



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:

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Date of Submission: 15 May 2019

LETTER OF TRANSMITTAL

Date: 15 May 2019

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 Nutrition & Food Engineering (NFE) program curriculum.

I have prepared this report based on the acquired taste 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 sixty 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

Niranjan Roy
ID: 162-34-540
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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 **Niranjan Roy**, bearing respectively **ID No: 162-34-540** of the department of Nutrition and Food Engineering has been approved for presentation and defense/viva-voice.

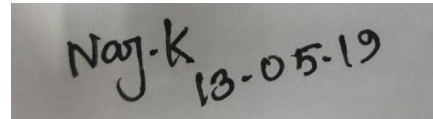
I am pleased to hereby certify that the data and finding presented in the report are the authentic work of **Niranjan Roy**. I strongly recommended the report presented by **Niranjan Roy**, for further academic recommendations and defense/viva-voice. **Niranjan Roy** bears a strong moral character and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



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ACKNOWLEDGEMENT

In the preparation of this report, I would like to acknowledge the encouragement and assistance given 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 person who is 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 **Ms. Najia Kamrul**, Lecturer of Department of Nutrition & Food Engineering for her whole-hearted help and supervision during my project work and organizational attachment period.

I also grateful to all the other **NFE Faculty member** for their great help during university life.

I would also like to give thanks to my seniors, juniors and my classmates and colleagues of Dhaka dairy plant for their help, advice, and suggestions, inspiration and support.

I also thankful to **Dr. Khondokar 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.

EXECUTIVE SUMMARY

Bangladesh Milk Producers Co-operative Union Limited (BMPCUL) which is known as Milk-vita is a leading government organization for milk & milk products provider in Bangladesh. This report is prepared on my two-month practical experience at BMPCUL. This Internship program gives me lot of knowledge about milk and milk products practically.

This report has been presented based on my observation and experience gathered from the company. The organization has many divisions and department but I got the opportunity to work in production department and quality control department. This report mentions about both raw and processed milk and milk products qualities and processing knowledge.

Bangladesh Government & Bangladesh Milk Producers Co-operative Union Limited works together for this company. It ensures quality products for consumers. It promises to serve pure and quality products to the consumers.

Bangladesh Milk Producers Co-operative Union Limited (BMPCUL) provides facilities for internship opportunity for students there. Major objective of this report is to identify quality milk and milk products.

It also concern for developing the production and quality of dairy products. Customer's choice is very important to Bangladesh Milk Producers Co-operative Union Limited (BMPCUL).

My 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.

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Chapter-One

Introduction

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

Now-a-days a number of 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.

Milk-vita collect milk from local village or market by co-operative union. Before collecting them milk-vita test the quality of milk by their local experts. Then they transport collected milk to their all milk processed plant. But before sending them they chilled their collected milk for ensuring quality of milk.

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

Bangladesh Business investment in is seen to be encompassing around a what -to-do, or what not to do paradox towards hunting sectors to be ventilated by entrepreneurs. Moreover new investment the existing entrepreneurs are in a deep ocean of thoughts in deciding appropriate factors in their business. Neither the new entrepreneur fell safe in putting money for new businesses, nor did the existing business houses fall encouraged to expand their business in diversified ways just at the juncture of period to the new global market pattern This is because of apprehended competition from the world marketers or entrepreneurs like multinationals to be encountered by the national business arena. In addition, it has also been experienced in Bangladesh that there exist the abundance of queue in selecting same avenues, which are apparently believed to be profitable business As a result of this rush, very few prospects are believed to be attaining anticipated goals and investment on non-orthodox and challenging fields not being unfolded.

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. Milk is obtained from healthy cows 5 days after and 15 days before parturition.



1.2 Origin of the Report

Internship program is a graduation requirement for NFE students. Daffodil International University & Department of NFE provide Internship opportunity for students in different company and different sectors. Its main purpose is to give the student knowledge about practical experience and real work place. It gives an opportunity to student to get closer to job seekers. Main challenge for an intern student is to use theoretical concepts in real life experience.

The study and internship program have following purposes:

- To come out from textbooks and learn about real world
- To learn about competency and efficiency of real work environment
- To help students to express dependability, initiative, and professionalism and tasks they are assigned
- To get closer contact with job seekers
- To fulfill the requirement of NFE Program
- To compare the real scenario with the lessons learned in DIU
- To learn about production and quality control of dairy products
- To learn Different types of dairy products

This report is the result of two months long internship program conducted in Bangladesh Milk Producers Co-operative Union Limited (BMPCUL) is prepared as a requirement for the completion of the NFE program of Daffodil International University. As a result I need to submit this report based on the “Quality control Assurance and Production of Dairy Products at BMPCUL.

1.3 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 details about the Production and Quality Control of Dairy Products under Hygienic Condition. However I got an opportunity to work in both Production & Quality Control Assurance Department.

1.4 Methodology

A systematic procedure is requires for the preparation of the final report. 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 is as follows:

1.5 Limitation of the report:

Every report has some limitation so my report has also some limitation. These are given below:

- Due to some rules and regulation they did not give me some information because that is against their policy
- All of them was not filled up the feedback properly which cause insufficient of data
- Due to insufficient time they were unable to give me much information.

CHAPTER-TWO

OVERVIEW OF THE ORGANIZATION

2.1 Historical Background of the Company

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 purchase 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 promote production and improve nutrition & quality.
- To ensure customers satisfaction.
- To increase purchasing power
- To increase popularity
- To create new employment opportunity.
- To keep business morality.
- To develop local farmers condition.
- To ensure adulteration free final product.
- To increase quantity and quality products for consumers.

2.3 Products and Services:

- Pasteurized milk
- Gee
- Laban
- Sweet Yoghurt
- Sour Yoghurt
- Rosh-malai
- Ice-cream

Chapter-Three

Design of the Study

3.1 Work Area

Study area divided into 2 areas. Such as

1. Laboratory
2. Production

3.2 Laboratory

A laboratory is essential for quality check of different ingredients and final products. It also ensures safety of consumers. It also works for development of any products. Different types of operational test occurred in the laboratory, some of them given below as example-

- Platform test/ Alcohol test
- CLR test
- Fat test
- Organoleptic test

3.2 Production

Production area is that where fresh raw ingredients (milk) are processed for further processing. Production area also divided into different groups, such as-

- Mixing area
- Processing area
- Packaging area
- Storage area

Different Production plant is used for different types of products production. But sometimes same plant can be used for many products.

Chapter-Four

Processing section

Composition of milk:

- Water-----87.3%
- Lactose (carbohydrate) ----- 4.9%
- Fat ----- 3.4%
- Protein ----- 3.3%
- minerals (referred to as ash) – 0.7%

4.1 Pasteurize milk

Procedure:

1. Raw milk is collected from farm and from co-operative union office
2. Collected raw milk is passed through platform test and others adulteration test.
3. Then passed milk is chilled in a storage vat at 4⁰C
4. Storage milk is recombined with skim milk or full cream milk for maintaining fat percentage (3.5%) according to BSTI standard.
5. If raw milk has higher fat percentage then skim milk is added to make balance
6. If raw milk has less fat percentage then full cream milk is added to make balance
7. Then this recombined milk is pasteurized at 80 to 85⁰C for 15 seconds



Fig: 3.1 Milk Pasteurizer

8. Pasteurized milk is homogenized by milk homogenizer



Figure: 3.2 Milk Homogenizer

9. Then cooling them at 4⁰C
10. Then cooled milk is stored in storage vat (4 vat)
11. Then cooled milk is taken in the packaging machine



Figure: 3.3 Milk Packaging Machine

12. In the packaging area milk is packaged in different amount such as 250ml, 500ml, 1Litre etc.



Figure: 3.4 Packaged Milk (1Litre Packet)

13. If found any fault in pasteurized packaged milk then it is taken away from packaging area and follow the procedure again
14. Well packaged pasteurized milk is stored in the freezing room at 0 to 4⁰C

4.2 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

Procedure:

- At first some hot water (approximately 60°C) is added into the blending vat. Then full cream milk powder (FCMP), skim milk powder (SMP), sugar, stabilizer and finally remaining water are added. The mixing operation is blended at 80°C in the mixing vat so that the warm mix which dissolves them.
- Then the mixture is pasteurized by a continuous heating process. The liquid mixture is heated in a vat to at 81°C for 15 seconds and subsequently cooled by the chilled water which helps to destroy pathogenic bacteria present in the mixture.
- Homogenization helps largely to the smoothness of Ice-Cream which gives fine dispersion of butterfat globules in the mixture. The function of homogenizer is to break down the fat globules.
- After the homogenization the mix is cooled down to 4°C. This is known as aging. The mix held in vat from 3 to 24 hours at a temperature of 5°C.
- Then fill them in the ice-cream container.
- Then freezing them in at freezing temperature.
- Then ice-cream are kept at hardening room for 1 hour at -20°C where semi-solid become solid ice-cream.
- After hardening ice-cream are kept in the storage room where temperature maintained -4 to -20.
- Then they are ready for marketing.

Health Benefits of Ice Cream:

- ✓ Source of Vitamins
- ✓ Provides Energy
- ✓ Source of Minerals

4.3 Sweet Yoghurt & Sour Yoghurt

4.3.1 Sweet Yoghurt Manufacturing Process

Sweet yoghurt:

Sweet yoghurt is a popular dairy product. It is popular in both young and children. Particularly in all aged people. Sweet yoghurt is another product made by milk-vita.



Fig: Sweet yoghurt

Ingredients/Recipe:

1. Milk
2. Sugar
3. Culture

Procedure:

- 1st milk are taken in a cleaned vessels
- Then boil them at boiling temperature until 40% reduced by weight, Milk-vita wants to assist good product to people so they do this.
- Then add 15% sugar in the milk
- Then heat the mixer
- Remove from the heat and cooled until 40°C
- Then added starter culture in the mixer
- Then preserve it 6 hours to make curd
- Then keep them at 40°C temperature
- Then they are ready for packaging
- Then marketing them for sell
- Easy to eat
- Not much expensive

Benefits of using Sweet Yoghurt:

1. Good for digestion
2. Easy to eat
3. Not much expensive

4.3.2 Sour Yoghurt manufacturing process

Sour Yoghurt:

Milk-vita produces sour yoghurt. It is popular for using it in cooking specially in roast-making.

Ingredients/Recipe:

1. Whole milk
2. Skim milk
3. Culture



Fig: Sour Yoghurt

Procedure:

- 1st whole milk are taken in a cleaned vessels
- Then add skim milk into it
- Then boil them at boiling temperature
- Then cool as soon as possible to 40 to 45°C
- Added starter culture in it
- Then wait for 4 hours to coagulate the mixer
- Then packaged in plastic box
- Then they kept them in the refrigeration
- Then they are marketing for selling

Benefits of using sour yoghurt:

1. Good for increase taste of food
2. Helpful for flavor
3. Economic benefits

4.4 Laban yoghurt drink

It is a dairy product which is also known as yoghurt drink. It found all over the world but specially in South-Asian country. Milk-vita provides 80% yoghurt in their Laban.

Ingredients:

1. Yoghurt
2. Salt
3. Stabilizer
4. Sugar

Procedure:

- For making Laban at first yoghurt is poured into the mixer machine
- Then salt and sugar are added into the yoghurt
- Then stabilizer is used in the mixer
- After adding the stabilizer in the mixer operator started the mixer machine and mixed it properly for an hour with heat
- Well mixed mixer is ready to pour as Laban into the packaging bottle or jar.
- Poured bottles are sealed and labeled them nicely
- After Labelling bottles are stored in the freezing room for 24hours
- Then bottles are taken outside and make them dry
- Finally wrapping them in a cartoon or box
- Then stored them in the storage room.

Benefits of Laban:

1. It is good for digestion
2. It increases palatability.

4.5 Rash-malai:

It is one of the sweet dairy products made by milk-vita. It is also a popular sweet desserts in South-Asian country.

Ingredients/Recipe:

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



Fig: Rash-malai

Procedure:

- 1st some baking powder and curd without water are mixed together to make dough
- Some flour is used in the dough to make easier handle and make good shapes of sweet.
- Then small sweet balls are kept in the syrup for few hours
- Then syrup are separated from sweet balls
- In the mean time milk are heated until they become half by volume
- Then hot milk are added into the sweet balls
- Some green cardamom is used for flavor.
- Then they kept for being cool
- Then cool rash-malai are packed in 1kg box container
- After packaging they kept in the storage room
- Then they distribute to the seller

Chapter-Five

Quality Control Section

5.1 Quality control check of raw milk:

- Platform test/ Alcohol test,
- CLR test
- Fat test
- Soda test
- Salt test
- Sugar test.

5.2 Quality control check of final products:

- Peroxide test of pasteurized milk,
- Microbial test &
- Sensory evaluation check.

5.3 C.I.P:

Full meaning of C.I.P is Cleaning-in-Place. C.I.P is use to ensure safety and to avoid contamination. Use caustic soda as a chemical for ensure C.I.P

Procedure:

1. 1st cold water is used to wash the pipe/vat/tanker
2. Then use hot water to wash the pipe/vat/tanker
3. Then use sodium Hydroxide (caustic soda) 0.5 to 2% / Volume of water to wash again
4. Then use hot water to clean the sodium hydroxide Use Phenolphthalein indicator with the water if no color change found that means C.I.P has been done perfectly.

Purpose of C.I.P:

1. To ensure safety
2. To avoid contamination
3. To maintain the reputation

Use:

1. Use for transport tanker
2. Use for storage vat & pipes
3. Use for transport tanker.

5.4 Titrable Acidity test of Milk:

Generally the acidity of milk means the total acidity (Natural + developed) or titrable acidity. It is determined by titrating a known volume of milk with standard alkali to the point of an indicator like phenolphthalein. In fact, the method measures the buffering capacity of milk and not the true acidity

Apparatus:

1. Test tube
2. Pipette
3. Conical flask
4. Sample (Milk)

Reagents

- 0.1 N NaOH.
- Dilute the Titrisol solution to 1 litre.
- 1 % Phenolphthalein solution
- Dissolve 1g of phenolphthalein in 50 ml 96% ethanol and dilute to 100 ml with deionized water

Procedure:

- Fill the burette with N/10 NaOH solution.
- Mix the milk sample thoroughly by avoiding incorporation of air.
- Transfer 10 ml milk with the pipette in conical flask.
- Add equal quantity of glass distilled water.
- Add 3-4 drops of phenolphthalein indicator solution* and stir with glass rod.
- Take the initially reading of the alkali in the burette at the lowest point of meniscus.
- Rapidly titrate the contents with N/10 NaOH solution continue to add alkali drop by the drop and stirring the content with glass rod till first definite change to pink color which remains constant for 10 to 15 seconds.
- Complete the titration within 20 seconds.
- Note down the final burette reading.

Calculation:

No of ml. of 0.1 N NaOH solutions required for neutralization x 0.009

% Lactic acid = ----- x 100

Weight of sample (Weight of sample = Volume of milk x specific gravity)

5.5 Fat test:

Fat test is another quality control test parameters of milk. It is important to pricing the milk. Milk-vita fixed price of milk by fat percentage. Different animal have different fat percentage

Apparatus & equipment:

1. Butyrometer, Nockstop, & pin
2. Sulfuric acid
3. Amyl alcohol
4. Centrifuge machine
5. Sample (Milk)

Procedure:

1. 1st 10ml sulfuric acid are taken into butyrometer
2. Then 10.47ml milk is added into it
3. Then 1ml amyl-alcohol also added into the mixer
4. Some water has been added to adjust the mixer
5. Thennock-stop and pin is used to lock the butyrometer
6. Then shake the mixer for some times
7. Then put the butyrometer in the centrifuge machine for 5mintues with 110RPM at 600C.
8. Then measure the fat percentage by 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.

Purpose of Fat test:

1. To know the fat percentage
2. To extract extra fat from milk
3. Extracted extra fat can be useful for making other dairy products
4. To minimize cost and fixed the price of milk.

5.6 CLR test:

CLR is the short form of Corrected Lactometer Reading. It also known as specific gravity test or density test. In this test lactometer and temperature reading is important. If temperature found below 20⁰C then for per 1⁰C, 0.2 will be deducted from lactometer reading. Similarly temperature found greater than 20⁰C then for per 1⁰C, 0.2 will be added with lactometer reading. This test is used to know the density of milk. Normal specific gravity of milk is 1.026 to 1.028.

Apparatus & Equipment:

1. Sample (milk)
2. Lactometer with thermometer
3. Lactometer jar



Fig: CLR test

Procedure:

- Clean the lactometer and jar finely
- Then put the lactometer into the jar
- Then then put the milk into the jar
- To adjust temperature flow the water on the jar
- Then measure the lactometer reading and temperature.
- Then calculate the CLR

5.7 Soda test:

It is one type of adulteration test.

Apparatus & Equipment:

1. Test tube
2. 100% Ethanol
3. Rosalic acid
4. Sample milk

Procedure:

- Take 2ml 100% alcohol in a test tube
- Add 2ml milk in it
- Add 2ml rosalic acid
- If pink color seen then soda positive
- If orange color seen soda negative.

5.9 Salt test:

It is another adulteration test. People add salt to increase SNF of milk.

Apparatus & Equipment:

- 1, Test tube
2. Silver Nitrate (AgNO_3)
3. K_2CrO_4
4. Sample milk

Procedure:

1. Take 5ml Silver Nitrate in a test tube
2. Add 4 to 5 drops K_2CrO_4 in it
3. Then finally take 1ml milk
4. If brown color seen in the mixer it means salt negative
5. If color turns into slightly yellowish color that means salt positive

5.10 Sugar test:

Sugar test is one kind of adulteration test. Because some bad peoples are intentionally add some sugar in milk to increase the density of milk. So to find out these officials do this test.

Apparatus & Equipment:

1. Test tube
2. Test tube holder
3. Bunsen burner
4. Resorcinol solution
5. Sample milk

Procedure:

1. 1st 5ml resorcinol solution are taken into a test tube
2. Then add 1ml milk into the test tube
3. After added milk it become coagulate
4. Then use holder to hold the test tube to put it into the Bunsen burner's flam
5. Keep it until boiling
6. Then take away from flam and gives time to cool the mixer
7. Then within few minutes if mixer turns brick red color which means sugar test positive
8. If mixer shows slightly red color then it is sugar test negative
9. Sugar test positive milk are not acceptable

Purpose of sugar test:

1. To check adulteration
2. To ensure there is no added sugar in milk
3. To ensure safety

Chapter-Six

Results & Discussion

6.1 Alcohol Test:

Alcohol Positive (+) = Coagulation of milk

Alcohol Negative (-) = No coagulation of milk

In Milk Vita we found that the result of Alcohol test was negative. If the Alcohol test is positive it is known as adulterated milk. 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:

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

Specific gravity of milk varies from animal to animal. Normal 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 rise the density of milk by lying people.

6.4 Soda test:

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

Soda Negative (-) = Orange color

In Milk Vita we found that the result of soda test was negative. If the Soda test is positive it is known as adulterated milk. To increase the foaming of milk soda is intentionally added by dishonest people. Soda Positive milk must be rejected.

6.5 Salt test:

Salt Positive (+) = Yellow color

Salt Negative (-) = Brown color

In Milk Vita we found that the result of salt test was negative. If the Salt test is positive it is known as adulterated milk. Salt test positive milk must be rejected. Salt is added to milk to increase the SNF content of milk.

6.6 Sugar test:

Sugar Positive (+) = Brick red color

Sugar Negative (-) = slightly red color

In Milk Vita we found that the result of sugar test was negative. If the Sugar test is positive it is known as 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.

6.7 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.

Chapter -Seven

Conclusion:

This internship program helped to learn lots of things about dairy products. It has covered both production and quality control site. It was a great opportunity to know about milk-vita and its regular works. It enriched the knowledge about processing of some dairy products such as pasteurized milk, chocolate milk, ice-cream, Laban, yoghurt etc. It will be supportive in future to conduct adulteration test of dairy products. Adulteration test of milk such as soda test, salt test, sugar test etc. have been learned there. Hopefully during these internships the knowledge gathered about doing products specially the information about BSTI standards of different doing products would be helpful in future life.