Engineering Department to complete graduation. Daffodil International University & Department of NFE provide Internship opportunity for students in different company and different sectors. Its main purpose is to educate the students with practical experience and real work place. It gives an opportunity to the students to get closer to job seekers. In this program students get chance to use their theoretical knowledge in real work place.

The study and internship program have following purposes:

- To fulfill the requirement of BSc in Nutrition and Food Engineeing program to complete graduation
- To gain knowledge about practical work beside theoretical knowledge
- To help students to express dependability, initiative, and professionalism and tasks they are assigned
- To get closer contact with job providers
- To know about Bangladesh Milk Producers Co-operative Union Limited (Milk Vita)
- To learn about various dairy products
- To learn about production of dairy products and their quality control.
- To provide opportunity to gain practical knowledge and use it in job place.

1.3 Objective of the program

There are two objectives of this internship program. They are:

- General objective
- Specific objective

General objective

- To learn production and quality control of milk and milk products.
- To fulfill the Bachelor of Nutrition and Food Engineering degree requirement of Faculty of Allied Health Sciences of Daffodil International University.

Specific Objective:

More specifically this study contains following aspects:

- To learn about Bangladesh Milk Producers Co-operative Union Limited (BMPCUL).
- To give focus on the hygienic production quality and control of Dhaka Dairy Plant (Milk vita).
- To have an idea about the activities of Bangladesh Milk Producers Co-operative Union Limited (BMPCUL).
- To give an overview of this organization.

1.4 Scope of the study

Through extensive discussion this report has been prepared. The main intention of this study is the Production and Quality Control of Milk & Dairy Products compositional standard and quality and processing of dairy products by the Dairy products Producers Company. The report covers detail about the Production and Quality Control of Dairy Products under Hygienic Condition.

1.5 Methodology

Methodology starts from selection of topic, data source, interpreted results in a systematic manner and key points are to be found out. The overall process of methodology are as follows**:**

Selection of the topic:

The selection of the topic for any research is very important. It depends on gained knowledge and on-practical experience from the assigned organization.

Source of data:

There are two sources of data.

Primary Source of data:

- Conversation with the company officials.
- Formal and informal conversation
- Conversation with the employee of the organization assigned with us.

Secondary Source of data:

- Official website of Milk Vita.
- Journal and article
- Manual and files of the organization.
- Prospectus

Tools Used:

Some arithmetic and graphical tools are used in this report for analyzing the data and to classify different types of data.

1.6 Limitation of the report:

Though I have tried my level best to make the report successfully but every one understand that no report can provide coverage of a given topic in an absolute sense. I had also some limitations to collect proper data.

- Because of their company policy, rules and regulations they were unable to provide some information.
- Because of unavailability of time some of them were unable to provide some information.

CHAPTER-TWO

OVERVIEW OF THE ORGANIZATION

2.1 History of Milk Vita:
Background of Bangladesh Milk Producers' Co-operative Union Limited

Bangladesh Milk Producers Co-operative Union Limited (BMPCUL) known by its brand name Milk-vita was first introduced when Bangladesh wasn't born. It starts its journey in 1946 at Lahirimohonpur, Pabna (Presently Sirajgong). It was established to send milk products to Calcutta market.

After partition a private company named Eastern milk products Limited purchased this dairy company in 1952 from original owner. In 1965 the first milk producer's co-operative union was formed as named Eastern Milk Producers Co-operative Union Limited (EMPCUL). After that dairy plants were run by Eastern Milk Producers Co-operative Union Limited (EMPCUL).

In 1973 Bangladesh government has taken it under their supervision. The name of the organization was changed when Bangladesh Government became the owner of the company. In 1977 a brand name of the company was fixed as Milk-vita.

Bangladesh Milk Producers Co-operative Union Limited (EMPCUL) established different plants in Baghabarighat (Bogra), Tekerhat (Madaripur) Mirpur-7 (Dhaka).

Earlier Bangladesh Milk Producers Co-operative Union Limited (EMPCUL) has started its journey to supply raw milk countrywide. Then it started to supply different dairy products.

The head office of this organization named "Dugdha Bhaban" is at Dhaka. At present it is one of the top ranked dairy industries in Bangladesh based on quality.

2.2 Objective of the Company

Bangladesh Government started Bangladesh Milk Producers Co-operative Union Limited (EMPCUL) earlier to drive away the poverty among rural people. Other objectives are given below-

- To gain sufficiency in the dairy sector within 2025.
- To fulfill the demand of customer satisfaction.
- To promote production and improve nutrition and quality.
- To create available employment opportunity.
- To develop local farmers financial condition.
- To provide hygienic product
- To provide with quality products for the consumers.

2.3 Products of Milk-Vita:

- Pasteurized milk
- Chocolate milk
- Powder milk
- Butter
- Ghee
- Laban
- Matha
- Sweet yogurt
- Sour yogurt
- Vanilla cup ice cream
- Chocolate ice cream
- Rosh-malai

CHAPTER-THREE

DESIGN OF THE STUDY

3.1 Study Area

The study is divided into two areas. Such as

1. Study on the Laboratory
2. Study on the Production

3.2 Laboratory

In Milk-Vita they conduct various laboratory test of raw material and final products. After getting clearance from laboratory they accept the raw milk as well as launch final product in the market.

Laboratory test includes:

- Platform test
- Alcohol test
- CLR (corrected lactometer reading) test
- Fat test
- Organoleptic test

3.2 Production area

After getting clearance from laboratory they transfer the raw milk in production area for further processing.

Production area includes the following section.

- Storage (raw milk) area
- Mixing area
- Processing area
- Packaging area
- Storage (final product) area

CHAPTER-FOUR

PROCESSING SECTION

Milk processing flowchart:

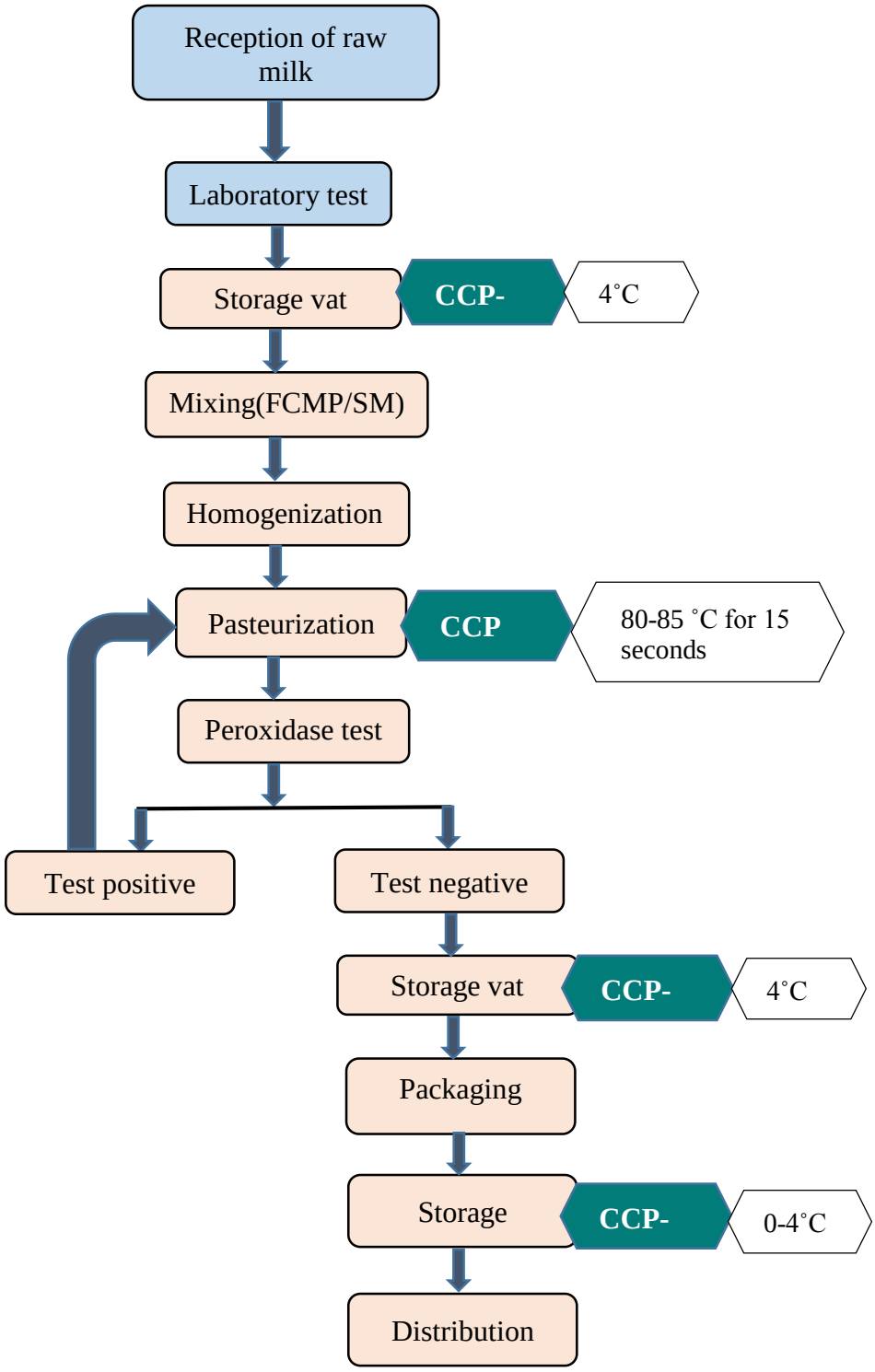

Fig: Flowchart of Milk Processing

4.1 PASTEURIZED MILK

Processing steps:

1. Raw milk is stored in a storage vat at 4^0C

2. Skim milk or full cream is added to storage milk for maintaining fat percentage (3.5%) according to BSTI standard.

3. Skim milk is added to make balance if raw milk has higher fat percentage

4. Full cream milk is added to make balance if raw milk has less fat percentage

5. Then these recombined milk is homogenized by milk homogenizer
6. Homogenized milk is pasteurized at 80 to 85^0C for 15 seconds
7.Then the pasteurized milk is cooled at 4^0C

8.Then cooled milk is stored in 4 storage vat

9.Then cooled milk is taken into the packaging section from storage vat

Figure: 4.1 Milk Homogenizer

Figure: 4.2 Milk Pasteurizer

Figure: 4.3 Milk Packaging Machine

10.Milk Vita has different amounts of packaged milk such as 250ml, 500ml, 1 liter etc.

Figure: 4.4 Packaged Milk (1Litre Packet)

11.Wrong pasteurized packaged milk is removed from packaging area and pasteurized again

12.Well pasteurized packaged milk is stored at 0 to 4^0C

4.2 CHOCOLATE MILK

Milk-Vita also produces Chocolate Milk which is favorite to the children.

Figure: 4.5 Chocolate Milk

Ingredients/Recipe: (For 400kg)

1. SMP- 12kg
2. FCMP-30kg
3. Sugar- 33kg
4. Stabilizer- 0.60kg
5. Cocoa powder- 2.80kg
6. Color- 0.032kg
7. Water- 321.568kg

Processing steps:

1. Approximately at 60°C hot water is added into the blending/mixing vat.
2. Then sugar, full cream milk powder (FCMP), skim milk powder (SMP), stabilizer, chocolate flavor, cocoa powder, color and finally remaining water are added. At 80^{0}C the mixing operation is blended.
3. Then homogenize the mixture
4. Then Pasteurized the mixture at 81^{0}C for 15 seconds and subsequently cooled by the chilled water which helps to destroy pathogenic bacteria present in the mixture
5. Then they transferred into instant storage vat from where chocolate milk is taken into the packaging machine
6. Then chocolate milk is packaged through packaging machine.

7. Milk is packaged in different amounts such as- 250ml, 500ml

8. Then packaged milk is stored in the storage room at 4^0C temperature

4.3 LABANG A YOGHURT DRINK

Labang is a kind of dairy product of Milk-Vita. It is also known as yogurt drink. It found all over the world but specially in South-Asian country. Milk-vita provide 80% yoghurt in their Labang.

Ingredients: (For 154.518 Liter)

- Sour yogurt/ sour curd-128.232 kg
- Sugar -10% (12.823 kg)
- Salt -0.7% (0.897 kg)
- Treated water- 17% (21.799kg)
- Propagated culture- 2%
- Xyanthen gum-0.03%

Processing steps:

1. At first sour yogurt/ sour curd is poured into the mixer machine.
2. Then sugar, salt and water added with the sour curd
3. Then xyanthen gum is added into the mixer as a thickening agent
4. After adding xyanthen gum , the mixer is mixed thorough for about an hour.
5. After mixing the mixer is ready to package as Labang.
6. Labang is packaged into packaging bottle
7. After filling the bottle with Labang the bottle is sealed and labeled properly
8. The labeled bottle is stored in the freezing room for 24 hours
9. After 24 hours the bottles are taken out from the freezing room and make them dry
10. Then the bottles are wrapped in carton or box
11. Then carton/box is stored in the storage room for distribution.

4.4 Matha

Matha is an another dairy product as yogurt drink of Milk Vita.

Ingredients: (for 38.67 Liter)

1. Sour curd-29.592 kg
2. Water-25% (7.398 kg)
3. Sugar-7% (2.589 kg)
4. Salt-0.6% (0.221 kg)
5. Bit salt-0.075% (0.027 kg)
6. Propagated culture-2%
7. Xyanthen gum-0.03%

Processing steps:

1. At first sour yogurt/ sour curd is poured into the mixer machine.
2. Then sugar, salt water and bit salt are added with the sour curd
3. Then xyanthen gum is added into the mixer as a thickening agent

4. After adding xyanthen gum , the mixer is mixed thorough for about an hour.
5. After mixing the mixer is ready to package as Matha.
6. Matha is packaged into packaging bottle
7. After filling the bottle with Matha the bottle is sealed and labeled properly
8. The labeled bottle is stored in the freezing room for 24 hours
9. After 24 hours the bottles are taken out from the freezing room and make them dry
10. Then the bottles are wrapped in carton or box
11. Then carton/box is stored in the storage room for distribution.

4.5 SWEET YOGHURT

Ingredients/Recipe:

1. Milk

2. Sugar

3. Culture

Processing steps:

1. For sweet yoghurt at first milk is taken in a clean vessel

2. Milk is then boiled at boiling temperature until 40% is reduced by weight.

3. 15% sugar is added with it

4. The mixer is heated at 80^0C.

5. Then heat is removed from the mixer and cooled it until 40^0C temperature is present.

6. When mixer became cooled starter culture was added with it

7. Then it was kept for 6hours to form curd

8. When curd is formed it stored at 4^0C temperature

9. For curd formed mixer poured into the plastic container

10. Then level the container and put them into the box.

10. Then stored them in the storage room at 4^0C.

4.6 SOUR YOGHURT

Figure: Sour Yoghurt

Ingredients/Recipe:

1. Whole milk
2. Skim milk
3. Culture

Processing steps:

1. For sour yoghurt at first milk is taken in a clean vessel
2. Then skim milk is added into it
3. Then the mixer is boiled at boiling temperature
4. Then mixture is cooled as soon as possible temperature should maintain between 40 to 45^0C
5. After that starter culture was added into it.
6. 4 hours is necessary to coagulate the mixer
7. Before coagulation mixer is poured in plastic container of different sizes
8. After coagulation sour yoghurt is formed
9. Then Sour yoghurt is kept in the refrigerator.

4.7 ROSH-MALAI

It used as sweet desserts in South-Asian country.

Ingredients/Recipe:

1. Curd
2. Flour
3. Baking powder
4. Green Cardamom
5. Syrup

Processing steps:

1. For making rash-malai some baking powder and curd without water are mixed together to make dough

2. Then a small amount of flour is used in the dough to make easier handle and to make desire shapes of sweet.

3. Then small sweet balls are kept in the pre-made syrup for few hours

4. Then sweet balls are separated from the syrup

5. On the other hand, milk is heated until they become half by volume

6. Half volume milk is added into sweet balls container

7. A small amount of green cardamom is used for flavor.

8. It is Cool for sometime

9. Cooled rash-malai is packed in 1kg box container

10. After sealed the container, rash-malai is kept in the refrigerator.

4.8 ICE-CREAM

Figure: 4.6 Vanilla cup Ice-cream

Figure: 4.7 Choc-bar Ice-cream

Ingredients/Recipe: (For 100kg)

1. Sugar-16%

2. Butter-8%

3. Stabilizer-0.5%

4. FCMP- 13.5%

5. Flavor- 0.21%

6. SMP- 1.1%

7. Water- All the rest

Processing steps:

1. Approximately at 60^0C hot water is added into the blending/mixing vat.
2. Then sugar, full cream milk powder (FCMP), skim milk powder (SMP), stabilizer, chocolate flavor, cocoa powder, color and finally remaining water are added. At 80^0C the mixing operation is blended.
3. Through a continuous heating process the mixture is pasteurized.
4. Pasteurized the mixture at 81^0C for 15 seconds and subsequently cooled by the pro chilled water which helps to destroy pathogenic bacteria present in the mixture
5. Later the mixture is homogenized
6. After the homogenization the mix is cooled down to 4^0C. This process is known as aging.
7. Aging is done at 5^0C and for 3 to 24 hours
8.Then overrun is done. Overrun is defined as increase in volume by adding air
9. Then fill them in the ice-cream container
10. Then freezing them in at freezing temperature of -5^0C.
11.Then ice-cream is kept for hardening for 1 hour at -20^0C where semi-solid become solid ice-cream at hardening room
12. After hardening ice-cream is kept in the storage room where temperature maintained -4 to -20.

CHAPTER FIVE

PHYSICAL & BIO-CHEMICAL TEST OF MILK & MILK PRODUCTS

5.1 ALCOHOL TEST

It also known as Platform test. For this test 68% ethanol is used. To determine acidity of milk alcohol test is occurred. Normally maintain the ratio of 1:1 but in milk-vita it is done by maintaining the ratio of 2:1, ethanol : sample (milk).

Apparatus:

- Test tube
- Pipette

Reagents:

- Ethanol

Procedure:

1. For platform test at first 2ml of 68% ethanol is taken into a test tube by a pipette

2. Then 1ml milk is added into the test tube

3. Test tube are Shaken the for sometime

4. Looked for coagulation.

5. If the milk coagulates then it means this milk contain alcohol (alcohol positive)

6. No coagulation means alcohol negative

5.2 FAT TEST

Fat test is done to fix the price of raw milk. Because Milk-Vita fix the price of milk depend on fat percentage.

Apparatus:

- Butyrometer, knock stop and pin
- Centrifuge machine
- Pipette

Reagents:

- 85% Sulfuric acid
- 100% Amyl alcohol

Procedure:

1. 10ml of sulfuric acid is taken into butyrometer

2. Then 10.45ml of sample milk is added into it

3. Then 1ml amyl-alcohol is also added into the mixer

4. Small amount of water has been added to adjust the mixer

5. knock-stop and pin used to lock the butyrometer

6. Then the mixer is shaken for a while

7. After shaken the butyrometer put into the centrifuge machine for 5mintues at 60^0C with 1130RPM
8. After 5minutes fat percentage is measured by scale reading of butyrometer through open eyes.

9. Normally 3.5 is expected but it can be 3.2 to 4.2

10. Need to be careful in time of using centrifuge machine.

Figure: Centrifuge machine

5.3 Specific gravity test (CLR TEST)

Corrected Lactometer Reading (CLR) is known as specific gravity test or density test. If temperature is below 20^0C then for per 1^0C, 0.2 will have to be deducted from lactometer reading. Similarly, if temperature is greater than 20^0C then for per 1^0C, 0.2 will have to be added with lactometer reading. To know the density of milk this test is used. Normally specific gravity range of milk is between 1.026 and 1.028.

Apparatus & Equipment:

- Lactometer with thermometer
- Lactometer jar

Procedure:

1. At first a clean lactometer and jar with milk sample is taken

2. Then lactometer is put into the jar

3. Tap water is poured on the jar to adjust the temperature

4. After sometime lactometer reading and temperature are observed for calculation

Figure: Lactometer with jar

5. Calculation

Calculation:

CLR =LR ± 0.2 (per ^{0}C)

= 26.4 + 1.2

= 27.6

Here,

Temperature = 26^{0}C

LR =26.4

CLR =?

Specific gravity = $1 + \frac{CLR}{1000}$

= 1.0276

5.4 PEROXIDASE TEST

This test is done with pasteurized milk to measure the effectiveness of the pasteurization.

Apparatus and equipment:

- Test tube
- Pipette

Reagents:

- 0.1 N NaOH
- H_2O_2
- Paraphenylenediamine

Procedure:

1. 5ml pasteurized milk is taken into a test tube
   Then 1 drop of Hydrogen Peroxide is added into the test tube and shake the tube
2. Then 1 drop of Sodium Hydroxide is taken into the test tube and again shake it

3. After then 2 drops of Paraphenylenediamine is added and the test tube is shaken for a few seconds
4. Then wait for 30 seconds for any changes occur in color
5. If the changes to blue, then it means peroxidase positive
6. White color means peroxidase negative.

Figure: Peroxidase negative (White color) & Positive (Blue color)

If the test is peroxidase positive, then it means that pasteurization

5.5 SODA TEST

Apparatus and Equipment:

- Test tube
- Pipette

Reagents:

- 100% ethanol
- Rosalic acid

Procedure:

1. 2ml of 100% ethanol is taken in a test tube
2. Then 2ml milk is added into the test tube
3. Then 2drops of rosalic acid is added in the test tube and shake the test tube thoroughly
4. Then observe the changes occurs in color
5. If the color of the milk turns into red rose or brownish or brick red color means soda positive
6. If it turns into orange color, then it means soda negative.

Figure: Soda Positive

Figure: Soda Negative

5.6 SALT TEST

To capture the dishonesty of some milk suppliers salt test is done. They add salt with the milk to increase SNF of milk.

Apparatus:

- Test tube
- Pipette
- Dropper

Reagents:

- Silver nitrate ($AgNO_3$)
- Potassium dichromate (K_2CrO_4)

Procedure:

1. At first 2ml of Silver Nitrate is taken in a test tube
2. 4 to 5 drops of K2CrO4 is added with it
3. Then 2ml of milk is added with it
4. Appearance of yellow color means salt test positive
5. Appearance of brown color or no color change means salt test negative

Figure: Salt Positive

5.7 SUGAR TEST

Sometimes dishonest milk supplier add sugar with milk to increase the density of the milk. To determine their dishonesty sugar test is conducted by the quality control department.

Apparatus:

- Test tube
- Test tube holder
- pipette
- Bunsen burner

Reagent:

- Resorcinol solution

Procedure:

1. Take 5ml resorcinol solution in a test tube
2. Then 1ml milk is added with resorcinol solution and shake the test tube
3. Then hold the test tube by a test tube holder and heat the test tube until it starts to boil
4. After boiling test tube is removed from heat and cool it as soon as possible
5. Appearance of brick red color means sugar test positive
6. Appearance of slightly red color means sugar test negative
7. Sugar test positive milk are not acceptable

Figure: Sugar Positive

5.8 CLOT-ON-BOILING TEST

Apparatus:

- Test tube
- Bunsen burner/water bath

Procedure:

1. 2ml of milk is taken in a test tube
2. Then the test tube is put on a Bunsen burner or in a water bath
3. Heat the test tube for about 3-4 minutes then remove the test tube from heat
4. Look forward to the test tube for precipitation

5.9 C.I.P Test

C.I.P (Cleaning-in-Place) is used to avoid contamination. Caustic soda is used as a chemical for C.I.P.

Procedure:

1. At first cold water is used to wash the pipe/vat/tanker for 10min

2. After that hot water is used to wash the pipe/vat/tanker for 10min

3. Then sodium Hydroxide (caustic soda) as C.I.P chemical is used an amount of 0.5 to 2%/Vol of water to wash again for 15min

4. Then hot water is used to clean the sodium hydroxide from pipe/vat/tanker for 10min

5. Finally, water from pipe/vat/tanker is taken as sample to test C.I.P

6. Phenolphthalein indicator is used in water to test C.I.P

7. Appearance of Pink color means C.I.P test positive
8. Appearance of no color means C.I.P negative

Figure: C.I.P positive test

5.10 MICRO-BIOLOGICAL TEST

It is important to know the bacterial count in milk and milk products. Because bacteria such as *E. coli* can cause contamination in milk. *E. coli* can cause disease in consumers if a high number of *E. coli* is present in milk. Range of total bacterial count is 30 to 35 thousand CFU *E. coli* cause dysentery. Coliform bacteria are another concern to count.

Characteristic of Coliform:

- Gram negative bacteria
- Group of bacteria
- Rod shaped bacteria
- CO_2 gas producer
- They grow rapidly in soil
- Acceptable range is 10 CFU/ml

Apparatus:

- Dilution tube
- Petri dish
- Pipettes
- Incubator
- Autoclave
- Sprit lamp

Reagents:

- Sodium chloride
- Potassium chloride
- Calcium chloride
- Distill water

Media:

- Violet Red bile agar
- Yeast extractor
- Bile salt

Procedure:

1. At first test tube, petri dish, solutions and media are autoclaved
2. Then a ringer solution is made by using water and salt (Such as sodium chloride, potassium chloride, calcium chloride etc.) they used .85% NaCl solution.
3. Then the solution is poured in the dilution tube
4. The solution is heated until boil then heat is removed & let it be cooled
5. A spirit lamp is used to sterilize pipettes every-time before using them to take sample into the petri dish.
6. 0.5ml milk is taken for coliform and for total count 1ml milk is taken into the ringer solution and shake it to dilute the solution
7. 1ml of dilute solution is taken into another ringer solution and dilute it again

8. After that 1ml is taken by a pipette and transferred it into petri dish
9. Then red agar is transferred into the sample containing petri dish for coliform but transfer yellow agar into the sample containing petri dish for total count
10. Red agar is added 2 times for bacterial growth
11. Then petri dishes are kept in an incubator at 40 to 42^0C for 16 to 18 hours.
12. After incubation period bacteria is count through open eyes.
13. For total count petri dish is divided into 4 parts and count 1 parts and multiply with 4 and multiply the digit by 100 for calculation of existing bacteria in sample
14. But for coliform, colony is counted.

Figure: Yellow agar containing Petri-dish

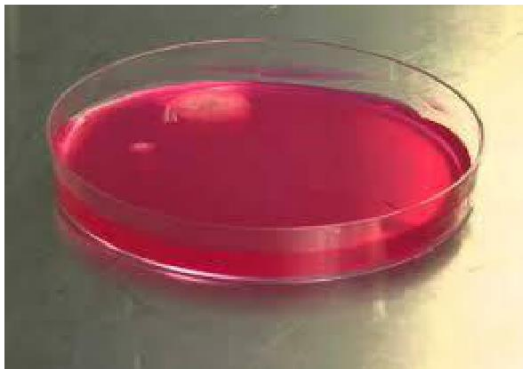

Figure: Red agar Containing Petri-dish

CHAPTER 6

RESULTS & DISCUSSION

6.1 Alcohol Test

Alcohol Positive (+) = Coagulation of milk

Alcohol Negative (-) = No coagulation of milk

In milk-vita we mostly found alcohol negative. Alcohol Positive milk must be rejected for further process.

6.2 Fat Test

From the butyrometer reading fat percentage was calculated as 3.4.
Normally 3.5 is expected as standard but 3.2 to 4.2 also found in some animal's milk. But less than 2 % fat containing milk must be rejected.

6.3 CLR Test or Density Measurement

In milk-vita Tested milk's specific gravity was 1.0286 which means no water was added in it.

Density or specific gravity of milk vary from animal to animal. Normal density or gravity of Cow milk range is between 1.028 – 1.030 and for Buffalo milk 1.030 to 1.032. Sugar and flour is added to increase the density of milk by dishonest people.

6.4 Peroxidase Test

Peroxidase Positive (+) = Blue color

Peroxidase Negative (-) = White Color

In milk-vita we found peroxidase positive regularly. Peroxidase Positive milk must be rejected for further process.

6.5 Soda Test

Soda Positive (+) = Red rose or Brick red color

Soda Negative (-) = Orange color

In milk-vita soda test was negative. To increase the foaming of milk soda is intentionally added by dishonest people. Soda Positive milk must be rejected.

6.6 Salt Test

Salt Positive (+) = Yellow color

Salt Negative (-) = Brown color

Salt test was negative in milk-vita. Salt test positive milk is known as adulterated milk. So salt test positive milk must be rejected. Salt is added to milk to increase the SNF content of milk.

6.7 Sugar Test

Sugar Positive (+) = Brick red color
Sugar Negative (-) = Slightly red color

In milk-vita Sugar test was negative all the time. Sugar positive milk is adulterated milk. Sugar is added intentionally by dishonest people to increase the carbohydrate content of milk. It also added to increase the density of milk.

6.8 C.I.P

C.I.P Positive (+) = Pink color

C.I.P Negative (-) = No color

In milk vita C.I.P found negative regularly except 1time.

6.9 Clot-on-Boiling Test

Generally, above 0.22% of lactic acid in milk gives test positive. Such milk can't stand for heat treatment. So this kind of milk is not acceptable for processing or further heat treatment.

6.10 Microbiological Test

Total bacterial count was 18thousand CFU/ml.

30 to 35 thousand CFU total bacterial count is acceptable.

Coliform count was 8 CFU/ml.

According to standard coliform count range should be less than 10 CFU/ml is acceptable.

Proper Pasteurization is necessary to kill these micro-organisms. It is essential to kill them because they are harmful for consumption. They can cause many diseases in human.

Conclusion

The internship program has covered both quality and production area in the Milk-Vita. From Raw milk collection to products every steps all were observed by me. The operational process of every operation in the industry was observed by me. In this internship program I have learned about the production of various dairy products such as pasteurized milk, chocolate milk, ice cream, labang, matha , yogurt etc. The internship program helped to learn methods for ensuring of product quality. For ensuring quality product different types of physical, biochemical and adulteration tests are carried out in the Milk-Vita company such as Alcohol test, Fat Test, CLR Test, Organoleptic Test, Soda test, Sugar test, Salt test etc. This above test is done in implementing routinely daily procedure in the lab. The microbiological test is also carried out such as Standard Plate Count (SPC), Coliform Count (CC) routinely.

From this internship program I have gained lots of practical experiences on dairy products. I also learned how to maintain their quality control. I have learned about production of dairy products. These experience gathered form Milk-Vita will help me in my future career.

At the end line again I want to give thanks to the authority of the Bangladesh Milk Producers Co-operative Union Limited (BMPCUL).

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The End

