INTERNSHIP REPORT

ON

"Studies on the Quality of Raw and Processed Milk and Milk products
At
Dhaka Dairy Plant"

SUBMITTED TO:

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SUBMITTED BY

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LETTER OF TRANSMITTAL

Date: 18.12.2013

Dr.K.M. Formuzul Haque,
Prof.& Head
Department of Nutrition & Food Engineering
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Subject: Submission of Internship Report.

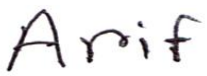
Dear Sir,

I am here by submitting my Internship Report, which is a part of the NFE Program curriculum. It is great achievement to work under your active supervision. This report is based on, "Studies on the Quality of Raw and Processed Milk and Milk products At Dhaka Dairy Plant" 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 Mr. Abu Shoriful Islam, DGM , Quality Control Department.

This project gave me both academic and practical exposures. First of all I learned about the organizational culture of a prominent Milk producing organization of the country. Secondly, the project gave me the opportunity to develop a network with the corporate environment.

I shall be highly obliged if you are kind enough to receive this report and provide your valuable judgment. It would be my immense pleasure if you find this report useful and informative to have an apparent perspective on the issue.

Sincerely Yours



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APPROVAL OF CERTIFICATE

I am pleased to certify that the internship report on the Quality of Raw and Processed milk and milk products conducted by Md. Arif Hosen Raju bearing student ID No: 111-34-144 of the department of Nutrition & Food Engineering has been approved for presentation and defense/viva-voice. Under my supervision Md. Arif Hosen worked in Bangladesh Milk Producers Co-operative Union Limited (Milk Vita) as an intern.

I am pleased to hereby certify that the data and findings presented in the report are the authentic work of Md. Arif Hosen Raju. I strongly recommended the report presented by Mohammad Arif Hosen Raju for further academic recommendations and defense/ viva-voice. Mohammad Arif Hosen Raju 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.

Dr. K.M Formuzul Haque
Professor & Head
Department of Nutrition & Food Engineering
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ACKNOWLEDGEMENT

First of all, I wish to express my gratitude to the almighty ALLAH for giving me the strength to perform my responsibilities as an intern and complete the report within the stipulated time.
I am deeply indebted to my Department Head, Dr. K.M Formuzul Haque, Daffodil International University for his whole-hearted supervision during my organizational attachment period. I am also grateful to **Mr. Abu shoriful Islam DGM**, as my organizational supervisor. It would have been very difficult to prepare this report up to this mark without their guidance.

My gratitude goes to entire NFE 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 my Dhaka dairy Plant, **fellows, seniors and colleague**s who gave me good advice, 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 am grateful to **Professor Dr. M. Mokhtaruzzaman** Department of Nutrition and Food Engineering, Daffodil International University.

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I would like to express my warmest thanks to **Mehbuba khanam**, Assistant laboratory Officer, Department Nutrition & Food Engineering. I express my deep gratitude to the office stuff of the department of Nutrition & Food Engineering under faculty of Allied Health Sciences, daffodil International University.

EXECUTIVE SUMMERY

This report is prepared on the basis of my two-month practical experience at the Bangladesh Milk Producers Co-operative Union Limited (BMPCUL). This internship program helped me to learn about the practical scenario of a Milk & Milk Products Producing Company. Milk Producers Co-operative Union Limited (BMPCUL) is a dynamic and leading government organization countrywide Milk & milk products provider. Milk Vita is a service oriented as well as commercial organization. It is the biggest and only on co-operative based milk industry in Bangladesh.

Bangladesh Milk Producers Co-operative Union Limited (BMPCUL) was established at Lahirimohanpur, Pabna (presently Sirajgong) with the target to send milk products to Calcutta (India) market. After the partition, Eastern milk Products Limited, a private company purchased this dairy in 1952 from the original owner. In 1965, the first milk producers' co-operative was formed under the name Eastern Milk Producers' Co-operative Union Limited (EMPCUL) .The dairy plants were owned and operated by the Eastern Milk Producers' Co-operative Union Ltd. along with the other two existing dairies. The nomenclature of the organization was changed to Bangladesh Milk Producers' Co-operative Union Ltd. In 1977 keeping its Brands name of products the same, Milk-Vita.

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

Bangladesh Milk Producers Co-operative Union Limited (BMPCUL) provides these facilities for internship student. A research is conducted to draw a conclusion on the studies of the quality milk and milk products and Milk processing. The result that is found is much considerable's. The result of the research is described in details in this report in the later chapters.

After knowing the scenario of Bangladesh Milk Producers Co-operative Union Limited (BMPCUL) in terms of their Milk processing and milk quality control. The report also consists commendations and conclusion according to my point of view, which I think would improve the environment of the organization if implemented.

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Abstract

The present Internship program was undertaken to learn determination of physical parameter of raw milk quality (e.g. organoleptic and specific gravity) subsequently its processing and also to study the microbiological quality of raw milk (total plate count, Coliform count and) at Quality Control Department & production department in Bangladesh Milk Producers Co-operative Union Limited (BMPCUL) of Dhaka District of Bangladesh, during the period from September 1 to October 31, 2013. Adultration of milk is common matter in Bangladesh. Raw milk was supplied from different chilling center baghabari, Jamalpur, rangpur, shirajgong etc. Milk vita purchase raw milk from a number of local organized farmers so that the detection of adulterants was a part of total quality of milk for ensuring raw milk quality. Rapid test for Acidity: Such as alcohol, Clot-on- boiling test etc, Fat determination: Using Gerber method test for milk and each milk products, Total solid: Adulteration with water: Gross adulteration of liquid milk with water is shown by density test, Titratable acdity, Milk solid-non-fat (SNF) in milk products, Salt test, Urea test, Formalin test, Hydrogen peroxide test Soda Test, Sugar test, Starch test. Processing of milk and milk products (pasteurized liquid milk and variety of ice-cream) was part of this present study and was investigated.

CHAPTER 1 INTRODUCTION

The basic function of Milk Company is to provide milk to the urban dweller as well as rural area through container. Milk processing has already started introducing some diversified areas with help of milk producer in Bangladesh.

Dairy Technology is presently providing various milk and milk products for human consumption. Still raw milk is sold in the market everywhere in the country. Deteriorate may occurs in the milk as being sold in the open market over the country.

Milk is consumed by the different communities of the society. As milk is a nutritious food (drinks) and ideal food containing its component.

In the Western world, cow's milk is produced on an industrial scale and is by far the most commonly consumed form of milk.

As Bangladesh is an agricultural country, agricultural products like raw fresh milk is converted into various milk products namely Skim milk powder (SMP) and full cream milk powder, butter, cheese etc. They can be found in the market during off season as powder form with good quality. The number of milk consumer is increasing day by day.

In 2011, FAO estimates 85% of all milk worldwide was produced from cows.

Presently there are milk producer companies in the market. Each of them is trying to maintain and increase their market share. Among them Bangladesh Milk Producers Co-operative Union Limited (BMPCUL) is one of the leading companies in this sector.

1.1 Definition of Milk

Milk is a translucent white liquid produced by the mammary glands of mammals. It provides the primary source of nutrition for young mammals before they are able to digest other types of food. Milk is defined to be the lacteal secretion, practically free from colostrums, obtained by the complete milking of one or more healthy cows, five days after and 15 days before parturition. **(www.fao.org)**.

Figure 1: Milk

1.2 ORIGIN OF THE REPORT

Internship Program of Daffodil International University is a Graduation requirement for the NFE students. This study is a partial requirement of the Internship program of NFE curriculum at the Daffodil International University. The main purpose of internship is to get the student exposed to the job world. Being an intern the main challenge was to translate the theoretical concepts into real life experience.

The internship program and the study have following purposes:

- To have an idea of activities of the Milk vita ;
- To view the processing of milk and milk products in the plant;
- To know the factories of milk union;
- To identify different problem rising in milk and milk products;
- To compare the real scenario with the lessons learned in DIU University;
- To fulfill the requirement of NFE Program.

This report is the result of two months long internship program conducted in Bangladesh Milk Producers Co-operative Union Limited (BMPCUL) and 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 "Studies of the milk and Milk products on Quality and Processing at Bangladesh Milk Producers Co-operative Union Limited (BMPCUL). This report also includes information on the products and services of Bangladesh Milk Producers Co-operative Union Limited (BMPCUL).

1.3 OBJECTIVE OF THE REPORT

The objective of the report can be viewed in two forms:

- General Objective
- Specific Objective

General Objective:

This internship report is prepared primarily to fulfill the Bachelor of Nutrition and Food Engineering (NFE) degree requirement under the Faculty of daffodil International University.

Specific Objective:

More specifically, this study entails the following aspects:

- To give an overview of Bangladesh Milk Producers Co-operative Union Limited (BMPCUL).
- To focus on the milk products quality, Bangladesh Milk Producers Co-operative Union Limited (BMPCUL).
- To discuss the Standards of Milk composition and milk quality of Bangladesh Milk Producers Co-operative Union Limited (BMPCUL).

1.4 SCOPE OF THE STUDY

The main intention of this study is the milk compositional standard and quality and processing of milk products carried by the Bangladesh Milk Producers Company.

The report covers details about the product quality and processing overview and also. However the study is only related to the quality control department (Laboratory) and production division as I was provided an opportunity to only work in this area

Sources of data

Primary Sources:

Primary Data was derived from the practical deskwork. Moreover, the survey also helped me to get information directly from the employees.

Secondary Sources:

- Internal sources- Different documents provided by concerned officers and different circulars, manuals and files of the organization.
- External source- Different websites related to the dairy sector and online resources.

Collection of Data:

Conducting a survey of thirty employees helped me to collect primary data. The questionnaire is applied on the stuff and employee. The survey helped me in both deriving the information and also explaining the condition of milk quality both raw and processed of the milk & milk products of the concerned division. Secondary data was collected from Milk vita websites and other related websites and documents.

CHAPTER-2 OVERVIEW OF THE ORGANIZATIONS

2.1 HISTORICAL BACKGROUND OF THE COMPANY BANGLADESH

Bangladesh Milk Producers' Co-operative Union Ltd. popularly known by its brand name Milk Vita, was established by the Bangladesh Government in 1973, industry after the liberating war, based upon the recommendation by UNDPAZAO and DANIDA in the pattern of AMUL. It was initiated as a development project of the Government titled "Co-operative Dairy Complex" with the objective of ensuring fair payment for the deficient, landless and borderline milk producing farmers of the rural Bangladesh and on the other palm to provide the metropolis dwellers with a regular assistance of advanced and sterile milk and milk products at a reasonable value. The scheme had the suggestion of establishing dairy plants in the milk extra areas already identified as Pabna, Tangail, Manikganj and Faridpur. The Authority started implementation of the programme in its First Five Year Method (1973-78). The plants were to manage through collecting of milk by a network of milk producers' co-operative societies in milk-shed areas. The project envisages the buy of milk from personal farmer members of the primary milk producers' societies, twice daily, transport of this milk to rural dairy plants of Tangail, Manikganj and Faridpur by a mix of various methods of transportation. After beginning processing at the countryside plants, milk is to be transported to Dhaka in insulated road milk tankers for processing, packing and marketing of pasteurized Liquid Milk and Milk Products. Milk together at the Baghabarighat Plant from it's nearby societies, is to be converted into Butter, Powder Milk and Ghee etc. All the products on the contrary, are to be marketed through Dhaka Marketing Unit. The Head Office named "Dugdha Bhaban" of the organization. Milk Vita is a supply oriented too as commercial organization. It is the major and only on co-operative based milk business in Bangladesh. Adjacent the co-operatives acts & rules it is direct by itself. It's a profitable organization. In spite of various limitations it is trying difficult to get self sufficiency in the dairy sector.

2.2 OBJECTIVE OF THE COMPANY

Bangladesh Milk Producers Co-operative Union Limited (BMPCUL) started its operation for the poverty alleviation and to enhance the milk production in the country. Other hand to provide the city dwellers with a regular supply of fresh and hygienic milk and milk products at a reasonable price.

- ✓ Improved household nutrition and increased purchasing power.
- ✓ Increased milk yield and productivity of the plant.
- ✓ Community empowerment to the poor through direct participation in organized co-operatives.
- ✓ Management skill developed through accountability of the MILK VITA board members taken from milk producers.
- ✓ Increased quantity and quality of safe pasteurized milk and products affordable for consumers which enhanced health awareness.
- ✓ Off farm employment generation created.

2.3 PRODUCTS AND SERVICES

i. Liquid pasteurized milk
ii. Chocolate milk
iii. Mango milk
iv. Chocobar ice cream
v. Vanilla cup
vi. Lollies- Orange, Lemon, and pineapple
vii. SMP
viii. FCMP
ix. Rosh malai

CHAPTER-3 DESIGN OF THE STUDY

3.1 STUDY AREA

Laboratory- A laboratory is essential to enable the management of the plant to guarantee products of approved quality. The following test is routinely performed by the plant laboratory and accurate control over all the plant operational Tests:

I. Organoleptic test: The plant provides one or more graders to examine milk and milk products for odor and appearance.
II. Rapid test for Acidity: Such as alcohol, Clot-on- boiling test etc.
III. Fat determination: Using Gerber method test for milk and each milk products.
IV. Total solid: Determination of the water content is necessary to control milk and milk products and may be obtained by simple method; for instance, from density and fat content of liquid milk.
V. Adulteration with water: Gross adulteration of liquid milk with water is shown by density test, but for more accurate control by freezing point test.
VI. Titratable acdity
VII. Milk solid-non-fat (SNF) in milk products
VIII. Salt
IX. Urea test
X. Formalin test
XI. Hydrogen peroxide test
XII. Soda Test
XIII. Sugar test
XIV. Starch test

Production area: Production area is the part of plant in where raw fresh milk is processed or pasteurized to provide quality products consumer. Here production area is divided into two section such as pasteurized milk section and ice-cream section.

Ice- cream section:

Ice –cream section is part within production area and ice-cream also a type of milk products. In ice-cream section, 30 to 40 workers and 10 stuffs are involved in this section during ice production. Ice cream is produced several times a week.

3.2 SAMPLING PROCEDURE (RAW MILK)

3.2.1 APPARATUS & SAMPLING EQUIPMENT TREATMENT

a) Agitators or plungers for mixing milk in bucket.
b) Dipper or Pipette of suitable size, for collecting sample.
c) Mechanical stirrers, for mixing content of large vessel.
d) Containers or bottles for samples, from water-proof, grease proof, material suitable for sterilization for samples for bacteriological tests, size from o.1 to 1 liter.
e) Lids for sample containers, rubber or plastic stopper
f) Insulated transport container for samples for bacteriological examination, capable of maintaining low temperature (0 to +5c)

3.2.2 Treatment:

a) The sampling equipment for chemical purposes should be dry and clean
b) Sampling equipment has to be clean and sterilization is required for microbiological testing. Disposable plastic equipment also needs to be sterile.
a) Exposure to hot air at 170-175 °C for not less than 2 hours.
b) Exposure to steam at 121 ± 1 °C for not less than 20 minutes in an autoclave.

3.3 PROCEDURE

A. Samples from milk can

The milk is stirred well, using agitator with perforated disc and rod long enough to reach the bottom of the container mix milk well by p during from one can into the other several times. If the milk has fat layer or fat particles on the surface it is necessary to warm it to 43-45^0 C then stir.

i. Sample of milk is taken with pipette or dipper.

ii. For complete chemical test a sample of not less than 500 ml will be required. For fat, acidity and density testing a sample of 100-150 ml is required.
iii. The sample container is filled with milk and closed with stopper.
iv. Analysis is accomplished as soon as possible after the sample has arrived.
v. Rinsing the equipment used for sampling after use.
vi. Samples should be taken in duplicate.

B. Samples from tanker or tanks

i. Mix milk thoroughly, by inverting, stirring or plunging the container for at least 5 minutes. If the volume is small, it can be poured to and from one product container to another of the same volume. Check milk temperature and record it on the sample container label.
ii. Take the sample as soon as possible after mixing. Make sure the size of the sample is sufficient for all necessary tests.
iii. Seal each sample container airtight immediately after filling.

3.4 SAMPLE PRESERVATION

- If the laboratory cannot start with the analysis immediately or if the samples have to be transported to long distances, they have to preserve to prevent the development of micro-organism.
- For microbiological tests the samples are preserved by cooling them up to 0 degree Celsius. Take care not freezes the sample. For physical and chemical tests, the milk sample is preserved by using different preservative as potassium Dichromate is that it increases the density and formalin.

3.6 PHYSICAL AND BIOCHEMICAL TEST OF RAW AND PASTEURIZED MILK

3.6.1 DENSITY MEASUREMENT (CLR)

Procedure

1. Sample the milk while taking care not to introduce air bubbles into the milk during sampling, as these would interfere with the readings.

2. The sample is placed in the cylinder, measure the temperature and place the lactometer slowly into the milk until it is floating freely.
3. The lactometer should be read at the top of the liquid meniscus, i.e., where the meniscus appears to meet the stem. Record the reading together with the temperature

Figure2: lactometer reading

3.6.2 ALCOHOL TEST

Equipment and materials

a) Test tube.

b) Pipette.

c) 68% ethanol solution (by weight: e.g. mix 68 ml 96% alcohol with 28 ml distilled water)

PROCEDURE

1) Mix equal amounts (e.g. 2 ml) of milk and ethanol solution in test tube with the pipette.

2) Agitate by gentle movement and look for coagulation.

3.6.3 CLOT-ON-BOILING (COB) TEST

OBJECTIVE

• To determine developed acidity

• To know the heat stability for processing of milk

APPARATUS

i. Test tubes (15.0 x 1.0 cm, preferably with a mark at 5 ml).
ii. Source of heating, e.g. a boiling water bath or a flame.

Procedure

1) Put test tubes with about 2ml of milk in heating source for up to 4 minutes.

2) Rotate the tubes in an almost horizontal position and examine the film of milk or side of the test-tube for any precipitated particles.

3.6.4 DETERMINATION OFADDED UREA IN MILK TEST

REAGENT: Dissolve 1.6g DMAB in 100 ml ethyl alcohol and10 ml concentrate HCl.

PROCEDURE:

1. 1 ml of milk sample is taken into test tube using a sterile pipette.
2. 1ml of 1.6% DMAB reagent is mixed with milk sample using separate pipette and shake.
3. After shaking the normal milk shows a slightly yellow color and urea adulterated milk shows deep yellow color.

3.6.5 TEST FOR FORMALIN ADDITION (JENKINS)

PURPOSE: The addition of formalin-40% solution of formaldehyde (HCOH) in Water the milk is prohibited. It can only be used for samples preservation. But some unconscientiously producers add it to the milk to extend the keeping quality. Therefore it is necessary to detect the addition of formalin to milk. A sample method by Jenkins is described bellow

APPARATUS

i. Pipette, 10 ml
ii. Pipette, 5 ml
iii. Test tube.

REAGENTS

a. Concentrated hydrochloric acid (HCL) density 1.12.
b. 5% solution of ferric chloride ($FeCl_3$ 6 H_2o) (Dissolved 5 gm of ferric chloride in water to fill up to 100 ml).

PROCEDURE

1. Fill the test tube with 10 ml of milk.
2. Add 5 ml of conc. HCl and 1-2 drops of ferric chloride solution.

3. Heat the test tube slowly.
4. If violet color appears it is the proof of the presence of formalin in the milk`

3.6.6 HYDROGEN PEROXIDE ADDITION TEST (BY ARNOLD AND MENTZEL)

APPARATUS

i. Test tube
ii. Pipette, 5 ml

REAGENT

a. Vanadic acid solution (1 gm of vanadium penta oxide + 20% sulphuric acid)

PROCEDURE

1. Fill the test tube with 5 ml of milk.
2. Add 5 ml of vanadic acid solution. Shake well
3. In presence of hydrogen peroxide appears red coloration. Absence of red coloration indicates absence of hydrogen per oxide in supplied milk.

3.6.7 DETECTION OF SODA IN MILK

REAGENT

Rosalic acid solution (0.1% w/v): Weigh 100 mg of rosalic acid powder and dissolved it 30 ml of ethyl alcohol and make up the volume with distilled water to obtain final volume of 100 ml.
Ethyl alcohol (95 %): Take 95 ml of ethyl alcohol in a 100 ml of volumetric flask and make the volume up to the mark with distilled water and mix well.
PROCEDURE:

1. 2 ml of milk is added in a test tube using pipette.
2. 2 ml of 95% ethyl alcohol is mixed with milk sample.
3. Then few drops 0.1% rosalic acid is added in the test tube
4. If alkali is present a rose red color appears whereas milk shows only a brownish color

3.6.8 DETECTION OF SALT (SODIUM CHLORIDE) IN MILK

REAGENT**:**

a. Silver nitrate (AgNO3) solution: 0.1N aqueous.
b. Potassium chromate ($KcrO_4$) solution : 10% (w/v) aqueous

PROCEDURE:

1. 2 ml of milk sample is taken into test tube using a marked pipette.
2. 1 ml of 5% potassium chromate is added in the test tube with separate pipette
3. Then 2 ml of 0.1N silver nitrate is added in sample.
4. Appearance of yellow color indicates presence of dissolved chloride in milk and appearance of red precipitate indicates absence of dissolved chlorides.

3.6.9 TEST FOR DETECTION OF CANE SUGAR IN MILK

REAGENT

a. Resorcinol
b. Hydrochloric acid

PROCEDURE

1. 10 ml of milk is taken in a test tube.
2. Added 5 ml of hydrochloric acid along with 0.1 g of resorcinol.
3. Shake the test tube well and place it in a boiling water bath for 5 min.
4. Appearance of red color indicates the presence of added cane sugar in milk.

3.6.10 PASTEURIZED MILK PEROXIDASE TEST

APPARATUS

i. Glass test tubes
ii. Hot water bath at 95^0 c.

REAGENT

a. 0.20% Hydrogen peroxide ($H_2 O_2$) solution prepared by diluting 7 ml. 3% (9 vol.) $H_2 O_2$ in 98 ml. distilled water; 0.1 ml sulphuric acid is added to stabilize the solution and when

stored in dark place indicator dropping bottle. In a cold store the solution will keep for up to 3 months.

b. 2% paraphenyldiamine Hydrochloride solution prepared by diluting 0.5 gm Paraphyldiamine hydrochloride in 50 ml. cold distilled water followed by filtration and storage in a dark indicator dropping bottle. The solution must be renewed every week.
c. Sodium Hydroxide solution-1.0% strength
d. Hydrochloric acid (HCl) solution- 1.0% strength

PROCEDURE

1. Add 5 ml. pasteurized milk to a test tube.
2. Check acidity using litmus paper.
3. Neutralize by 1.0% NaOH or HCl solution addition.
4. Add 1 drop of H_2O_2 solution and shake.
5. Add 2 drops paraphnyllamine hydrochloride solution and shake.
6. Judge the color of test tube content within 30 second.

3.6.11 DETERMINATION OF FAT CONTENT BY GARBER METHOD

PRINCIPLE

The test is a volumetric method in which fat is separated from milk by centrifugal force. Sulphuric acid is used to dissolve the protein that forms the membrane around the fat (fat globules) and amyl alcohol is added to improve the separation of fat from other solids.

EQUIPMENT AND MATERIALS

a) Sulphuric acid (density 1.807 - 1.812 g/ml at 27 ^{0}C, colorless).
b) Amyl alcohol.
c) Butyrometers : 6%, 8% and 10% scales depending on fat content.
d) Stoppers and shaker stands for butyrometers made from a suitable grade of rubber or plastics.
e) 10 ml pipette for sulphuric acid (with rubber suction device).
f) 10.75 ml pipette for milk.
g) 1 ml pipette for amyl alcohol.

h) Centrifuge, electric or hand driven.

Figure3: Gerber Machine (Centrifuge)

PROCEDURE

1. About 10 ml of sulphuric acid is taken into the butyrometer.
2. About10.75 ml pipette with milk delivered into butyrometer
3. 1 ml of amyl alcohol using the 1 ml pipette is added. Shake the Butyrometer in the shaker stand until no white particles are seen and invert it a few times.
4. The butyrometer is placed in the centrifuge (water bath) for 5 min, placing two butyrometers diametrically opposite.
5. The butyrometers is transferred stoppers downwards into water bath for 3-10 minutes.
6. Bring lower end of fat column on to a main graduation mark by slightly withdrawing stopper.

3.6.12 PASTEURISED MILK OTHER PHYSICAL/ CHEMICAL TESTS

All other physical and chemical test for pasteurized are carried out as described in raw milk section. Organoleptic test, Clot –on – boiling test, Alcohol test, Sediment test, Acidity test, Fat content--- Gerber method, MSNF & Total Solids (TS) content, Density--- Lactometer

3.7 ICE-CREAM

3.7.1 SAMPLING PROCEDURE

.APPARATUS

i. Plungers
ii. Dippers
iii. Multi-use sample containers
iv. Sample container carrier
v. Thermometer
vi. Marker pencil

PROCEDURE

A. Bulk ice- cream mix
    1. Ensure plunger, dipper and sample container clean and dry.
    2. Label sample container with marker pen with number corresponding to laboratory records
    3. Mix ice-cream mix thoroughly using plunger on mechanical agitator. 50 gm sample is collected using dipper and transferred to the bottle
    4. Temperature of sample is recorded.
    5. Sample is transferred to laboratory for testing as soon as possible.
    6. Samples which cannot be tested immediately should kept cool in the refrigerator
B. Retail pack of ice-cream
    1. Retail pack is labeled with marker pan with number corresponding
    2. Time of cooling and production date is recorded.
    3. Open retail pack and draw 50 g sample off.

3.7.2 ICE-CREAM DETERMINATION OF FAT CONTENT BY GERBER METHOD

APPARATUS

1. 0- 15% Gerber butyrometers.
2. Rubber stoppers

3. Pipettes- 5 ml.
4. Stadard pipette or automatic measure for amyl alcohol- 1 ml.
5. Standard pipette or automatic for sulphuric acid- 10 ml.
6. Centrufuge- working at 1100 rpm, 18-20 inches in diameter.
7. Waterbath for butyrometers set at 65^0 c.

PROCEDURE

1. Measure 10 ml of sulphuric acid into a butyrometer by means of the standard or automatic measure without wetting the neck of butyrometer.
2. Melt or mix the sample as required; if marked separation of the sample has occurred, warm the sample to 40^0 C mixes thoroughly, and then cool to 20^0 c.
3. Pipette 5 ml of sample into the butyrometer without wetting the neck
4. Using the same pipette and 5 ml warm distilled water to the butyrometer without wetting the neck using the distilled water to rinse the residue from the pipette.
5. Close the neck of the butyrometer with a stopper.
6. Shake the butyrometer in the protected shaking stand until all the content is thoroughly mixed and no white particles can be seen.
7. Immediately after mixing place the butyrometer in the centrifuge with the graduated part pointing towards centre; take care that is placed in centrifuge systematically, i.e. exactly opposite another butyrometer.
8. Centrifuge for 5 minutes, after they centrifuge speed has reached 1100rpm.
9. Remove butyrometer from centrifuge; adjust fat level if necessary using rubber stopper so that it is on butyrometer scale.
10. Place butyrometer stopper downward in a water bath set at 65^0 c for 3 minutes
11. Rmove butyrometer from water bath, adjust the position of the fat on the graduation scale; read the fat percent at the lowest point of meniscus, at eye level.
12. Thoroughly clean the butyrometer immediately after use discarding contents into a special disposal container.

3.7.3 ICE- CREAM TOTAL SOLIDS- GRAVIMETRIC METHOD

APPARATUS

i. Stainless steel dish and lid.
ii. Oven set at 100^0 c
iii. Tongs
iv. Pipette
v. Dessicator
vi. Accurate balance

PROCEDURE

1. Weigh previously dried and cooled stainless steel dish lid note weight (A)
2. Pipette approximately 5 ml. ice cream mix or melted ice-cream into the dish.
3. Weigh dish and lid plus ice-cream mix (B)
4. Using tongs place dish and lid plus ice cream into oven for 3hours
5. Using tongs remove dish and lid plus dried contents from oven and cool in desiccators for 15 minutes.`
6. Weigh cooled dish.
7. Repeat oven- desiccators- weigh sequence until constant final weight of dish lid and content achieved (C).

3.7.4 ICE-CREAM TITRATABLE ACIDITY

APPARATUS

i. 25 ml burette
ii. 10 ml pipette
iii. White porcelain dish- 60 ml capacity.
iv. Glass stirring rod.

REAGENT

a. Sodium hydroxide solution (NaOH)- 0.10 N
b. Phenolphthalein indicator solution (0.5%) - prepared by dissolving 1 g phenolphthalein in 100 ml 95% Ethyl Alcohol and 0.10 N. NaOH solution until one drop gives a faint pink color; make up to 200 ml. with distilled water.

PROCEDURE

1. Melt and/or mix the sample as required.
2. Pipette 10 ml. thoroughly mixed sample into dish.
3. Add 1 ml. phenolphthalein indicator
4. Note level of 0.10 N NaOH solutions in burette – A ml.
5. Currently titrate against 0.10 N NaOH until a faint pink color appears.
6. Rinse remaining sample from pipette by sucking up contents of porcelain disc 2 or 3 times.
7. Continue to titrate carefully against 0.10 N NaOH solutions until faint colour remains constant for 10 seconds- note level of 0.1 N NaOH solutions in burette- B ml.

3.7.5 ICE- CREAM OVERRUN TEST

APPARATUS

1. 0.10 ml ice-cream cup.
2. Spatula.

PROCEDURE

1. Weigh dry empty ice cream cup- note weight (A).
2. Weigh same ice-cream cup containing ice-cream mix full to rim- note weight (B).
3. Fill same ice-cream cup with ice-cream from freezes smooth off, but do not compress, using spatula-weigh and note weight (C)

3.8 BACTERIOLOGICAL TESTS

3.8.1 SAMPLING PROCEDURE: Sampling of milk and milk products for bacteriological tests should follow the same procedure as described for various products as Milk and ice-cream. Special aseptic care should be observed when taking samples. Equipment and containers utilized for sampling shall be sterilized.

3.8.2 PRESERVATION

Preservative should never be added to samples intended for bacteriological or organoleptic examination. Instead they should be held at a low temperature (0^0 C to + 5^0 C) except for conserved milk products when the sample indicates unopened hermetically sealed containers in which the products are sold. Liquid products and butter should be kept cold and bacteriological examination of liquid product should start as soon as possible and never later than twenty four hours after sampling.

3.8.3 TRANSPORT

Samples shall be transported to the laboratory as quickly as possible. For examples intended for bacteriological examination an insulated transport container capable of maintaining a low temperature (o^0 c to + 5^0 c) should be used except for samples of conserved milk products in unopened containers or in the case of very short journey.

3.8.4 STANDARD COLONY COUNT

SAMPLING: A sample of milk or milk powder is taken by the methods described for raw milk sampling procedure and milk powder sampling procedure.

APPARATUS

i. Bunsen burner
ii. Pipette
iii. Dilution tubes
iv. Dilution bottles, 150-170 capacity
v. Petri dishes
vi. Thermometer, up to 100^0c
vii. Glass vessels with closure, for weighting.
viii. Closed containers for pipette.
ix. Closed containers for Petri dishes.
x. Water bath.
xi. Desiccators.
xii. Counting chamber.
xiii. Analytical balance.
xiv. Incubator, to operate at 20^0 to 60^0 c, with ± 1^0c accuracy.

xv. Autoclave, to operate at up to 150^0 c. Oven for sterilization, to operate up to 200^0c.

xvi. Refrigerator.

REAGENTS

Dilution fluid: Quarter strength Ringer solution shall be used, of the following composition:-

Sodium chloride	9.0- g
Potassium chloride	0.42 g
Calcium chloride, anhydrous	0.24 g
Sodium bicarbonate	0.20 g
Distilled water upto	1000 ml

Before use add 1 part of the above solution to 3 parts of distilled water. The dilution fluid should be dispensed in dilution bottles closed with stopper to certain 99 ml or 90 ml after sterilization. The dilutions can also be dispensed in to test tube to certain 9 ml after sterilization. The quantity to be filled into containers before sterilization must be determined by experiment but should not vary more than ± 2 percent. The containers with dilution fluid should be sterilized in autoclave at 121^0c for 15 minutes.

Medium:

Yeast extract	---- 2.5% g
Tryptone	---- 5.0 g
Dextrose	---- 1.0 g
Agar	---- 15.0 g
Distilled water up to	---- 1000 ml
Separated milk	---- 10.0 ml

Dissolve the substance in distilled water and allow to stand for a few minutes, mix adjust to pH adjustment 7.0 , heat to boiling for 2 minutes, cool to 45^0c and pour 10 ml into Petri dishes. Prepare medium shortly before use, do not autoclave.

3.8.4.1 PROCEDURE FOR LIQUID MILK

1. Mix the milk sample thoroughly.

2. With a sterile pipette transfer required amount to dilution bottles or tube.
3. From the sample make dilutions in ¼ Ringers solution. Dilution,:

   The 1:10 dilution , prepare by addition :

   To dilution bottle-

   11ml sample to 99 ml of diluents, 10 ml sample to 90 ml of diluents

   To dilution tube –

   1 ml sample to 9 ml of diluents, The 1: 100 ml. of dilution prepare by the addition of 1 ml of sample to 99 ml. of diluents or 1ml of 1:10 dilution to 9 ml of diluents.
4. Dilution bottles mix by shaking up and down 25 times through an excursion of about 30 cm. Dilution tubes mix by beating the tube to hand palm 25 times.
5. All transfers should be done under aseptic conditions. When open the bottle or tube flame the orifice.
6. For transfer, measure required quantity of sample (dilution), holding the pipette vertically, Touch the tip of the pipette against side of bottle (tube), wait 2-3 seconds. Blow out the contents.

   For each transfer use separate sterile pipette.
7. Prepare as many dilutions as received so as to obtain on Petri dishes 30 to 300 colonies. For instance, if the colony count is expected to be less than 10,000 per ml. prepare the plates from 1:10 and 1: 100 dilutions. If the colony count is expected to be between 10.000 and 300.000 per ml. prepare plates from 1: 100 and 1:1000 dilution.
8. Take a fresh pipette and inoculate 1 ml from the final dilution into a Petridis. Hold the tip of pipette above the bottom of dish, against the dish, blow out content, wait 3 seconds, touch the tip of pipette against the dish, blow out last drop. The dilution should be inoculated in Petri dish in duplicate.
9. To each dish and 10 ml of melted medium kept in the water bath at 45^0c. If tubes are used, dry and flames before pouring.
10. Immediately after pouring mix medium and inoculums by :

    Five to and fro movements, followed by five circular clockwise movements, followed by five to- and-fro movements, followed by five circular anti clock wise movements.
11. Allow the dishes to stand until medium has set. Invert the dishes, Transfer to incubator.

12. Incubate dishes between upwards for 22- 24 hours at 30^0c, and do not stack more than 6 high. The temperature should not vary by more than ± 1^0c.
13. Colonies should be counted within 4 hours of the expiry of the incubation period.
14. After incubation time count using a counting chamber, a suitable lens and tally counter. Only plates with colony counts between 30 and 300 shall be used for recording results. If more than one dilution gives a count within this range select the higher result per ml.
15. Express the result as the number of bacteria per ml of milk, by multiplying the count per plate by the reciprocal of the dilution from which it was prepared.

3.8.4.2 PROCEDURE FOR MILK POWDER

1. Prepare 90 ml quantities of sterile diluents in suitable wide-mouthed bottles with aseptic closure. Warm in water bath to 50^0c before use.
2. Weigh 10 grams of milk powder, dissolve in 90 ml diluents. Shake gently and invert 25 times. Replace for10 minute to water bath at 50^0c. Invert once and proceed with examination.
3. Use general technique for preparation of dilutions and inoculation of Petri dishes as described under 5 (2 to 12).
4. Dishes shall be incubated for 5 days at 30^0c ± 1^0c.
5. After incubation time colonies should be counted within 4 hours of the incubation period. Use the counting chamber, a suitable lens and a tally counter. Spreaders should be counted cash as one colony.

   If spreaders cover more than half, the plate should be discarded. If spreader covers one quarter of plate the result will be of doubtful accuracy. Care is required to avoid confusion between pin point colonies and minute particles of undisoloved powder.

   Count should be recorded and, using appropriate dilution factor, reported per gram of powder.
6. If it is required to estimate the count per ml of reconstituted milk equivalent in composition to normal milk, reconstitution by dissolving 13 grams of FCMP or 10 grams of SMP in 100 ml of diluents. Then proceed with examination and described above.

3.8.4.3 PROCEDURE FOR BUTTER

1. Take an average butter sample as described before.
2. Prior the operation warm dilution blanks and pipettes to 40^0c with butter samples warm in water bath, until butter is fluid for pipeting.
3. Wet the pipette by drawing into 11 ml of sterile, warm dilution water and discharge the content.
4. Transfer the adequate amount of butter in dilution bottles or tubes, as described before.
5. Other operations are as described in procedure for liquid milk. Counting after 2 days at 30^0c.

3.9 RAW MILK COLIFORM COUNT

APPARATUS: Same to Standard Plate count

REAGENT

Sodium chloride	9.0- g
Potassium chloride	0.42 g
Calcium chloride, anhydrous	0.24 g
Sodium bicarbonate	0.20 g
Distilled water up to	1000 ml

Before use add 1 part of the above solution to 3 parts of distilled water. The dilution fluid should be dispensed in dilution bottles closed with stopper to certain 99 ml or 90 ml after sterilization.

The dilutions can also be dispensed in to test tube to certain 9 ml after sterilization. The quantity to be filled into containers before sterilization must be determined by experiment but should not vary more than ± 2 percent.

MEDIUM

Violet Red Bile Agar :

Yeast extract	--	3 g
Peptone or Gelysate	--	7 g
Bile salts	--	1.5 g

Lactose	--	10 g
Sodium chloride	--	5 g
Neutral red	-	0.03 g
Crystal violet	--	0.02 g
Agar	--	15g
Distilled water up to	--	1000 ml

Dissolve the substance in distilled water and allow standing for a few minutes, mixing, adjusting pH to 7.4 Heat to boiling for 2 minutes, cool to 450c and pouring 10 ml quantities into Petri dishes. Prepare medium shortly before use, do not autoclave.

PROCEDURE:

1. The milk sample is mix thoroughly.
2. With a sterile pipette transfer required amount to dilution bottles (tubes). From the sample make dilution in ¼ Ringers solution.

   The 1:10 dilution prepare by addition of : 11ml sample to 99 ml of diluents, 10 ml sample to 90 ml of diluents,1 ml sample to 9 ml of diluents; The 1: 100 dilution prepare by the addition of 1 ml of sample to 99 ml. of diluents or
3. Dilution bottles mix by shaking up and down 25 times through an excursion of about 30 cm.

   Dilution tubes mix by beating the tube to hand palm 25 times. Other method of mixing of dilution tubes is to suck dilution with the pipette, up to 1 ml mark, withdraw the pipette and expel liquid. Perform this operation 10 times.
4. All transfers should be done under aseptic conditions. When open the bottle or tube flame the orifice.
5. For transfer measure required quantity of sample (dilutions), holding the pipette vertically. Touch the tip of the pipette against side of bottle (tube). Wait 2-3 seconds. Blow out the contents.

   For each transfer use separate sterile pipette.
6. Prepare as many dilutions as required so to obtain on Petri dishes 30 to 300 colonies. For instance, if the colony count is expected to be less than 10,000 per ml. prepare the plates

from 1:10 and 1: 100 dilutions. If the colony count is expected to be between 10.000 and 300.000 per ml. prepare plates from 1: 100 and 1:1000 dilutions.

7. Take a fresh pipette and inoculate 1 ml from the final dilution into a Petri dish. Hold the tip of pipette above the bottom of dish, against the dish, blow out last drop. The dilutions should be inoculated in Petri dish in duplicate.
8. To each dish and 10 ml of melted medium kept in the water bath at 45^0c. If tubes are used, dry and flames before pouring.
9. Immediately after pouring mix medium and inoculums by :
   Five to and fro movements, followed by five circular clockwise movements, followed by five to- and-fro movements, followed by five circular anti clock wise movements.
10. Allow the dishes to stand until medium has set. When the medium has hardened overlay with 4 ml of the same medium in liquid state and allow this layer to harden. Invert the dishes, Transfer to incubator.
11. Incubate dishes between upwards for 22- 24 hours at 30^0c, and do not stack more than 6 high. The temperature should not vary by more than $\pm 1^0$c.
12. Colonies should be counted within 4 hours after the incubation period completed..
13. After incubation time count red-colored colonies typical for coliforms with the bare eye. If more than one plate gives similar result, select the higher result per ml.
14. Express the result as the number of bacteria per ml of milk, i.e. number of colonies multiplied by the inverse of dilution.

3.10 PROCESSING SECTION

3.10.1 PASTEURIZED MILK

Raw milk: Raw milk is collected from own different chilling water. The raw milk temperature is stored in the vat at about 4^0 C. The next step of pasteurization process is the standardization of raw milk.

Clarification and filtration: Clarification and filtration is used to remove suspended materials from milks. In the principle of clarification, suspended material is eliminated by centrifugal force. This is done by density difference between suspended materials and milk medium.

Standardization: Standardization of milk is the important step of milk processing. In this section, milk is standardized with skim milk powder (SMP) or full cream milk powder (FCMP) If raw milk fat is higher than BSTI Standard (i.e. 3.5%) only skim milk powder (SMP) is added with balancing Total solids (TS) and if the raw milk fat is lower than BSTI standard (i.e.3.5%) full cream milk powder is added in the milk and balanced the fat and also total solids.

Pasteurization: Pasteurization is a heat treatment process that destroys disease producing organisms (pathogens) and milk deteriorate microorganism presence in the raw milk. It also destroys natural enzyme can cause milk deterioration. Milk is heated in the pasteurizer at 85^0 C for 15 second by using HTST pasteurizer.

Figure 3: Milk pasteurizer

Homogenization: The volume of fat globules in milk is 0.1 mμ to 16 mμ. But in 80 to 90% of the fat globule size is 2 to 8 mμ. 1 ml milk contains about 1.5 to 5 billion fat globules. Homogenization process breaks down milk fat as a result 98% of the fat globules becomes 2 mμ or bellow this. During homogenization the milk must be liquid state (temperature 60^0 C or above). Milk is send in a narrow ways of homogenizer with high velocity and in the narrow ways creates a pressure of about1800 to 2500 psi. Fat is crushed due to high pressure and high velocity of valve impact. The homogenized milk can be stored at 7^0 C for 48 hours.

Figure 4: Milk Homogenizer

Packaging: The cooled milk (4^0 C or bellow) is then packaged by foil paper. The milk packet is stored in cold room.

Figure 5: Packaging machine

3.10.2 CHOCOLATE MILK

Raw materials

a) SMP
b) FCMP
c) Sugar
d) Stabilizer
e) Flavour
f) Water

Procedure: Mixing, Pasteurization & Homogenization steps are same to same as ice-process

3.10.3 ICE-CREAM MANUFACTURING

Figure 6: Different types of Lollies

INGREDIENTS

i. SMP
ii. FCMP
iii. Sugar
iv. Butter
v. Stabilize
vi. Water

vii. Flavor

Processing steps:

Mixing: At first some hot water (approximately 60^0 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^oc in the mixing vat so that the warm mix which dissolve them.

Pasteurization: The mixture is pasteurized by a continuous heating process. The liquid mixture is heated in a vat to at 81^0c for 15 seconds and subsequently cooled by the chilled water which helps to destroy pathogenic bacteria present in the mixture.

Homogenization: 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 downs the fat globules.

Aging: After the homogenization the mix is cooled down to 5^0C. This is known as aging. The mix held in vat from 3 to 24 hours at a temperature of 5^0C.

Overrun: overrun is defined as the increase in volume into the mix due to adding whipping air` While the mix is being agitated in the freezer to produce to produce uniform freezing, the air is added for swelling during freezing process. For cup vanilla ice-cream has 90% overrun and Choco-bar ice-cream has 40% overrun.

Freezing: Freezing is the process by which it converts the mix into ice cream by simultaneously aerating, freezing and beating. The vanilla cup ice-cream is frozen at a temperature of -5^0C. The ice-cream is semisolid for further processing. Chocobar ice-cream is frozen to -30 to -32^0 C . **Hardening:** Polo cup of semisolid ice-cream are placed in a hardening room where a temperature of -20^0c is maintained. Most of the remainder water is frozen in this stage. **Storage**: Storage is the condition in where product is kept until marketing. It is very important to maintain the temperature. The storage temperature for of ice-cream is maintained at -25^0C.

CHAPTER 4 DISCUSSION

4.1 DISCUSSION & INTERPREATION

3.11.1 Alcohol Test &Interpretation of CLR

Readings between 1.028 and 1.033 are considered normal and are sometimes recorded as degrees using the last two figures, i.e. 28 and 33.

Calculation of Solids based on density

Total Solids can be estimated from the corrected. lactometer reading and the fat content of the milk, using the following formula:

SNF (%) = CLR/4 + Fat%*0.2 + 0.14

(C= Corrected L R= Lactometer reading)

When the estimation for Total Solids got, it is easy to estimate SNF as

Follows:

TS% = SNF - fat %

The alcohol test is used for rapid assessment of stability of milk for processing particularly for condensing and sterilization. The test aids in detection abnormal milk such as colostrums, milk from animals in late lactation, milk from animals suffering from mastitis.

4.2 Clot-On- Boiling Test

The acidity of milk that gives a positive test is generally above 0.22% (as lactic acid) or has an abnormally high percentage of protein like colostrums milk. Such milk cannot stand the heat treatment in processing and is therefore not suitable for distributing as liquid milk or for processing. Such milk must therefore be rejected.

4.3 Interpretation of Urea test

Urea is generally added in the preparation of synthetic milk to raise the SNF value. Control, normal milk may show a faint yellow color due to presence of natural urea. Generally, urea and caustic soda raise the level of fat in milk.

4.4 Formalin Test**:**

Formalin is a preservative and can preserve milk for long period of time. Due to its high toxicity, it is considered to cause liver and kidney damage.

4. 5 Interpretation of Soda test:

Soap is added to milk to increase the foaming of milk and thus to have thick milk. Soap can be detected by adding phenolphthalein indicator to the adulterated milk.

4. 6 Cane sugar & salt test:

The common sugar present in milk is lactose. The fat content of the milk is more compared to the protein content. Table sugar like sucrose is added to the milk to increase the carbohydrate content of the milk and thus the density of milk will be increased. **Salt**: salt may be added to milk to raise its SNF level in milk.

4.7 Starch

It increases total solid value.

4.8 Fat Test

Note down the upper and lower scale readings corresponding to the lowest point of fat meniscus and surface of separation of fat and acid. The difference between the two readings gives the percentage by mass of fat in milk. The reading has to be done quickly before the milk cools.

4.9 Peroxidase of Pasteurized Milk

Blue color : positive (not pasteurization above 80^0 c/ 15 seconds)

White color : Negative (pasteurized above 80^0/ 15 seconds)

Certain chemicals (e.g.) Potassium dichromate and copper and mercury salts) which may have found their way into the milk will also turn the sample blue, even if it has been properly heat treated. Milk from cows with certain disease will also give a positive reaction irrespective of the temperature to which the milk has been heated.

4.10 Ice-Cream Mix Fat

In the Gerber test the membranes surrounding the fat globules are destroyed by sulphuric acid and a single fat layer separates out. To improve fat test separation amyl alcohol is added, the

mixture is centrifuged in a special Gerber tube (butyrometer) and the volumetric percentage of fat is registered in the graduated part of the tube at a fixed temperature.

4.11 Total Solids (TS) Ice Cream

The total solids content of an ice-cream or an ice-cream mix is measured as an aid to accurate control of mix ingredients and for production and quality control purposes. In the test a known amount of sample is heated for given period of time to drive off moisture, the remaining content being the solids portion of the original sample.

% Total Solids = 100 x C – A/ B – A

Where, A = weigh of dish and lid =11.017 g

B = Weight of dish and lid + ice-cream =16.681 g

C = Weight of dish and lid + dried content =13.016 g

% Total Solids = 100 x 13.016 – 11.017/ 16.681 – 11.017 =35.30%

4.12 Ice-Cream Acidity

The test is used to determine the estimated lactic acid content of ice-cream and ice-cream mixses that is to check their suitability for further processing or for subsequent sale after storage titratable acidity of ice cream is calculated using the following formulae

% lactic acid = (B-A) x 0.09 x 100/ (100- fat% of sample)

4.13 overrun test

Overrun is defined as volume of ice-cream obtained after the freezing process in excess of the same volume of original ice-cream mix. This increased volume built mainly of air incorporates during the freezing process. The overrun test measure this increased volume and is used to ensure that the overrun obtained during freezing produces the correct body, texture palatability necessary to good ice-cream quality for particular ice-cream mix formula.

4.14 Standard plate count (SPC)

The following bacteriological standard are widely accepted

Raw milk stand colony count :

Less than 100,000/ml -- excellent, milk accepted

100,000 – 2 millions -- satisfactory, milk accepted.

More than 2 millions -- not satisfactory, milk separated or rejected.

Pasteurized milk standard colony count:

Tested soon after packaging -- less than 30.000/ ml

tested after 24 h at 17^0 C -- less than 500.000/ ml

Milk powder standard colony count:

FCMP - US premium, less than less than 30.000 per gram

US Extra, less than 100.000 per gram

US standard, less than 50.000/ ml

SMP - US extra, less than 50.000 per gram

- US standard, less than 50.000 per gram

Butter (from unripened cream) - Satisfactory - less than 10.000 / ml

Doubtful - 10.000- 100.00/ ml

Unsatisfactory more than 100.000/ ml

4.15 Coliform Test

A solid medium violet Red Bile Agar is used, and dilution are inoculated on medium in petri-dish and dilution are inoculated on medium in Petri dishes. After incubation at 30^0c for 22-24 hours, the red colonies typical for coliform are counted and expressed as the number per ml. of milk. They indicate lack of cleanliness in milk production .They are killed by proper pasteurization .To get reliable results with bacteriological tests a very careful manipulation and high experience are required.. In bacteriological test it is required to deal with live organisms which react differently and in different conditions, grow with different speed.

Higher number of coliforms in raw milk indicates unhygienic production and manipulation conditions. In pasteurized milk, according to standard, less than 10 per ml coliforms are required.

CHAPTER 5 RECOMMENDATIONS & CONCLUSION

RECOMMENDATION

The expanding city of Dhaka used to get 2.00 to 2.50 Lakh litres of milk vita liquid milk per day which was only early 3000-4000 liters the establishment of this project. So the milk vita needs to develop the distribution system and there need to create a strategic plan for the developing the distribution system by the experts and many kinds of resources need to acquire. It is also required to set up the protein determination equipment. Another change need to create the own firm or own managed firms. This also needs many kind of arrangement to change. The milk vita need to create own firm / own managed firm because if the supplier get extra price from another company they will give their milk to them. For that reason the company faces scarcity of raw milk. If they have enough own firm, this kind of risk will minimized. The most of the people of Bangladesh is poor. The company can give cow to the people cultivation.[1]

3.13 CONCLUSION**:**

The internship program have covered both quality and production area in the milk vita. The internship program helped to learn methods for ensuring of raw milk quality and its products identification. The program also helped to learn production of milk and milk products like pasteurized milk, variety of ice-cream. For ensuring raw milk quality different types of physical and biochemical tests are carried out in the milk vitae organization such as Alcohol Test, Formalin Test, Starch Test, Salt Test, Sugar Test, Hydrogen Peroxide Test, Urea Test And Fat Test. For determination of these tests, at first milk sample (a representative part of milk) is brought by the milk tank grader in the milk vita laboratory. Then the laboratory stuff perform different adulteration test for ensuring primary raw milk quality so that ensuring of the milk is good or poor quality to allow or reject the pasteurization process for producing of pasteurized liquid milk its products. 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. Pasteurization process destroys pathogenic bacteria (Salmonella, E. coli,

Staphylococcus aureus) which can cause food borne illness, sometimes death may occur due to these bacterial toxicity. Insufficient pasteurization process does not kill these bacteria. So the HTST (time temperature combination) should adjust correctly otherwise fail the operation that can be poor quality milk and will be considered as unsuitable for consumption of human being. Flavor milk are chocolate milk and mango flavor milk production and quality control of these milk is carried out are alcohol test, organoleptic test as color, flavor. Actually milk vita maintains or regulates its milk & milk products quality parameter according to BSTI standards.

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