PROJECT REPORT

ON

MILK PROCESSING AND MILK PRODUCT

AT

SUDHA DAIRY PLANT

JAMSHEDPUR UNIT

SUBMITTED BY:

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CONTENTS

1. ABOUT COMFED
2. INTRODUCTION ABOUT MILK
3. CONSTITUIENTS OF MILK
4. VARIOUS SECTIONS OF DAIRY PLANT
5. QUALITY TEST FOR MILK AND MILK PRODUCTS
6. BACTERIOLOGICAL TEST
7. PACKAGING OF MILK
8. TESTING OF WATER
9. LIST OF EQUIPMENT IN THE LABORATORY
10. CONCLUSION

COMFED

The Bihar State Co-operative Milk Producers' Federation Ltd. (COMPFED) was established in 1983 as the implementing agency of operational Flood programme of dairy development on "Anand "pattern in Bihar.

All the operation of erstwhile Bihar State Dairy Corporation were handed over to COMFED.

A unit of Bihar State Milk Co- Operative Federation Ltd. It is in Jamshedpur, Saraikela. It was established and commissioned in January, 1984. At present, it has infrastructure that produces about 100 TLPD (lakh litres per day). It majorly caters to the urban population of Jamshedpur providing standard quality milk and milk products at affordable prices.

MILK

MILK is a nutrient- rich liquid food produced in the mammary glands of mammals. Milk is a whitish liquid containing proteins, fats, lactose various vitamins and minerals that is produced by the mammary glands of all mature female to nourish their young for a period beginning immediately after birth. It should be free from Colostrum

Major Components:

Water (87%), Fat (9%), Proteins (casein, Beta- lactoglobulins, alpha- lactalbumin, whey, etc.) and Lactose which is the main carbohydrate of milk.

Minor Components:

Minerals, enzymes, vitamins (A, D, E, K & riboflavin), dissolved gases (carbon dioxide, nitrogen, and oxygens) and some dissolved salts (in the form of phosphates, nitrates, and chlorine of calcium).

Types of Market Milk-

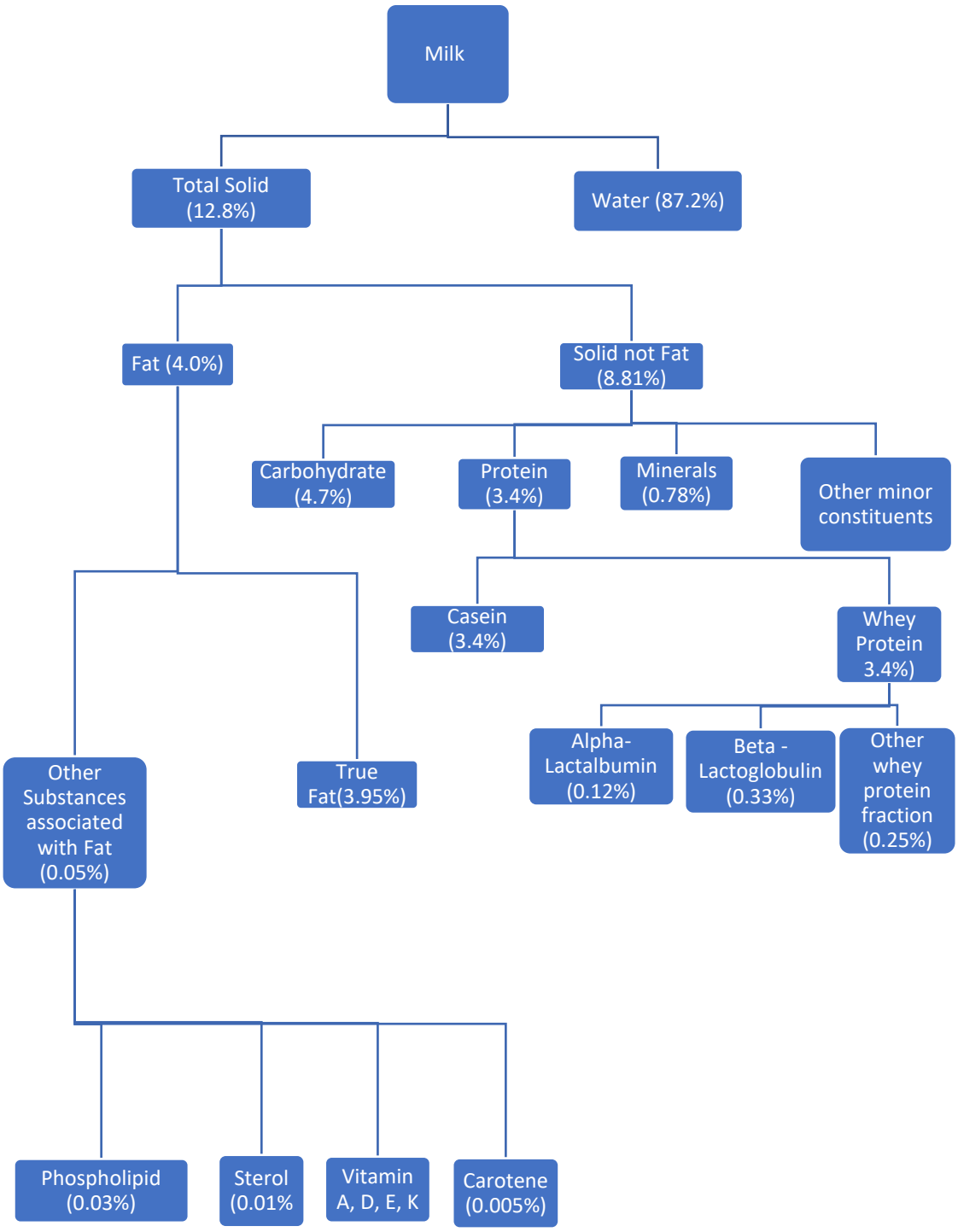
1. Standardized Milk- Milk that has been standardized to have a milk fat content of 4.5% and SNF (8.5%).

2. Toned Milk- Milk made by mixing cow's or buffalo's and has a milk fat % (3%) and SNF (8.5). It is pasteurized and phosphatase test shows it is properly treated

3. Double Toned Milk- Milk made by adding skimmed milk powder to whole milk, resulting in a milk fat content of around 1.5%. It is ideal for those trying to maintain weight as it has fewer calories.

4. Full Cream Milk- Milk made by blending cow's and buffalo's milk, standardized to have a milk fat% of 6% and SNF content of 9%. It is richer and creamier in taste

COMPOSITION OF MILK



VARIOUS SECTION OF A DAIRY

1) Reception Dock
2) Processing Section of milk
3) Production Section of Lassi
4) Production Section of Dahi
5) Production Section of Paneer
6) Production Section of Peda
7) Quality Control
8) Boiler Section
9) Packaging section
10) Refrigeration
11) Dispatch
12) Administration, Stores, Accounts and Purchase

1. Raw Milk Reception Dock (RMRD)

Raw Milk Reception Dock (RMRD) is the primary intake point of liquid milk entry in Sudha Dairy, Jamshedpur. It receives milk from Sudha units located in various parts of Bihar and Jharkhand, including Muzaffarpur, Ara, Samastipur, Barauni, Bhagalpur, and Kaimur. The milk is transported to Jamshedpur by milk storage tanks, equipped with temperature-controlled storage to maintain milk quality during transit.

Despite the modern transportation methods, the goal at reception remains to handle the milk as quickly as possible, as it is still susceptible to spoiling until it is refrigerated, transferred to the dairy's storage tanks, and processed. The RMRD team at Jamshedpur is responsible for conducting quantity and quality checks for approval, while also managing the time-sensitive process of receiving milk from multiple vehicles.

2. Processing Section of Milk

a)Filtration:

Purpose: Filtration is used to remove solid particles and debris from milk, such as dust, silt, and sediment, which can impair product quality and shelf life.
Procedure: To physically catch and remove the particles, milk is run through a series of filters composed of materials like paper, cloth, or ceramic.
Filtration produces cleaner milk with greater clarity and a lower microbial load, which is useful for subsequent processing and storage.

b) Pasteurization:

Pasteurization is a heat treatment process used to destroy harmful pathogens in milk while retaining its flavour and nutritional value.
It extends the shelf life of the milk because it inactivates the pathogens and enzymes that spoil food.
It is not a form of sterilization, because bacterial spores are not destroyed.

i) Regeneration

Purpose: Preheat the milk to reduce the energy required for heating during pasteurization.

Procedure: Milk enters the heat exchanger where it is preheated by hot, already-pasteurized milk that is being cooled down.

Temperature: The temperature during regeneration is typically raised from around 4°C (refrigerated temperature) to about 57°C to 65°C.

ii) Heating:

- **Purpose**: To raise the milk to the necessary temperature to destroy pathogenic microorganisms.
- **Procedure**: Milk is heated using a heat exchanger
- **Temperature**: Common pasteurization methods include:
- High-Temperature Short-Time (HTST): Milk is heated to 72°C (161°F) for 15-20 seconds.

iii) Holding

- **Purpose**: Ensure that the milk remains at the pasteurization temperature for a sufficient time to achieve microbial destruction.
- **Procedure**: Milk is held at the target temperature in a holding tube or chamber.
- **Temperature** and **Time**: The same as specified in the heating step, depending on the method used (HTST, UP, LTLT).

iv) Flow Diversion Valve

- **Purpose**: To ensure only properly pasteurized milk moves forward in the process, while any milk that does not reach the required temperature is diverted back for reprocessing.
- **Procedure**: The FDV continuously monitors the temperature of the milk. If the milk temperature falls below the set point, the valve diverts the milk back to be reheated.
- **Temperature**: The critical control point is set at the target pasteurization temperature (e.g., 72°C for HTST).

v) Cooling:

- **Purpose**: Rapidly cool the pasteurized milk to prevent microbial growth and preserve quality.
- **Procedure**: Milk passes through another heat exchanger where it is cooled by cold water or refrigerant.
- **Temperature**: The milk is typically cooled to 4°C (39°F) or lower

c) Chilling

- **Purpose**: Chilling rapidly reduces the temperature up to 3-4° C of the milk to inhibit bacterial growth, controlling their rate of reproduction, their action on lactose and maintain freshness. This process also helps to prevent the growth of thermal bacteria like *Thermus aquaticus*, *Thermus Flavi* etc.
- **Process**: Milk is passed through a heat exchanger where it is cooled using chilled water or refrigerant to the desired temperature.

d) Homogenization:

- **Purpose**: Homogenization is a process that breaks down fat globules in milk to prevent cream separation and create a uniform texture.
- **Procedure**: Milk is forced through a homogenizer at high pressure, which breaks down fat globules into smaller particles that are evenly distributed throughout the milk.

FLOW CHART OF Pasteurization

Cold Store

- **Purpose**: Proper storage is essential for maintaining the quality and safety of dairy products. It is basic requirement for the processing and storage of milk as it is perishable in nature.
- **Procedure**: Dairy products are stored in refrigerated tanks or containers at controlled temperatures to slow down bacterial growth and maintain freshness.
- Shelf – life of milk-
- The shelf-life of milk is 2 days at 8 ° C.

3. Production of Lassi:

Lassi is a sweetened, flavoured, fermented milk product consumed by large sections of the population throughout the country. It is an excellent refreshing beverage for quenching thirst. There is a large variation in the quality characteristics of lassi sold in the different parts of the country. In rural India, lassi is also known as butter milk. Lassi is a creamy viscous fluid with rich aroma and mildly acidic in taste. It is prepared by mixing a calculated quantity of sugar and flavour with dahi by agitation. Sugar is added in the form of syrup. It is desirable to homogenize the product for improved body and texture. Lassi is filled in sterilized containers and stored at 4-6 °C until consumed.

Principle:

The principle involved in preparation of lassi is processing of milk into dahi, using lactic starter culture, breaking of curd employing agitator or centrifugal pump to obtain uniform smooth consistency and thereafter blending of sugar syrup and desired flavour (essence). The final product is in the form of beverage.

Procedure:

1. Milk reception and quality testing:

Raw milk is received at the dairy and undergoes quality tests to ensure it meets standards for fat content minimum 4.6, SNF content minimum 8.7 %, acidity, and absence of contaminants.

2. Pasteurization:

The milk is heated to a specific temperature (usually around 80-82) to eliminate harmful bacteria while preserving nutritional value.

3. Curd preparation:

Pasteurized milk is cooled to about 38-42 °C. Starter culture containing lactic acid bacteria is added of 1-1.5 %. The milk is then incubated for 4-6 hours until it forms into curd (yogurt). Acidity of curd is 0.6-0.8%.

4. Churning of curd:

The curd is churned in large vats or mechanical churners for 50 minutes.

5. Homogenization and chilling:

The lassi mixture is homogenized to ensure uniform distribution of ingredients and a smooth texture. It's then chilled to around 4°C.

6. Lassi mixing:

The remaining buttermilk is mixed with water to achieve the desired consistency. Sugar is added for sweetness with filtration by nylon or muslin cloth, and flavours like rose.

7. Inspection & testing acidity:

Quality testing of lassi and inspection of acidity which ranges 0.7 – 0.9 %.

8. Packaging and distribution:

The finished lassi is packaged into pouches. Then stored in refrigerated conditions and distributed through Sudha Dairy's network.

4. Production section of Dahi:

- Dahi is a set-type fermented dairy product originated in the Indian Subcontinent.
- Consumption of fermented milk products is associated with several types of human health benefits partly because of their content of lactic acid bacteria.
- Dahi added with probiotic bacteria enhances its health benefits such as immune enhancement, blood pressure reduction, antiatherogenic effect, antidiabetic effect, anticarcinogenic effect, antioxidative effect and curing of gastrointestinal disorders.

Principle:

The principle of processing dahi at Sudha Dairy revolves around controlled fermentation, where specific bacterial cultures (Lactobacillus bulgaricus and Streptococcus thermophilus) are added to pasteurized and homogenized milk. These bacteria convert lactose into lactic acid, causing the milk to coagulate and develop the characteristic texture and flavor of dahi. Key principles include maintaining optimal temperature for fermentation, ensuring strict hygiene and sanitation to prevent contamination, and implementing continuous quality control to meet safety and consistency standards. This process transforms milk into a nutritious and palatable product with an extended shelf life.

Procedure:

1. Milk reception and quality testing:

Raw milk is received at the dairy and undergoes quality tests to ensure it meets standards for fat content minimum 4.6, SNF content minimum 8.7 %, acidity, and absence of contaminants.

2. Pasteurization:

The milk is heated to a specific temperature (usually around 80-82 °C) to eliminate harmful bacteria while preserving nutritional value.

3. Homogenization:

Milk is homogenized to break down fat globules, ensuring a uniform and smooth texture in the final product.

4. Inoculation and Fermentation:

Addition of Starter Culture: Specific strains of lactic acid bacteria (e.g., Lactobacillus bulgaricus and Streptococcus thermophilus) are added to the milk.

Incubation: The inoculated milk is kept at a controlled temperature (around 38-42 °C) for 4-5 hours to allow fermentation. The bacteria convert lactose into lactic acid, which coagulates the milk proteins, forming dahi.

5. Cooling and Packaging:

Cooling: Once the desired acidity and texture are achieved, the dahi is cooled to stop further fermentation.

Packaging: The dahi is then packaged in sterile containers to maintain hygiene and extend shelf life.

6. Quality Control:

Testing: Throughout the process, samples are tested for various quality parameters, including microbial load, acidity (0.6-0.8), taste, and texture, to ensure the product meets the set standards.

7.Storage and Distribution:

Cold Storage: The packaged dahi is stored at temperatures at 6°C to preserve its quality until it reaches consumers.

8. Shelf- Life:

The shelf life of Sudha Dahi, typically ranges from 7 days when stored under proper refrigeration conditions (below 5°C). However, the exact shelf life can vary based on factors such as packaging, storage conditions, and preservatives used. It is always best to check the expiration date printed on the packaging for the most accurate information. Proper storage in a cool environment is essential to maintain the quality and safety of the dahi throughout its shelf life.

5. <u>Production Section of Paneer:</u>

Paneer is a very common indigenous dairy product in Indian subcontinent, is like an un- ripened variety of soft cheese which is used in the preparation of a variety of culinary dishes and snacks. It is obtained by heat and acid coagulation of milk, entrapping almost all the fat, casein complexed with denatured whey proteins and a portion of salts and lactose. Paneer is marble white in appearance, having firm, cohesive and spongy body with a close-knit texture and a sweetish-acidic-nutty flavour

Principle:

Paneer making is simply coagulating the previously standardized and heat-treated milk using suitable acids (including sour whey), draining the whey followed by pressing of the coagulated mass till a dense block is obtained which is subsequently chilled in chilled water and then diced, if needed before packaging the same. The pressed block of curd is removed, cut into pieces, and immersed in chilled water of 5-6°C for about 2 hours. Dipping of paneer pieces facilitates cooling of product and improves the body and texture of paneer. The coagulated mass is transferred to a hoop, lined with muslin cloth and the hoop subjected to pressing to obtain compact mass of paneer

Procedure:

1. Receiving milk: Milk is received in a clean and sterilized Stainless Steel multi- purpose vat. Milk is standardized for Fat (4.5% Min) and SNF (8.5% Min). Then milk is heated to 80-85 °C and hold it for 30 minutes, maintaining the same temperature. This process is also referred to as batch pasteurization.

Purpose of batch pasteurization is to reduce the microbial load. Temperature of the pasteurized milk is then brought down to 70-75 °C.

2. Prepare 1-2% citric acid solution with respect to the milk, which is used as a coagulant. The temperature of coagulant is maintained at 70°C, which is same as the temperature of milk at the time of addition of coagulants.

3. The coagulant is added in optimum quantity and stir them slowly, so that a clear whey separation shall be achieved. The green colour of the whey indicates proper coagulation. Stirring should not be intense otherwise this will lead to the break up the curd mass.

4. Allow the whey to be drained out through a muslin cloth and the coagulated curd remains in the vat/cloth. It is advised that the whey temperature should not fall below 630C during the whole process.

5. The curd mass shall be filled in the SS hoops lined with muslin cloth and pressed for 20 min. Pressing can be achieved through a press.

6. Immersed the pressed paneer blocks in pasteurized chilled water (10 °C) for at last an hour to achieve firmness. Further the paneer blocks were cuts and dried to remove extra free water.

7. At last, the paneer slices were packed in a vacuum-package made of high-density

polyethylene (HDPE) and stored at 5 – 8 °C for further sales/distribution.

6. Production Section of Peda:

Indian traditional sweetmeats (sweets / mithai) are very popular in our country and worldwide. Around 50% milk produced in India is converted to traditional Indian dairy products. Peda is also a popular khoa based Indian sweet but its organoleptic quality is different from burfi. Peda is harder and have granular texture in comparison with burfi. Its shape is also round

Principle:

Manufacture of peda involves blending and kneading of khoa and sugar, prefer, relatively at higher temperature (80-90° C) in case of brown peda, until a smooth and homogenous product is formed. Peda pieces are made in round shape from the properly kneaded mixture of khoa and sugar. Principle of making peda involves processing milk solids (khoa), sugar, and flavourings to create a consistent product. Quality analysis, adherence to standards, and proper packaging are essential for maintaining freshness and ensuring a delightful treat.

Procedure:

With Milk:

1. Receiving milk: Milk is received in a clean and sterilized Stainless Steel multi- purpose vat. Milk is standardized for Fat (4.5% Min) and SNF (8.5% Min). High fat percentage of milk should be taken in a open pan for evaporation Continuous scrapping mechanism must be attach with the pan. It may be steam jacketed or gas fired

2.Heating of Milk: Then milk is heated to 90 °C. Evaporate the milk till the volume get reduced by one third.

3. Addition of Sugar: Addition of 30% powdered sugar, Continuous scrapping, and heating to obtained a smooth pasty consistency.

4. Unloading and shaping of peda mass: Unloading the khoa mass in a tray for cooling and shaping manually Manual method of shaping and moulding of peda.

4. Moisture control: Moisture is decreased to 85% to 17 %.

5. Shaping: Then product is cooled for 1 day and shaped in moulds.

With Khoa:

1. Khoa is broken into bits and heated to 90°C.

2. Addition of Sugar: Addition of 30% powdered sugar, Continuous scrapping, and heating to obtained a smooth pasty consistency.

3. Unloading and shaping of peda mass: Unloading the khoa mass in a tray for cooling and shaping manually Manual method of shaping and moulding of peda.

4. Moisture control: Moisture is decreased to 85% to 17 %.

5. Shaping: Then product is cooled for 1 day and shaped in moulds.

7. Quality Control

TEST FOR MILK AND MILK PRODUCT

1) PHYSICAL TEST

- **a.** Organoleptic test
- **b.** Flavour
- **c.** Colour

2) CHEMICAL TEST

- **a.** Temperature
- **b.** pH
- **c.** Acidity
- **d.** Clot on boiling test
- **e.** Alcohol Test
- **f.** Phosphatase test
- **g.** Fat test
- **h.** Solid not fat Test
- **i.** Adulteration test
- **j.** Cleaning in Place (CIP) test
- **k.** Moisture Test
- **l.** Milk Powder Test
- **m.** Total hardness of Water

3) BIOLOGICAL TEST (MICROBIOLOGY)

- **a.** Methylene Blue reduction test (MBRT)
- **b.** Standard plate count (SPC)
- **c.** Coliform test
- **d.** Swab Test
- **e.** For Yeast and Mold

1) PHYSICAL TEST

a) ORGANOLEPTIC TEST:

Rapid milk quality segregation at the milk receiving platform is made possible by the organoleptic test. Milk graders do not need any special equipment, but they do need to have keen vision, smell, and taste perception. Test costs are minimal, and results are available immediately. Other, more objective and sensitive tests must be performed on milk that cannot be sufficiently assessed organoleptically.

Procedure:

- Open a can of milk.
- Immediately smell the milk and taste the milk
- Observe the appearance of the milk.
- If still unable to make a clear judgement, taste the milk, but do not swallow it. Spit the milk sample into a bucket provided for that purpose or into a drain basin, flush with water.
- Look at the can lid and milk can to check cleanliness.

Abnormal smell and taste may be caused by:

- Atmospheric taint (e.g., barny/ cowy odour)
- Physiological taints (hormonal imbalance, cows in late lactation – spontaneous rancidity).
- Bacterial taint
- Chemical taints or discolouring.
- Advance acidification (pH <6.4).

Remarks: Organoleptic test evaluation should be Excellent, Very Good, Good, Satisfy

b) FLAVOUR:

- **Reason:** To assess the taste and aroma of milk, which can indicate its quality and freshness.
- **Principle**: Milk should have a pleasant, slightly sweet taste with no off-flavours. Off-flavours can be indicators of spoilage, contamination, or improper handling.
- **Procedure**: Taste the milk sample and identify any deviations from the expected flavour profile.
- **Judgment:** Flavors are evaluated based on established sensory descriptors and compared against reference standards.
- **Remark**s: Flavour evaluation should be Good and Normal remarks.

c) COLOUR:

- **Principle**: To visually inspect the colour of milk, which can reveal information about its composition and potential defects.: Fresh, high-quality milk should have a consistent, opaque white colour. Deviations in colour may indicate the presence of contaminants or other quality issues.
- **Procedure**: Observe the milk sample against a white background under appropriate lighting conditions. Judgment: The colour is evaluated based on established standards or reference samples, and any deviations from the expected white colour are noted.
- **Remarks**: Colour evaluation is for buffalo milk -white and for cow milk – yellow because it is rich in carotene.

2) CHEMICAL TEST

a. TEMPERATURE:

Freshly drawn milk from healthy animals should have a temperature between 37-39°C (98.6-102.2°F). However, for transportation and storage purposes, milk is rapidly cooled to a lower temperature to minimize bacterial growth and spoilage.

The recommended temperature for transporting and receiving milk at the dairy plant is typically between 2-4°C (35.6-39.2°F). This low temperature helps slow down the growth of microorganisms and enzymatic activities that can cause spoilage.

By maintaining the proper temperature during transportation and at the time of receiving, the dairy plant ensures that the milk remains fresh and safe, and its quality is preserved until it undergoes further processing steps, such as pasteurization, homogenization, and packaging.

b. pH TEST:

The pH test can be done by 3 processes:

1. **Digital pH meter:**

In which first we calibrate the solution with two buffer solution of 4 pH and 11 pH. Then calibrate the solution.

2. **Universal Indicator:**

First, we take 10 ml of solution like milk, lassi, caustic. Then 0.2 ml of universal indicator solution was added. Colour was visualized and check which pH list was observed.

3. **pH paper:**

Take 10 ml of solution such milk, lassi, caustic. Then dip litmus paper for few seconds. Then check the pH with the help of pH list was observed.

pH Range

- pH range of milk is 6.4- 6.7.
- pH range of lassi is 5.0-5.4
- pH range of Misti Doi is 5.2-5.4
- pH range of dahi is -5.2-5.4

c. ACIDITY TEST:

The acidity test of milk is of three types –

1. Natural Acidity Test:

- This test measures the natural or inherent acidity present in fresh milk due to the presence of acids like lactic acid, citric acid, and other minor acids.
- It is usually performed by titrating a known volume of milk with a standardized alkali solution (e.g., 0.1 N sodium hydroxide) using phenolphthalein as an indicator.
- The natural acidity of fresh cow's milk typically ranges from 0.14% to 0.16% lactic acid.

2. Developed Acidity Test:

- This test measures the total acidity of milk, including both the natural acidity and the acidity developed due to bacterial action on lactose (milk sugar) during storage or incubation.
- It involves incubating the milk sample at a specific temperature (e.g., 37°C) for a certain period (e.g., 24-48 hours) to allow the bacteria to convert lactose into lactic acid.
- After incubation, the developed acidity is determined by titrating the sample with a standardized alkali solution, similar to the natural acidity test.

3. Titratable Acidity Test:

- This is a more comprehensive test that measures the total acidity of milk, including natural, developed, and any other acids present.
- It involves titrating a known volume of milk with a standardized alkali solution (e.g., 0.1 N sodium hydroxide) using phenolphthalein as an indicator.
- The titratable acidity is expressed as a percentage of lactic acid or other acid equivalents.
- This test provides an overall assessment of the acidity level in milk, which can indicate the quality, freshness, and potential spoilage.

I. Acidity test for Milk:

Fresh milk has a slightly acidic pH ranging from 6.6 to 6.8 due to the presence of natural acids, such as lactic acid, citric acid, and other minor acids. The acidity level in milk is an important indicator of its quality and freshness.

The principle behind acidity in milk is related to the fermentation of lactose (milk sugar) by lactic acid bacteria naturally present in milk. As these bacteria metabolize lactose, they produce lactic acid, which increases the acidity of the milk over time.

Procedure:

a. 10ml of milk was measured with pipette and taken in beaker.
b. Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
c. Titrate it against N/10 solution of NaOH.
d. Observed the end point of milk at which white colour of milk is turned into light pink in colour.
e. Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.09 Acidity factor.
f. Generally, the acidity ranges between 0.126-0.135.

II. Acidity test for Curd:

Dahi, or curd, is a fermented milk product with a higher acidity level compared to fresh milk. The principle behind the acidity in dahi is like that of lassi, as it involves the fermentation of lactose by lactic acid bacteria.

During the curd-making process, milk is heated and cooled to a specific temperature, and then a starter culture containing lactic acid bacteria is added. These bacteria metabolize the lactose in milk, producing lactic acid as a byproduct. As the fermentation progresses, the lactic acid accumulates, increasing the acidity of the product.

The acidity level in dahi is typically higher than in milk, with a pH ranging from 4.0 to 4.6, depending on the fermentation time and the specific bacterial strains used. The increased acidity not only contributes to the characteristic tangy flavor of dahi but also aids in preserving the product by creating an unfavourable environment for the growth of spoilage microorganisms.

Procedure:

a. 10gm of curd was measured with pipette and taken in beaker.
b. 25ml of Distilled water was added and mixed properly.
c. Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
d. Titrate it against N/10 solution of NaOH.
e. Observed the end point of milk at which white colour of milk is turned into light pink in colour.
f. Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.09 Acidity factor.
g. Generally, the acidity ranges between for plane curd – 0.7-1.26 and For Misti Doi - 0.6-0.8.

III. Acidity test for Lassi:

During yogurt fermentation, specific lactic acid bacteria (such as Lactobacillus bulgaricus and Streptococcus thermophilus) convert lactose into lactic acid. This lactic acid accumulation increases the acidity of the yogurt, giving it a tangy flavor and a pH typically around 4.4 to 4.6.

Procedure:

a. 10ml of Lassi was measured with pipette and taken in beaker.
b. Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
c. Titrate it against N/10 solution of NaOH.
d. Observed the end point of milk white colour of milk is turned into light pink in colour.
e. Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.09 Acidity factor.
f. Generally, the acidity ranges maximum 0.54-0.72

IV. Acidity of Butter:

The principle of acidity in butter, primarily stems from the presence of organic acids, most notably lactic acid. These acids originate from the fermentation of lactose by lactic acid bacteria, either naturally present or added as starter cultures. The acidity is typically measured as percent lactic acid or titratable acidity and plays a crucial role in flavor development, preservation, and as an indicator of quality and freshness.

Procedure:

a. 20gm of butter was measured and 90ml boiled distilled water is added with pipette in beaker and mixed properly.
b. Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
c. Titrate it against N/10 solution of NaOH.
d. Observed the end point of milk white colour of milk is turned into light pink in colour.
e. Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.045 Acidity factor.
f. Generally, the acidity ranges maximum 0.06%

V. Acidity of Skimmed milk Powder (SMP):

The principle of acidity in skimmed milk powder (SMP) primarily relates to its reconstitution properties and storage stability. SMP typically has a slightly acidic pH of 6.5-6.7 when reconstituted. The powder's moisture content and storage conditions also affect acidity development over time. Proper acidity is crucial for SMP's functional properties in food applications, including its solubility, heat stability, and emulsifying capacity.

Procedure:

- 1gm of SMP was measured and 10ml distilled water is added with pipette in beaker and mixed properly.
- Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
- Titrate it against N/10 solution of NaOH.
- Observed the end point of milk white colour of milk is turned into light pink in colour.
- Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.9 Acidity factor.
- Generally, the acidity ranges maximum 1.5.

VI. Acidity of Whole milk Powder (WMP):

The principle of acidity in whole milk powder (WMP) is primarily concerned with maintaining product stability and quality during storage. The initial heat treatment and spray drying process can lead to slight protein denaturation and Maillard reactions, which contribute to the powder's acidity. During storage, lipid oxidation of the milk fat in WMP can produce free fatty acids, gradually increasing acidity over time.

This process is influenced by storage conditions, particularly temperature and oxygen exposure.

The acidity of WMP is typically measured as titratable acidity or pH upon reconstitution, with values generally ranging from 6.5 to 6.7 pH. Controlling acidity is crucial for maintaining the powder's sensory qualities, functional properties, and shelf life, as excessive acidity can lead to off-Flavors, reduced solubility, and decreased heat stability in reconstituted milk.

Procedure

- 1gm of WMP was measured and 10ml boiled distilled water is added with pipette in beaker and mixed properly.
- Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
- Titrate it against N/10 solution of NaOH.
- Observed the end point of milk white colour of milk is turned into light pink in colour.
- Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.9 Acidity factor.
- Generally, the acidity ranges maximum 1.2.

d. CLOT ON BOILING TEST (COB):

Milk naturally contains casein, which is a protein that remains dissolved and stable in the slightly acidic environment of fresh milk. However, if alkaline substances or neutralizers are added to milk, they can neutralize the natural acidity and cause the casein to precipitate or form a clot upon heating.

When a sample of pure, unadulterated milk is boiled, it should not form a clot or precipitate because the casein remains dissolved and stable in the slightly acidic pH of milk.

The milk will be clotted if acidity is 0.25% and more.

Procedure:

- **a.** 5ml of milk sample was taken in test tube.
- **b.** It was boiled for 5 minutes.
- **c.** Observed the milk, if clot is present, it will be positive result, if not, then it will be a negative result.
- **d.** Formation of clots or curdling was checked on the sides of the test tube.

e. ALCOHOL TEST:

Fresh, unadulterated milk contains casein, which is a stable protein that remains dissolved in the natural environment of milk. However, when a certain concentration of alcohol is added to milk, it causes the casein to precipitate or coagulate, forming a curd-like structure.

The alcohol test is performed by mixing equal volumes of milk and a solution of alcohol, usually 68% ethanol. If the milk is pure and fresh, the addition of alcohol will cause the casein to precipitate or coagulate, resulting in the formation of a distinct curd or clot. It is based on instability of the proteins when the levels of acid and / or rennet are increased and acted upon by the alcohol. It also increased levels of albumen (colostrum milk) and salt concentrates (mastitis) results in a positive test.

The ability of alcohol to precipitate casein in fresh milk is due to the disruption of the delicate balance of forces that keep the casein micelles dispersed and soluble in milk. The alcohol alters the ionic environment and hydrophobic interactions, causing the casein to precipitate or coagulate.

Procedure:

- **a.** Take a Petri plate and 3ml of milk was added.
- **b.** Then 3ml of 72% ethyl alcohol was added on it.
- **c.** Observed the milk if curdling occurs, it will be positive result, if not, then it will be a negative result.
- **d.** The range of alcohol taste is 3ml to 9 ml.

f. PHOSPHATASE TEST:

The principle of the phosphatase test is to measure the residual activity of the phosphatase enzyme in the milk sample after pasteurization. The presence of phosphatase activity indicates that the pasteurization process was inadequate or incomplete, while the absence of phosphatase activity suggests that the pasteurization process was effective.

The test is performed by adding a specific substrate (usually a phosphate compound) to the milk sample. If phosphatase is present and active, it will catalyse the hydrolysis of the substrate, resulting in the formation of a Coloured compound or a change in the pH of the solution.

The intensity of the Colour or the change in pH is measured and compared to a standard or reference value. The higher the phosphatase activity, the more intense the Colour or the greater the pH change will be, indicating that the pasteurization process was ineffective.

For preparation of stock buffer solution, two reagents are taken:

A) Reagent 1: 3.5 gm of Sodium hydrogen carbonate was taken

B) Reagent 2: 1.5 gm of Sodium bicarbonate was taken.

Then Both Reagent 1 and 2 are added in 1000ml of distilled water.

Stock buffer phosphatase solution stored in cool place at below 8 °C.

Shelf- life is 1 month.

For preparation of nitrate Phosphatase Solution:

0.15 gm of 4-nitrophenyl Phosphatase salt was dissolved in 100ml of stock buffer solution was taken and mix it well.

Shelf life is 1 week.

Procedure:

a. 1ml of milk was taken
b. 5ml of nitrate phosphatase buffer solution was added and mix it
c. Incubate it in water bath at temperature 37° C for 2 to 3 hours
d. If colour changes then it means phosphatase positive and milk is not pasteurized.

g. FAT PERCENTAGE TEST:

The fat percentage test is an important quality control measure in the dairy industry, as it helps ensure that milk and milk products meet the required fat content standards for labelling, nutritional value, and product quality.

- **Separation of fat**: The first step involves separating the fat from the other components of milk. This is typically achieved through either chemical or mechanical means. **Chemical methods** involve the use of reagents that break down or dissolve the non-fat components of milk, leaving the fat globules intact. **Mechanical methods**, such as centrifugation, rely on the difference in density between fat and other milk components to separate them.
- **Measurement of fat volume or weight**: Once the fat is separated, its volume or weight is measured. Different methods employ different techniques for this measurement: **a. Gravimetric methods** (e.g., Röse-Gottlieb, Mojonnier): In these methods, the separated fat is dried and weighed directly to determine its mass. b. **Volumetric methods** (e.g., Gerber, Babcock): These methods involve measuring the volume of the separated fat by trapping it in a calibrated glass vessel or butyrometer. The volume of the fat is then correlated to its weight or percentage using standardized charts or calculations.
- **Calculation of fat percentage**: The measured fat weight or volume is then used to calculate the fat percentage in the original milk sample. This calculation involves considering the volume or weight of the initial milk sample and any dilution factors used during the test procedure.

A. Fat percentage of milk:

a. The milk should be heated to 40° C and then cooled down to 27° C.
b. 10 ml of 90% Sulphuric acid (H_2SO_4) was taken in a butyrometer.
c. 10.75 ml of milk at 27 ° C was added slowly along the walls of the butyrometer.
d. 1ml of amyl alcohol was added to the butyrometer.
e. Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
f. Range of types of milk

For Skimmed milk - >0.5
For Toned Milk - >3
For Double toned Milk - <1.5
For Standard Milk – <4.5
For Full cream Milk - <6

B. Fat percentage of Curd:

a. 20gm of Curd was taken and 20ml of Distilled water was added in it and mixed properly.
b. 1ml of ammonium buffer was added in it.
c. 10 ml of 90% Sulphuric acid (H_2SO_4) was taken in a butyrometer.
d. 10.75 ml of curd solution at 27 ° C was added slowly along the walls of the butyrometer.
e. 1ml of amyl alcohol was added to the butyrometer.
f. Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
g. Calculation of Fat% is done by Fat is multiplying by 2.05.
h. Range of Fat % of Curd is 3%.

C. Fat percentage of Lassi:

a. Measure 40 gm of Lassi in a beaker and mixed properly.
b. 1ml of ammonium buffer was added in it.
c. 10 ml of 90% Sulphuric acid (H_2SO_4) was taken in a butyrometer.
d. 10.75 ml of lassi solution at 27 ° C was added slowly along the walls of the butyrometer.
e. 1ml of amyl alcohol was added to the butyrometer.
f. Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
g. Calculation of Fat% is done by Fat is multiplying by 1.025.

D. Fat percentage of Paneer:

a. Grated the paneer, measure 1.69gm of Paneer, paste was made with distilled water and make final volume of 10ml.
b. 10 ml of 90% Sulphuric acid (H_2SO_4) was taken in a butyrometer.
c. 10.75 ml of Peda solution at 27° C was added slowly along the walls of the butyrometer.
d. 1ml of amyl alcohol was added to the butyrometer.
e. Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
f. The Range of Fat % in paneer is 26-28%.

E. Fat percentage of Peda:

a. Grated the Peda, measure 1.69gm of Peda, paste was made with distilled water and make final volume of 10ml.
b. 10 ml of 90% Sulphuric acid (H_2SO_4) was taken in a butyrometer.
c. 10.75 ml of Peda solution at 27° C was added slowly along the walls of the butyrometer.
d. 1ml of amyl alcohol was added to the butyrometer.
e. Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.

F. Fat percentage of Skimmed Milk Powder (SMP):

a. Measure 1.69gm of SMP, paste was made with 5 ml of distilled water.
b. 10 ml of 90% Sulphuric acid (H_2SO_4) was taken in a butyrometer.
c. 10.75 ml of SMP solution at 27 °C was added slowly along the walls of the butyrometer.
d. 1ml of amyl alcohol was added to the butyrometer.
e. Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.

G. Fat percentage of Whole Milk Powder (WMP):

a. Measure 1.69gm of WMP, paste was made with 5 ml of boiled distilled water.
b. 10 ml of 90% Sulphuric acid (H_2SO_4) was taken in a butyrometer.
c. 10.75 ml of WMP solution at 27 °C was added slowly along the walls of the butyrometer.
d. 1ml of amyl alcohol was added to the butyrometer.
e. Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.

H. 1) Fat percentage of Butter by butyrometer:

a. Measure 5gm of Butter.
b. 10 ml of 90% Sulphuric acid (H_2SO_4) was taken in a butyrometer.
c. Butter was added slowly along the walls of the butyrometer.
d. 1ml of amyl alcohol was added to the butyrometer.
e. Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.

2) Fat percentage of Butter:

For moisture:

- Weigh the empty dish and recorded. 5gm of butter was weighed. This is initial reading.
- Heat the butter in the heater until colour changes to brownish.
- Then dish was kept at desiccator for 30 minutes to cool down.
- Final reading was recorded.
- To calculate the Moisture = Initial reading – Final reading.
- Range of moisture is maximum 16 %.

For butter curd:

- 25 ml of petroleum ether was added in dish allow it for 10 minutes, then slowly wash the burn particle.
- Repeat the process wash with 25 ml of petroleum ether.
- Heat the burn particle in oven until it dry (30-40 minutes).
- Then dish was kept at desiccator for 30 minutes to cool down.
- Final reading was recorded.
- Range of butter curd is 1.5 %.
- For Fat% of Butter:
- Calculation for fat% = 100 – (Moisture+ Butter curd)
- Range of Fat% is minimum 82%.

h. SOLID NOT FAT TEST:

The SNF value provides important information about the quality and composition of milk. A higher SNF value generally indicates a higher nutritional value, as it represents the combined content of proteins, lactose, and minerals.

Principle:

1. Determination of lactometer reading:

- A lactometer is carefully lowered into a sample of milk at a temperature of 29°C (84.2°F).

- The lactometer reading, which corresponds to the density or specific gravity of the milk at 29°C, is noted and recorded as the Corrected Lactometer Reading (CLR).

2. Determination of fat content:

- The fat content of the milk sample is determined using standard methods like the Gerber, Babcock, or Röse-Gottlieb tests.

- The result is expressed as the percentage of fat in the milk sample (Fat %).

3. Calculation of SNF using the formula:

- The SNF content is calculated using the formula: SNF (%) = CLR/4 + (Fat % × 0.21) + 0.66

- This formula considers the lactometer reading at 29°C (CLR), which is related to the total solids content, and the fat percentage (Fat %).

- The CLR is divided by 4 to account for the specific relationship between the lactometer scale and the total solids content.

- The fat percentage is multiplied by 0.21 because the contribution of fat to the total solids content is approximately 21%.

- The constant 0.66 is added to account for the average contribution of non-fat solids to the total solids content in milk.

4. Interpretation of SNF value:

- The calculated SNF value represents the percentage of non-fat solids (proteins, lactose, and minerals) present in the milk sample.

- This value can be compared to established standards or requirements for milk quality and composition to assess its suitability for various purposes.

* Note – CLR ranges – 26 to 31

If CLR is less than 26 which means water is added to diluted & more than 31 means Adulteration is mixed in milk.

Procedure:

Here is the procedure for determining the Solids-not-Fat (SNF) content in milk using the lactometer reading at 29°C (84.2°F) and the fat percentage:

Step 1: **Prepare the milk sample**

- Ensure that the milk sample is well-mixed and at a temperature of 40°C then cool down at 29°C (84.2°F).

Step 2: **Take the lactometer reading**

- Pour the milk sample into a clean, dry cylinder or container suitable for the lactometer.

- Gently lower the lactometer into the milk sample, ensuring that it floats freely without touching the sides or bottom of the container.

- Allow the lactometer to stabilize, and record the lactometer reading at 29°C as the Corrected Lactometer Reading (CLR).

Step 3: **Determine the fat percentage**

- Use one of the standard methods (e.g., Gerber, Babcock, or Röse-Gottlieb) to determine the fat percentage in the milk sample.

- Follow the specific procedure for the chosen method, ensuring accurate measurement and calculation of the fat percentage.

- Record the fat percentage as Fat %.

Step 4: **Calculate the SNF content**

- Use the following formula to calculate the SNF content:

SNF (%) = CLR/4 + (Fat % × 0.21) + 0.66

Where:

CLR is the Corrected Lactometer Reading at 29°C

Fat % is the percentage of fat in the milk sample

Step 5: **Record and interpret the result**

- Record the calculated SNF value, expressing it as a percentage.

- Compare the obtained SNF value with established standards or requirements for milk quality and composition.

i. ADULTERATION TEST:

Principle:

The principle behind adulteration tests for milk is to detect the presence of various substances that may have been intentionally added to the milk, either to increase its volume or extend its shelf life. These adulterants can compromise the quality, safety, and nutritional value of the milk.

Adulteration Test can be done in 3 methods:

A. **Chemical Method:** These are the traditional method that involve using specific chemical reagent to detect the presence of various adulterants.

1. Nitrate Fertilizer Detection Test:

- 1 ml of milk sample was taken in a test tube.
- 2ml of nitrate reagent was added along the sides of tubes
- Presence of a blue colour indicates the presence of nitrates (from fertilizers).

2. Glucose Detection Test:

- 1 ml of milk sample was taken in a test tube.
- 1ml of Glucose reagent- 1 was added
- Heat the mixture gently for 3minutes and then again cooled down the solution
- Then 1ml of glucose reagent -2 was added
- Presence of deep blue colour indicates the presence of glucose.

3. Sugar/Sucrose Detection Test:

- 1 ml of milk sample was taken in a test tube.
- 1ml of sugar reagent was added in it.
- Heat the mixture gently for 3 to 5 minutes.
- Presence of a brick-red colour indicates the presence of added sugar or sucrose.

4. Ammonia Fertilizer Test:

- 1 ml of milk sample was taken in a test tube.
- 2 ml of ammonia reagent was added in it and mixed gently.
- Brownish colour indicates the presence of ammonia (from fertilizers).

5. Neutralization Test:

- 2 ml of milk sample was taken in a test tube.
- 2ml of neutralizer reagent was added and mixed well.
- If the milk turns pink or red colour, it indicates the presence of neutralizers or alkaline substances.

6. Urea Detection Test:

- Take 2 ml of milk sample in a test tube.
- 2ml of urea reagent was added to it and mixed well.
- Distinct yellow colour indicates the presence of urea.

7. Hydrogen Peroxide Detection Test:

- 5 ml of milk sample was taken in a test tube.
- A few drops of potassium iodide solution was added.
- Formation of a pink or red colour indicates the presence of hydrogen peroxide.

8. Salt Test:

- 1 ml of milk sample was added in a test tube.
- Few drops of salt reagent -2 was added due to which it turns to red colour.
- Yellow colour appears that indicates the presence of added salt or sodium chloride.

9. Starch Test:

- 5ml of milk sample was added in test tube.
- 2 drop of solution was added in it
- Presence of blue or bluish violet colours indicates the presence of starch.

B. Strip method-

Take milk sample and dip the strip for 2-3 second and wait for 90 second to change the colour of strips. Check the result by Colour standards.

The Common strip test was–

- If COB is negative then I check Urea, glucose, and Neutralizer
- If COB is positive then I check Sucrose, Hydrogen Peroxide, Maltodextrin.

C. Using Milkoscan-

Milk sample was taken and kept it at the Milkoscan , it can scan all the adulterant that are present in milk.

j. CLEANING IN PLACE (CIP):

Principle:

The principle of CIP (Cleaning-in-Place) is based on the circulation of cleaning solutions through the interior surfaces of processing equipment and pipelines without the need for disassembly. This automated cleaning process aims to remove residues, soil, and contaminants from the equipment surfaces, ensuring proper hygiene and sanitation in food processing environments, including dairy plants.

The CIP process is controlled and monitored through a centralized system that regulates the flow rates, temperatures, concentrations, and circulation times of the various solutions. The effectiveness of the CIP process is evaluated by analyzing the final rinse water for the presence of residues or contaminants, as well as periodically inspecting the equipment surfaces.

There are 2 Types of CIP procedure;

A) Single CIP Procedure:

- Pre-rinse: Flush the system with Hot water for 10 minutes to remove any loose debris or residues.
- Alkali circulation:
  - Prepare the alkaline cleaning solution (containing caustic soda) at the desired concentration and temperature at 72-80°C for 30 mins.
  - Circulate the alkaline solution through the system for a predetermined time, allowing it to dissolve and remove organic residues like fats, oils, and proteins.
- Rinse:
  - Rinse the system with fresh water to remove the alkaline solution and any dissolved residues.
- Acid circulation (optional):
  - If mineral deposits or scale need to be removed, prepare an acidic cleaning solution (usually containing nitric acid or phosphoric acid).
  - Circulate the acidic solution through the system for a predetermined time.
- Final rinse:
  - Perform a final rinse with fresh water to remove any remaining cleaning solution residues.
- Sanitization:
  - Circulate a sanitizing solution (e.g., chlorine-based) through the system for 10 mins.
  - Rinse with fresh water to remove any residual sanitizer.

B) Acid CIP Procedure:

The Acid CIP procedure involves two separate cleaning cycles, one with an alkaline solution and another with an acidic solution, followed by rinsing and optional sanitization.

 Pre-rinse: Flush the system with fresh water to remove any loose debris or residues.

for 10 minutes

 First alkaline circulation:

- Prepare and circulate the alkaline cleaning solution (usually containing caustic soda or potassium hydroxide).

- This initial alkaline step helps remove organic residues like fats, oils, and proteins.
- Rinse with fresh water to remove the alkaline solution and dissolved residues.

 Acid circulation:

- Prepare and circulate the acidic cleaning solution (usually containing nitric acid or phosphoric acid).
- The acidic solution helps remove mineral deposits and scale.
- Rinse with fresh water to remove the acidic solution and dissolved residues.

 Second alkaline circulation:

- Prepare and circulate the alkaline cleaning solution again.
- This second alkaline step helps remove any remaining residues after the acid cleaning step.
- Rinse with fresh water to remove the alkaline solution and dissolved residues.

 Final rinse:

- Perform a final rinse with fresh water to remove any remaining cleaning solution residues.

 Sanitization (optional):

- If required, circulate a sanitizing solution (e.g., chlorine-based or peracetic acid) through the system.
- Rinse with fresh water to remove any residual sanitizer.

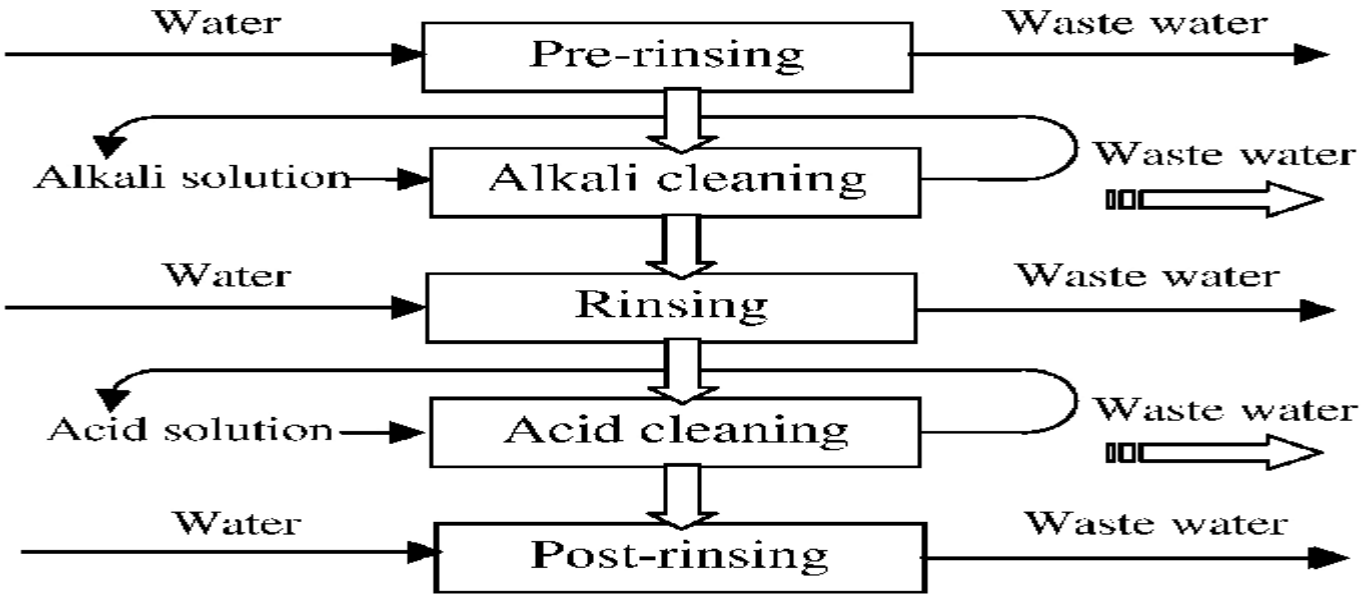
Concentration of Solution

Chlorine – 10%

Nitric Acid – 52-55%

Caustic soda – 99.9%

Flow Chart of CIP:



Strength Of CIP:

1. For caustic Soda:

a) 1 ml of Caustic Soda was taken in beaker.
b) 5-6 drops of Phenolphthalein indicator solution were added in it.
c) Then titrate the solution with Oxalic acid.
d) Calculation for the caustic Soda is done by multiplying of Volume of Oxalic acid used with 0.04 factor.

2. For Nitric Acid:

a) 1 ml of Nitric acid was taken in beaker.
b) 5-6 drops of Phenolphthalein indicator solution were added in it.
c) Then titrate the solution with N/10 NaOH.
d) Calculation for the Nitric Acid is done by multiplying of Volume of N/10 NaOH used with 0.63 factor.

3. For Chlorine:

a) 50 ml of Chlorine was taken in beaker, then 2gm of Potassium iodide and 10ml of acetic acid were added. Colour Changes to orange.
b) 5-6 drops of Phenolphthalein indicator solution were added in it.
c) Then titrate the solution with Sodium thiosulphate till orange changes to white.
d) Calculation for the Chlorine is done by multiplying of Volume of Sodium thiosulphate is used with 71 factor.

Strength Of Chemicals for CIP:

1. Caustic Soda:

- 2gm of Caustic Soda was taken and added in 500ml of Distilled Water.
- 10ml of solution is taken out in beaker.
- 4-5 drop of Phenolphthalein indicator solution was added in it.
- Then titrate the solution with Oxalic acid.
- Calculation for the caustic Soda is done by multiplying of Volume of Oxalic acid used with 10 factor.

2. Nitric Acid:

- 3.15gm of Nitric Acid was taken and added in 500ml of Distilled Water.
- 10ml of solution is taken out in beaker.
- 4-5 drop of Phenolphthalein indicator solution was added in it.
- Then titrate the solution with N/10 NaOH.
- Calculation for the Nitric Acid is done by multiplying of Volume of N/10 NaOH used with 10 factor.

3. Chlorine:

- 10ml of Chlorine was taken and added in 240 ml of Distilled Water.
- 25ml of solution is taken out in beaker then 2gm of Potassium iodide and 10ml of acetic acid were added.
- 4-5 drop of Phenolphthalein indicator solution was added in it.
- Then titrate the solution with Sodium Thiosulphate.
- Calculation for the Chlorine is done by multiplying of Volume of used with 0.3546 factor.

* **Teepol Test: (For Cleaning Purpose)**

Milk is a natural emulsion of fat globules dispersed in an aqueous phase. The addition of detergents or surfactants can alter the stability of this emulsion, leading to specific observable changes that form the basis of the Teepol test. It is used to cleaning purposes like CIP, Cleaning utensil, Surface, etc.,

Preparation of Teepol:

1. Trisodium Phosphate (TSP)- 2kg

2. Carboxymethylcellulose (CMC) – 2kg

3. Acid Salary – 2.5 kg

4. Urea – 3 kg

5. Caustic Soda – 3.5 kg

6. Distilled Water- 1200L

All mixed properly

pH range is **8-9.5**

Procedure-

- 10ml of Teepol solution was taken and 0.2ml of Universal indicator is added in it.
- The Colour was observed and colour was compared with standards

k. MOISTURE TEST:

The principle of the moisture test for milk and milk products is to determine the amount of water or moisture content present in the sample. This test is important because the moisture content can affect the quality, shelf life, and composition of the dairy product.

The principle behind the moisture test is based on the removal of water or moisture from the sample, typically through evaporation or drying processes, and measuring the weight loss or change in mass.

Procedure:

1. Gravimetric method

A) Moisture Test for Panner:

1. A heat and dry moisture aluminium disc were weighed and 10 gm of grated paneer was taken.
2. Then kept in desiccator for 10 minutes.
3. Panner was dried by heating in water bath at 100 ° C for 1 hours.
4. Cool down in Desiccator for 30 minutes.
5. Then again heating in hot air oven at 102 ° C for 1 hours, the colour becomes brown in colour
6. It was kept inside desiccator for 30 minutes. It was again weighed and reading was noted
7. It can be done 2 times more until it becomes dry 50-52%.

B) Moisture Test for Peda:

1. A heat and dry moisture aluminium disc were weighed and 10 gm of grated Peda was taken.
2. Then kept in desiccator for 10 minutes.
3. Peda was dried by heating in water bath at 100 ° C for 1 hours.
4. Cool down in Desiccator for 30 minutes.
5. Then again heating in hot air oven at 102 ° C for 1 hours.
6. It was kept inside desiccator for 30 minutes. It was again weighed and reading was noted
7. It can be done 2 times more until it becomes dry 12-16%.

2. Moisture test using Moisture Balance:

2-3 grams of product are taken in Moisture balance and Click start button and when the value remains constant. Then value is recorded.

l. MILK POWDER TEST:

There are 2 types of Milk Powder:

Skimmed Milk Powder (SMP):

SMP is made from skimmed milk and contains less than 1.5% fat. SMP, with its higher protein content (34-37%), is often used in baking, confectionery, and infant formulas.

Whole Milk Powder (WMP):

WMP is produced from whole milk and typically has 26-28% fat content. WMP, on the other hand, finds applications in chocolate manufacturing and reconstituted milk products.

These powders retain most of the nutritional properties of fresh milk and can be easily reconstituted by adding water. Their extended shelf life and convenient storage make them valuable in regions with limited access to fresh dairy, as well as in food manufacturing processes where liquid milk would be impractical.

A) Sediment Test:

The sediment test for milk powder is a quality assessment method that evaluates the presence of insoluble particles or impurities. The principle involves reconstituting the milk powder with water according to specified ratios, then allowing the mixture to stand undisturbed for a set period. During this time, any insoluble particles naturally settle to the bottom of the container due to gravity. After the settling period, the bottom of the container is examined for visible sediment. The amount, colour, and nature of the settled material provide insights into the milk powder's quality, cleanliness, and potential issues such as contamination or poor processing. This straightforward test offers a quick and simple way to assess the overall quality and purity of milk powder products.

1. **For Skimmed milk powder (SMP):**

- Weigh out the 10 of Skimmed milk powder.
- 100ml of water was added in it at 27-32°C temperature.
- Add the milk powder to the water in a clean, transparent container.
- Mix thoroughly with mixer grinder for 90 seconds to ensure complete reconstitution, avoiding excessive agitation.
- Let the reconstituted milk stand undisturbed for 5 minutes at room temperature.
- Take out 50 ml of SMP solution and kept in sedimentation Tube.
- Then Centrifuge the solution at 1500-2000 RPM for 5 minutes.
- Take out 25 ml of SMP solution from the Sedimentation tube and 25 ml of Distilled water is added.
- Then Centrifuge the solution at 1500-2000 RPM for 5 minutes.
- Carefully examine the bottom of the container without disturbing the contents.
- Observe and record the amount, colour, and nature of any visible sediment.
- Range of Sedimentation of Skimmed milk powder- 1.5-2ml

2. **For Whole milk powder (WMP):**

- Weigh out the 10 of Whole milk powder.
- 100ml of water was added in it at 27-32°C temperature.
- Add the milk powder to the water in a clean, transparent container.
- Mix thoroughly with mixer grinder for 90 seconds to ensure complete reconstitution, avoiding excessive agitation.
- Let the reconstituted milk stand undisturbed for 5 minutes at room temperature.
- Take out 50 ml of WMP solution and kept in sedimentation Tube.

- Then Centrifuge the solution at 1500-2000 RPM for 5 minutes.
- Take out 25 ml of WMP solution from the Sedimentation tube and 25 ml of Distilled water is added.
- Then Centrifuge the solution at 1500-2000 RPM for 5 minutes.
- Carefully examine the bottom of the container without disturbing the contents.
- Observe and record the amount, colour, and nature of any visible sediment.
- Range of Sedimentation of Whole milk powder- 1.5-2ml

B) Moisture Test for Milk Powder:

The moisture balance instrument combines a precision balance with a heating element. The sample is heated to evaporate its moisture content while continuously measuring its mass. As moisture evaporates, the sample's weight decreases. The instrument calculates the moisture content by comparing the initial and final weights of the sample. This method relies on the principle that water evaporates at a lower temperature than most other components in the sample. The heating process continues until the sample's weight stabilizes, indicating complete moisture removal. The moisture content is then expressed as a percentage of the original sample weight.

Procedure for Moisture Test of Skim Milk Powder (SMP):

- The moisture balance was turned on and allowed to warm up and stabilize.
- The empty sample pan was tared.
- 5gm grams of SMP were weighed onto the pan and spread evenly.
- The lid was closed and the analysis was started.
- The temperature was set to 102°C.
- The test was allowed to run until the instrument indicated completion.
- The final moisture percentage displayed was recorded.
- Range of moisture test of Skimmed milk powder is 4%

Procedure for Moisture Test of Whole Milk Powder (WMP):

- The moisture balance was preheated and its calibration was ensured.
- The clean, dry sample pan was tared.
- 5 grams of WMP were weighed onto the pan and distributed evenly.
- The lid was closed and the analysis was initiated.
- The temperature was set to 100°C.
- The test was allowed to run until the instrument signaled completion (typically when weight stabilized).
- The final moisture percentage shown on the display was noted.
- Range of moisture test for Whole Milk powder is 4%.

C) Ash Test:

The ash test involves heating the milk powder sample at a high temperature (typically around 540°C) in a muffle furnace until all organic matter is completely oxidized and burned off. This process leaves behind only the non-volatile inorganic constituents, primarily minerals and metal salts, which form the ash. The ash content is then calculated as a percentage of the original sample weight.

This test is important for assessing the mineral content of milk powder and can also indicate potential adulteration or contamination. The ash content provides information about the powder's nutritional value and its compliance with quality standards.

Procedure of Ash test for Skimmed Milk powder And Whole Milk Powder:

- A clean, dry crucible was weighed and its weight was recorded.
- Approximately 3 grams of milk powder SMP and WMP were accurately weighed into the crucible and the exact weight was noted.
- The crucible with the sample was placed in a muffle furnace preheated to 540°C.
- The sample was incinerated for 4-5 hours at 540°C.
- After the incineration period, the furnace was turned off and the crucible was carefully removed using tongs.
- The crucible was immediately transferred to a desiccator and allowed to cool for 1-1.5 hours.
- Once cooled to room temperature, the crucible with ash was weighed accurately.
- The ash content was calculated as a percentage of the original sample weight using the for

Ash % =

(Weight of ash after heating - weight of empty dish / Weight of dish with milk powder - weight of empty dish) × 100

- The result was recorded and the crucible was cleaned thoroughly for the next test.
- Range for Ash test
  For Skimmed milk Powder- 8.2% and For Whole Milk Powder – 7.3%.

D) Grading Test for Milk Powder:

The Grading Test assesses how well the milk powder dissolves and disperses when reconstituted with water. It measures the amount of undissolved particles or sediment that remains after reconstitution and a brief settling period. The test simulates the consumer's experience when preparing milk from powder and provides insight into the powder's quality and manufacturing process.

The principle relies on the fact that high-quality milk powder should dissolve quickly and completely, leaving minimal sediment. The amount and nature of any remaining sediment or undissolved particles are used to grade the powder's quality. This test helps ensure that the milk powder will perform well when used by consumers and meets industry standards for solubility and reconstitution.

Procedure for the Grading Test of milk powder:

1. 10 grams of milk powder were accurately weighed.
2. 100 ml of distilled water at room temperature was measured in a beaker.
3. The weighed milk powder was added to the distilled water.
4. The mixture was stirred vigorously for 90 seconds to ensure thorough mixing and reconstitution.
5. The reconstituted milk was allowed to stand for 15 minutes to let any undissolved particles settle.
6. After the standing period, the reconstituted milk was gently stirred to re-suspend any settled particles.
7. The milk was then poured through a tumble filter.
8. The filter was examined for any retained particles or sediment.
9. The amount of the sediment on the filter were observed and recorded.
10. The sediment was compared to standard grading charts to determine the grade of the milk powder.

Grading – A- 1 to 10, B- 1 to 15, C- 1to 20.

3) BIOLOGICAL TEST (MICROBIOLOGY)

I. METHYLENE BLUE REDUCTION TEST (MBRT):

The Methylene Blue Reduction Test (MBRT) assesses milk quality by measuring its reducing ability, which correlates with bacterial content and metabolic activity. This principle leverages the presence of reducing substances in milk, such as enzyme systems and bacterial metabolites, which can transform the blue methylene dye to a colourless form. A specific amount of methylene blue, a redox indicator that's blue when oxidized and colourless when reduced, is added to a milk sample. The time taken for the blue color to disappear, known as the reduction time, is measured. A shorter reduction time indicates a higher concentration of reducing substances, suggesting a higher bacterial load and metabolic activity, while a longer time implies better keeping quality. This simple yet effective test provides valuable insights into the microbiological quality of milk.

Procedure:

Preparation of Methylene Blue Reduction (MBR) solution:

a) 800 ml of Distilled water is sterilized in Autoclave for 15 minutes at 121 ° C in 15 PSI.
b) Methylene blue tablet is added in distilled water at 40 ° C.

Procedure for Methylene Blue Reduction Test (MBRT):

a) 10 ml of milk is taken in sterilized MBR tube.
b) 1 ml of MBR Solution was added in milk sample and mix well by gently swirling the tube.
c) Place the tube in a water bath or incubator maintained at 37°C (98.6°F).
d) Start the timer or stopwatch as soon as the tube is placed in the water bath or incubator.
e) Observe the colour change in the milk sample at regular intervals (e.g., every 15-30 minutes).
f) Record the time taken for the blue colour to completely disappear or become colourless.
g) This recorded time is the reduction time or decolourization time for the MBRT.
h) A longer reduction time (e.g., more than 5 hours) indicates lower bacterial activity and better keeping quality of the milk.

Standards

MBR Time	Quality of Milk
5& above	Very Good
3&4	Good
1&2	Fair
½ & below	Unacceptable

II. STANDARD PLATE COUNT (SPC):

The Standard Plate Count (SPC) is a microbiological technique used to determine the bacterial load or microbiological quality of milk and other dairy products. The principle behind the SPC is to enumerate the number of viable microorganisms (bacteria) present in the food product. It should be less than 30000 CPU/ml. Various dilutions of sample is prepared and pour plate techniques is carried out. Plate containing 30 colonies are considered viable. The Colonies are multiplied by dilution factor which gives the total variable count of the bacterial population in the sample.

Procedure:

Preparation of Stock Buffer:

1. 9 gm of NaCl was taken.
2. 1l of Distilled water was added in it.
3. Stock buffer is used in test tube for bench solution.

Composition of media:

- Peptic digest of animal tissue: 5.0 g/L
- Sodium chloride (NaCl): 5.0 g/L
- Beef extract: 1.5 g/L
- Yeast extract: 1.5 g/L
- Agar: 15.0 g/L

Media Preparation:

2.8 gm of Nutrient agar was added in 100ml of Distilled water. The mixture was gently heated while stirring to dissolve the powder completely. Care was taken to avoid overheating. The flask was then plugged with non-absorbent cotton wool. The media was sterilized by autoclaving at 121°C (15 psi) for 15 minutes. After autoclaving, the media was allowed to cool to about 50°C in a water bath. Once cooled, the media was gently mixed to ensure uniformity. The media was then aseptically poured into sterile Petri dishes, filling them about 1/3 to 1/2 full.

Serial Dilutions:

- 1ml of milk sample was taken and added in 9 ml of bench solution.
- Prepare a series of decimal dilutions (e.g., 1/10, 1/100, 1/1000) by transferring 1 ml of the previous dilution into 9 ml of sterile bench solution.
- Mix each dilution thoroughly by gentle shaking or vortexing.

Plating:

- Pipette 1 ml of the appropriate dilutions (e.g., 1/10, 1/100, 1/1000) onto separate sterile Petri dishes in duplicate or triplicate.
- Pour approximately 15-20 ml of the molten, cooled nutrient agar or appropriate agar medium over the inoculum in each plate.
- Gently swirl the plates to distribute the inoculum evenly throughout the agar.
- Allow the agar to solidify completely.

Incubation:

- Invert the plates and incubate them at 30-35°C for 48-72 hours, depending on the specific guidelines or standards followed.

Colony Counting:

- After the incubation period, remove the plates from the incubator.
- Count the number of colonies present on each plate using a colony counter or manual counting.
- Select plates with 25-250 colonies for counting, as this range provides statistically significant results.
- If necessary, calculate the average count from duplicate or triplicate plates.

Calculation of Standard Plate Count (SPC):

- Calculate the SPC using the following formula: SPC (CFU/ml or CFU/g) = (Number of colonies × Dilution factor) / Volume or Weight of sample plated
- For example, if 50 colonies were counted on a plate from a 10^-3 dilution, and 1 ml of the dilution was plated, the SPC would be: SPC = (50 × 1000) / 1 = 50,000 CFU/ml
- Range- Milk- 30000 CFU/ml.
  - Lassi – 100 CFU/ml
  - Dahi- 100 CFU/ml
  - Powder- 50000 CFU/ml
  - Water- 100CFU/ml
  - Paneer- 250 CFU/ml
  - Peda- 30000 CFU/ml

III. SWAB TEST:

The principle of the swab test, also known as the surface hygiene test or environmental monitoring test, is to assess the effectiveness of cleaning and sanitation procedures in food processing facilities, including dairy plants. This test helps detect the presence of microorganisms or residues on equipment surfaces, which can potentially contaminate food products and compromise food safety.

Procedure:

Preparation of Stock Buffer:

- 9 gm of NaCl was taken.
- 1l of Distilled water was added in it.
- Stock buffer is used in test tube for bench solution.

Media Preparation:

1. For SPC - 2.8 gm of Nutrient agar was added in 100ml of Distilled water.

2. For Coliform – 5.351 gm of MacConkey agar in 100 ml of Distilled water.

The mixture was gently heated while stirring to dissolve the powder completely. Care was taken to avoid overheating. The flask was then plugged with non-absorbent cotton wool. The media was sterilized by autoclaving at 121°C (15 psi) for 15 minutes. After autoclaving, the media was allowed to cool to about 50°C in a water bath. Once cooled, the media was gently mixed to ensure uniformity. The media was then aseptically poured into sterile Petri dishes, filling them about 1/3 to 1/2 full.

Sample Preparation:

Take Sterile Test Tube containing 25 ml of bench solution in which 25ml sterile pipette bounded with cotton plug in top and bottom area. Then Sterilized the area with burner. Sample was taken between the area of 30cm*30cm. Sample was taken from Milk storage tank, silo, all pipeline, packing machine balance tanks, cans, milk carrots, Streel trays, Air (SPC).

Plating:

- Pipette 1 ml of the appropriate dilutions (e.g., 1/25 dilution) onto separate sterile Petri dishes.
- Pour approximately 15-20 ml of the molten, cooled nutrient agar and MacConkey agar medium over the inoculum in each plate.
- Gently swirl the plates to distribute the inoculum evenly throughout the agar. Allow the agar to solidify completely.

Incubation:

- Invert the plates and incubate SPC plate at 30-35°C for 48-72 hours and for Coliform Plate at 30-37°C for 24 hours, depending on the specific guidelines or standards followed.

IV. COLIFORM TEST:

The principle of the Coliform test for milk and milk products is based on detecting the presence and quantity of coliform bacteria as indicators of sanitary quality and potential contamination. The test exploits coliforms' ability to ferment lactose, producing acid and gas. It uses selective media containing lactose and pH indicators, which change colour when acid is produced by lactose fermentation. The test typically involves inoculating the sample into the media, incubating at 35-37°C, and observing for characteristic colour changes and/or gas production. Results are often expressed as Most Probable Number (MPN) or Colony Forming Units (CFU). This method helps assess hygienic conditions during production, processing, and handling of dairy products, as the presence of coliforms can indicate faecal contamination or unsanitary conditions, making it a crucial quality control measure in the dairy industry.

Procedure:

Preparation of Stock Buffer:

- 9 gm of NaCl was taken.
- 1l of Distilled water was added in it.
- Stock buffer is used in test tube for bench solution.

Composition of MacConkey Agar:

1. Peptone: 17 g/L
2. Proteose peptone: 3 g/L
3. Lactose: 10 g/L
4. Bile salts: 1.5 g/L
5. Sodium chloride: 5 g/L
6. Neutral red: 0.03 g/L
7. Crystal violet: 0.001 g/L
8. Agar: 13.5 g/L Final pH: 7.1 ± 0.2 at 25°C

Media Preparation:

2.8 gm of Nutrient agar was added in 100ml of Distilled water. The mixture was gently heated while stirring to dissolve the powder completely. Care was taken to avoid overheating. The flask was then plugged with non-absorbent cotton wool. The media was sterilized by autoclaving at 121°C (15 psi) for 15 minutes. After autoclaving, the media was allowed to cool to about 50°C in a water bath. Once cooled, the media was gently mixed to ensure uniformity. The media was then aseptically poured into sterile Petri dishes, filling them about 1/3 to 1/2 full.

Serial Dilutions:

- 1ml of sample was taken and added in 9 ml of bench solution.
- Prepare a series of decimal dilutions (e.g., 1/10) by transferring 1 ml of the previous dilution into 9 ml of sterile bench solution.
- Mix each dilution thoroughly by gentle shaking or vortexing.

Plating:

- Pipette 1 ml of the appropriate dilutions (e.g., 1/10) onto separate sterile Petri dishes. For Milk powder we take 1gm of sample of SMP and WMP.
- Pour approximately 15-20 ml of the molten, cooled nutrient agar or appropriate agar medium over the inoculum in each plate.
- Gently swirl the plates to distribute the inoculum evenly throughout the agar.
- Allow the agar to solidify completely.

Incubation:

- Invert the plates and incubate them at 37°C for 24 hours, depending on the specific guidelines or standards followed.

Colony Counting:

- After the incubation period, remove the plates from the incubator.
- Count the number of colonies present on each plate using a colony counter or manual counting.
- Select plates with 25-250 colonies for counting, as this range provides statistically significant results.
- If necessary, calculate the average count from duplicate or triplicate plates.

Calculation of Coliform:

- Calculate the coliform using the following formula: Coliform (CFU/ml or CFU/g) = Number of presumptive coliform colonies counted * 10
- Range:
  - Butter- 10 CFU/ml
  - Milk – 0 CFU/ml

V. DETECTION OF YEAST AND MOLDS:

The principle for the detection of yeasts and molds in milk involves inoculating a sample onto specific culture media, such as Potato Dextrose Agar (PDA), which provide the necessary nutrients for their growth. Tartaric acid (pH – 3.5) may be added to the media as an acidulant, creating an acidic environment that favors the growth of yeasts and molds while inhibiting bacterial growth. The inoculated media are incubated under controlled temperature and humidity conditions favorable for yeast and mold development, typically ranging from 25°C – 26°C. During the incubation period of 3 to 5 days, yeasts and molds form distinctive colony morphologies, with yeasts appearing smooth and creamy, while molds exhibit filamentous, fuzzy, or pigmented growth. After incubation, the colonies are examined microscopically to confirm the presence of characteristic cellular structures, such as oval budding cells for yeasts and branching filamentous hyphae for molds. The number of colonies formed can be counted and quantified, providing an estimate of the yeast and mold contamination levels in the milk sample.

Procedure:

Sample preparation:

- 1ml of milk product sample was taken and added in 9 ml of bench solution.
- Prepare a series of decimal dilutions (e.g., 1/10, 1/100) by transferring 1 ml of the previous dilution into 9 ml of sterile bench solution.
- Mix each dilution thoroughly by gentle shaking or vortexing.

Composition of Potato Dextrose Agar (PDA):

1. Potato infusion: 200 g/L
2. Dextrose: 20 g/L
3. Agar: 15 g/L Final pH: 5.6 ± 0.2 at 25°C

Media preparation:

3.9 gm of Potato dextrose Agar was added in 100ml of Distilled water. The mixture was gently heated while stirring to dissolve the powder completely. Care was taken to avoid overheating. The flask was then plugged with non-absorbent cotton wool. The media was sterilized by autoclaving at 121°C (15 psi) for 15 minutes. After autoclaving, the media was allowed to cool to about 50°C in a water bath. Once cooled, the media was gently mixed to ensure uniformity. The media was then aseptically poured into sterile Petri dishes, filling them about 1/3 to 1/2 full.

Inoculation:

- Using aseptic techniques, pipette or spread a 1ml volume of the milk product sample onto the surface of the solidified PDA plate.

- 1 ml 10% Tartaric acid is added in plate, used to maintain the pH (3.5)

Incubation:

- Invert the inoculated PDA plates and incubate them at a temperature range of 25°C for 3-5 days.

- Count the number of distinct yeast and mold colonies on the plates, considering the dilution factor used during sample preparation.

WORK DONE BY ME:

06.06.24:

1. Acidity of Dahi:

Procedure:

a. 10gm of curd was measured with pipette and taken in beaker.
b. 25ml of Distilled water was added and mixed properly.
c. Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
d. Titrate it against N/10 solution of NaOH.
e. Observed the end point of milk at which white colour of milk is turned into light pink in colour.
f. Finally, the calculation for acidity for plane is done by volume of N/10 NaOH is multiplying by 0.09 Acidity factor - 12.3*0.09= **1.107**
g. Generally, the acidity ranges between 1.35.

2. Acidity of Lassi:

Procedure:

a. 10ml of Lassi was measured with pipette and taken in beaker.
b. Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
c. Titrate it against N/10 solution of NaOH.
d. Observed the end point of milk white colour of milk is turned into light pink in colour.
e. Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.09 Acidity factor – 7.6* 0.09 = **0.657**
f. Generally, the acidity ranges maximum 0.54-0.72.

3. Phosphatase test of milk:

For preparation of stock buffer solution, two reagents are taken:

A) Reagent 1: 3.5 gm of Sodium hydrogen carbonate was taken

B) Reagent 2: 1.5 gm of Sodium bicarbonate was taken.

Then Both Reagent 1 and 2 are added in 1000ml of distilled water.

Stock buffer phosphatase solution stored in cool place at below 8 °C.

For preparation of nitrate Phosphatase Solution:

0.15 gm of 4-nitrophenyl Phosphatase salt was dissolved in 100ml of stock buffer solution was taken and mix it well.

Procedure:

a. 1ml of milk sample of pasteurize milk was taken
b. 5ml of nitrate phosphatase buffer solution was added and mix it
c. Incubate it in water bath at temperature 37° C for 2 to 3 hours
d. Result: The colour does not change which means **phosphatase negative** and milk is pasteurized.

07.06.24

1. Acidity of milk:

Procedure:

a. 10ml of milk was measured with pipette and taken in beaker.
b. Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
c. Titrate it against N/10 solution of NaOH.
d. Observed the end point of milk at which white colour of milk is turned into light pink in colour.
e. Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.09 Acidity factor.
f. Acidity =1.35*0.09= 0.**1215**
g. Generally, the acidity ranges between 0.126- 0.135

2. Acidity of Curd:

Procedure:

a. 10gm of curd was measured with pipette and taken in beaker.
b. 25ml of Distilled water was added and mixed properly.
c. Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
d. Titrate it against N/10 solution of NaOH.
e. Observed the end point of milk at which white colour of milk is turned into light pink in colour.
f. Finally, the calculation for acidity for plane is done by volume of N/10 NaOH is multiplying by 0.09 Acidity factor - 14*0.09= **1.26.**
g. Generally, the acidity ranges between 0.7- 1.26

3. MBRT Test:

Procedure:

a) 10 ml of milk was taken in a sterilized MBR tube.
b) 1 ml of MBR Solution was added to the milk sample and mixed well by gently swirling the tube.
c) The tube was placed in a water bath or incubator maintained at 37°C (98.6°F).
d) The timer or stopwatch was started as soon as the tube was placed in the water bath or incubator.
e) The colour change in the milk sample was observed at regular intervals (e.g., every 15-30 minutes).
f) Result – The pasteurized milk start changing its colour blue to white after 1.30 hours and **completely changes after 5 hours.**

4. Strength of CIP:

Procedure:

a) For Caustic Soda:

- 1 ml of Caustic Soda was taken in beaker.
- 5-6 drops of Phenolphthalein indicator solution were added in it.
- Then titrate the solution with Oxalic acid.
- Calculation for the caustic Soda is done by multiplying of Volume of Oxalic acid used with 0.04 factor.
- Strength of Caustic Soda = 1.6*0.4 = **0.64**

b) For Nitric Acid:

- 1 ml of Nitric acid was taken in beaker.
- 5-6 drops of Phenolphthalein indicator solution were added in it.
- Then titrate the solution with N/10 NaOH.
- Calculation for the Nitric Acid is done by multiplying of Volume of N/10 NaOH used with 0.63 factor.
- Strength of Nitric Acid = 0.8 * 0.63= **0.504**

c) For Chlorine:

- 50 ml of Chlorine was taken in beaker, then 2gm of Potassium iodide and 10ml of acetic acid were added. Colour Changes to orange.
- 5-6 drops of Phenolphthalein indicator solution were added in it.
- Then titrate the solution with Sodium thiosulphate till orange changes to white.
- Calculation for the Chlorine is done by multiplying of Volume of Sodium thiosulphate is used with 0.71 factor.
- Strength of Chlorine = 2.5*0.71= **1.775**.

08.06.24

1. Fat test:

Procedure:

a) Fat percentage of milk:

- I have taken Standard milk which is heated to 40° C and then cooled down to 27° C.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of milk at 27 ° C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Result- Fat percentage of milk = **4.5**
- Range of types of milk
  For Skimmed milk - >0.5
  For Toned Milk - >3
  For Double toned Milk - <1.5
  For Standard milk – <4.5
  For Full cream Milk - <6

b) Fat percentage of Curd:

- 20gm of Curd was taken and 20ml of Distilled water was added in it and mixed properly.
- 1ml of ammonium buffer was added in it.

- 10 ml of 90% Sulphuric acid (H_2SO_4) was taken in a butyrometer.
- 10.75 ml of curd solution at 27 ° C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Calculation of Fat% is done by Fat is multiplying by 2.05.
- Result – Premium dahi – 2.2*2.05= **4.51** & for Misti Doi – 1.5*2.05=**3.075**

c) Solid Not Fat:

Procedure:

The procedure for determining the Solids-not-Fat (SNF) content in milk using the lactometer reading at 29°C (84.2°F) and the fat percentage:

1: **Prepare the milk sample**

- Ensure that the milk sample is well-mixed and at a temperature of 40°C then cool down at 29°C (84.2°F).

2: **Take the lactometer reading**

- Pour the milk sample into a clean, dry cylinder or container suitable for the lactometer.

- Gently lower the lactometer into the milk sample, ensuring that it floats freely without touching the sides or bottom of the container.

- Allow the lactometer to stabilize, and record the lactometer reading at 29°C as the Corrected Lactometer Reading (CLR).

The CLR value is **27.5.**

3: **Determine the fat percentage**

The Fat % of Standard milk is **4.5 %**

4: **Calculate the SNF content**

SNF (%) = CLR/4 + (Fat % × 0.21) + 0.66

SNF% = 27.5/4 + (4.5× 0.21) + 0.66

SNF% = **8.48**

10.06.24:

1. Moisture test for Panner and peda:

Procedure:

A) Moisture Test for Panner:

- A heat and dry moisture aluminium disc were weighed and 10 gm of grated paneer was taken.
- Then kept in desiccator for 10 minutes.
- Panner was dried by heating in water bath at 100 ° C for 1 hours.
- Cool down in Desiccator for 30 minutes.
- Then again heating in hot air oven at 102 ° C for 1 hours, the colour becomes brown in colour
- It was kept inside desiccator for 30 minutes. It was again weighed and reading was noted
- It can be done 2 times more until it becomes dry 50-52%.

B) Moisture Test for Peda:

- A heat and dry moisture aluminium disc were weighed and 10 gm of grated Peda was taken.
- Then kept in desiccator for 10 minutes.
- Peda was dried by heating in water bath at 100 ° C for 1 hours.
- Cool down in Desiccator for 30 minutes.
- Then again heating in hot air oven at 102 ° C for 1 hours.
- It was kept inside desiccator for 30 minutes. It was again weighed and reading was noted
- It can be done 2 times more until it becomes dry 12-16%.

Observation:

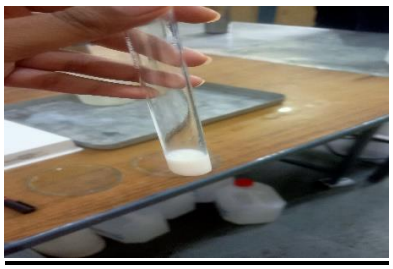
Product name	**Weight of empty dish in grams (M0)**	**Weight of dish with product in grams (M1)**	**Weight of dish after 1st heating in gram**	**Weight of dish after 2nd heating in grams (M2)**	**Differences (Initial – Final)**	**Percentage%**
Peda 1	31.863	41.863	41.031	40.844	1.019	**10.19%**
Peda 2	33.158	43.158	42.266	42.266	0.892	**8.92%**
Paneer 1	31.728	41.728	37.118	37.000	4.728	**47.28%**
Panner2	30.500	40.500	35.538	35.678	4.822	**48.22**

11.06.24

1.Clot on boiling test:

Procedure:

- 5ml of milk sample was taken in test tube.
- It was boiled for 5 minutes.
- Observed the milk, if clot is present, it will be positive result, if not, then it will be a negative result.
- Formation of clots or curdling was checked on the sides of the test tube.
- Result – **No clot was formed** on boiling its means Milk is in good quality.



2. Fat test of Dahi:

- 20gm of Curd was taken and 20ml of Distilled water was added in it and mixed properly.
- 1ml of ammonium buffer was added in it.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of curd solution at 27 ° C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Calculation of Fat% is done by Fat is multiplying by 2.05.
- Result – Premium dahi – 2.2*2.05= **4.51**
  Misti Doi – 1.5*2.05=**3.075**
  p- 200= 1.5*2.05=**3.075**
  p-400 =1.55*2.05= **3.1775**
  p1000= 1.5*2.05= **3.075**
  1kg dahi = 2.1*2.05= **4.305**

3. Adulteration test by strip:

Procedure-

Take milk sample and dip the strip for 2-3 second and wait for 90 second to change the colour of strips. Check the result by Colour standards.

The Common strip test was– **If COB is negative then I check Urea, glucose and Neutralizer**

If COB is positive then I check Sucrose, Hydrogen Peroxide, Maltodextrin.

12.06.24

1. Fat test of Dahi:

- 20gm of Curd was taken and 20ml of Distilled water was added in it and mixed properly.
- 1ml of ammonium buffer was added in it.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of curd solution at 27 ° C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Calculation of Fat% is done by Fat is multiplying by 2.05.
- Result –
  Premium dahi – 2.1*2.05= **4.305**
  Misti Doi – 1.55*2.05=**3.1775**
  p- 200= 1.5*2.05=**3.075**
  p-400 =1.55*2.05= **3.1775**
  p1000= 1.6*2.05= **3.28**
  1kg dahi = 2.1*2.05= **4.305**

2. Fat test of Lassi:

- Measure 40 gm of Lassi in a beaker and mixed properly.
- 1ml of ammonium buffer was added in it.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of lassi solution at 27 ° C was added slowly along the walls of the butyrometer.

- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Calculation of Fat% is done by Fat is multiplying by 1.025.
- Result- Lassi – 2.7*1.025= **2.7675**

3. Fat test of Paneer:

- Grated the paneer, measure 1.69gm of Paneer, paste was made with distilled water and make final volume of 10ml.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of Peda solution at 27° C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- The Range of Fat % in paneer is 26-28%.
- Result – 4.05*6.66=**26.973**

4. Fat Test of Peda:

- Grated the Peda, measure 1.69gm of Peda, paste was made with distilled water and make final volume of 10ml.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of Peda solution at 27° C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Result – 2.7*6.66=**17.982**

5. Fat test of Milk:

- I have taken Standard milk which is heated to 40° C and then cooled down to 27° C.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of milk at 27 ° C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Result- Fat percentage of milk = **4.5**

6. Methylene blue reduction test:

- 10 ml of standard milk is taken in sterilized MBR tube.
- 1 ml of MBR Solution was added in milk sample and mix well by gently swirling the tube.
- The tube was placed in a water bath or incubator maintained at 37°C.
- The timer was started as soon as the tube is placed in the water bath or incubator.
- Observe the colour change in the milk sample at regular intervals (e.g., every 30 minutes).
- Record the time taken for the blue colour to completely disappear or become colourless.
- This recorded time is the reduction time or decolourization time for the MBRT.
- A longer reduction time (e.g., more than 5 hours) indicates lower bacterial activity and better keeping quality of the milk.
- Result – The pasteurized milk start changing its colour blue to white after 1 hours and **completely changes after 5 hours.**

7. Teepol Test:

After the preparation of Teepol solution, I was checked the pH of the solution (Range of pH is 8-9.5) by Universal indicator.

Procedure-

- 10ml of Teepol solution was taken and 0.2ml of Universal indicator is added in it.
- The Colour was observed and colour was compared with standards.

13.06.24

1. Starch Test:

- 5ml of milk sample was added in test tube.
- 2 drop of solution was added in it
- Presence of blue or bluish violet colours indicates the presence of starch.
- Result – **No blue or bluish violet** colours observed which means Starch negative.

2. Cleaning in place test:

a) For Caustic Soda:

- 1 ml of Caustic Soda was taken in beaker.
- 5-6 drops of Phenolphthalein indicator solution were added in it.
- Then titrate the solution with Oxalic acid.
- Calculation for the caustic Soda is done by multiplying of Volume of Oxalic acid used with 0.04 factor.
- Strength of Caustic Soda = 1.5*0.4 = **0.6**

b) For Nitric Acid:

- 1 ml of Nitric acid was taken in beaker.
- 5-6 drops of Phenolphthalein indicator solution were added in it.
- Then titrate the solution with N/10 NaOH.
- Calculation for the Nitric Acid is done by multiplying of Volume of N/10 NaOH used with 0.63 factor.
- Strength of Nitric Acid = 0.8 * 0.63= **0.504**

c) For Chlorine:

- 50 ml of Chlorine was taken in beaker, then 2gm of Potassium iodide and 10ml of acetic acid were added. Colour Changes to orange.
- 5-6 drops of Phenolphthalein indicator solution were added in it.
- Then titrate the solution with Sodium thiosulphate till orange changes to white.
- Calculation for the Chlorine is done by multiplying of Volume of Sodium thiosulphate is used with 0.71 factor.
- Strength of Chlorine = 2.5*0.71= **1.775.**

14.06.24

1. Total hardness of Water:

- The sample was taken from-

a) New Sopnier (NS) Boiler1 – 100ml of water
b) Boiler Water (BFw) Boiler 2 – 100 ml of water
c) Old Sopnier (O.S) Boiler 3 – 100ml of water
d) Silo – 100 ml of water
e) Raw water – 50 ml of water

- Total hardness tablet was added in the sample.
- After tablet are solubilised well in water, 5-6 drops of ammonia buffer solution were added.
- Then Titrate all with EDTA until light colour is observed.
- Result- For N.S- **30ppm**, For BFw- **80ppm**, For O.S – **130ppm**, For Silo – **70 ppm**

15.06.24

I gain knowledge about food processing and manufacturing of several traditional Indian dairy products. These included:

1. Dahi: A type of yogurt commonly used in Indian cuisine.
2. Misti Doi: A sweet yogurt dessert popular in Bengali cuisine.
3. Lassi: A yogurt-based drink that can be made in sweet or savory varieties.
4. Paneer: A fresh cheese widely used in Indian cooking.

I learned about the production processes, ingredients, and techniques involved in making these dairy products. This knowledge likely covered aspects such as:

- The fermentation process for dahi and Misti Doi
- The straining and churning methods for lassi
- The acid-heat coagulation process for paneer production.

17.06.24

1. Standard Plate Count (SPC):

Preparation of Stock Buffer:

- 9 gm of NaCl was taken.
- 1l of Distilled water was added in it.
- Stock buffer is used in test tube for bench solution.

Media Preparation:

2.8 gm of Nutrient agar was added in 100ml of Distilled water. The mixture was gently heated while stirring to dissolve the powder completely. Care was taken to avoid overheating. The flask was then plugged with non-absorbent cotton wool. The media was sterilized by autoclaving at 121°C (15 psi) for 15 minutes. After autoclaving, the media was allowed to cool to about 50°C in a water bath.

Serial Dilutions:

- 1ml of milk sample was taken and added in 9 ml of bench solution.

- Prepare a series of decimal dilutions (e.g., 1/10, 1/100, 1/1000) by transferring 1 ml of the previous dilution into 9 ml of sterile bench solution.
- Mix each dilution thoroughly by gentle shaking or vortexing.

Plating:

- Pipette 1 ml of the appropriate dilutions (e.g., 1/10, 1/100, 1/1000) onto separate sterile Petri dishes.
- Pour approximately 15-20 ml of the molten, cooled nutrient agar or appropriate agar medium over the inoculum in each plate.
- Gently swirl the plates to distribute the inoculum evenly throughout the agar.
- Allow the agar to solidify completely.

Incubation:

- Invert the plates and incubate them at 30-35°C for 48-72 hours, depending on the specific guidelines or standards followed.

Colony Counting:

- After the incubation period, remove the plates from the incubator.
- Count the number of colonies present on each plate using a colony counter or manual counting.
- Select plates with 25-250 colonies for counting, as this range provides statistically significant results.
- If necessary, calculate the average count from duplicate or triplicate plates.

Calculation of Standard Plate Count (SPC):

- Calculate the SPC using the following formula: SPC (CFU/ml or CFU/g) = (Number of colonies × Dilution factor) / Volume or Weight of sample plated

Result – No colony formed

2. Swab Test;

Preparation of Stock Buffer:

- 9 gm of NaCl was taken.
- 1l of Distilled water was added in it.
- Stock buffer is used in test tube for bench solution.

Media Preparation:

1. For SPC - 2.8 gm of Nutrient agar was added in 100ml of Distilled water.

2. For Coliform – 5.351 gm of MacConkey agar in 100 ml of Distilled water.

The mixture was gently heated while stirring to dissolve the powder completely. Care was taken to avoid overheating. The flask was then plugged with non-absorbent cotton wool. The media was sterilized by autoclaving at 121°C (15 psi) for 15 minutes. After autoclaving, the media was allowed to cool to about 50°C in a water bath. Once cooled, the media was gently mixed to ensure uniformity. The media was then aseptically poured into sterile Petri dishes, filling them about 1/3 to 1/2 full.

Sample Preparation: Take Sterile Test Tube containing 25 ml of bench solution in which 25ml sterile pipette bounded with cotton plug in top and bottom area.

Then Sterilized the area with burner. Sample was taken between the area of 30cm*30cm. Sample was taken from Milk storage tank, silo, all pipeline, packing machine balance tanks, cans, milk carrots, Streel trays, Air (SPC).

Plating:

- Pipette 1 ml of the appropriate dilutions (e.g., 1/25 dilution) onto separate sterile Petri dishes.
- Pour approximately 15-20 ml of the molten, cooled nutrient agar and MacConkey agar medium over the inoculum in each plate.
- Gently swirl the plates to distribute the inoculum evenly throughout the agar. Allow the agar to solidify completely.

Incubation:

- Invert the plates and incubate SPC plate at 37°C for 48-72 hours and for Coliform Plate at 37°C for 24 hours, depending on the specific guidelines or standards followed.

Result – No colony formed

3. Yeast And Mould Test:

Sample preparation:

- 1ml of milk product sample was taken and added in 9 ml of bench solution.
- Prepare a series of decimal dilutions (e.g., 1/10, 1/100) by transferring 1 ml of the previous dilution into 9 ml of sterile bench solution.
- Mix each dilution thoroughly by gentle shaking or vortexing.

Media preparation:

3.9 gm of Potato Dextrose Agar was added in 100ml of Distilled water. The mixture was gently heated while stirring to dissolve the powder completely. Care was taken to avoid overheating. The flask was then plugged with non-absorbent cotton wool. The media was sterilized by autoclaving at 121°C (15 psi) for 15 minutes. After autoclaving, the media was allowed to cool to about 50°C in a water bath. Once cooled, the media was gently mixed to ensure uniformity. The media was then aseptically poured into sterile Petri dishes, filling them about 1/3 to 1/2 full.

Inoculation:

- Using aseptic techniques, pipette or spread a 1ml volume of the milk product sample onto the surface of the solidified PDA plate.
- 1 ml 10% Tartaric acid is added in plate, used to maintain the pH (3.5)
- Once the PDA media has cooled to around 45-50°C, pour it into sterile Petri dishes, mixed it and allow it to solidify.

Incubation:

- Invert the inoculated PDA plates and incubate them at a temperature range of 25°C for 3-5 days.
- Count the number of distinct yeast and mold colonies on the plates, considering the dilution factor used during sample preparation.

Result – No colony Formed

18.06.24

1. Acidity of Skimmed Milk Powder:

- 1gm of SMP was measured and 10ml distilled water is added with pipette in beaker and mixed properly.
- Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
- Titrate it against N/10 solution of NaOH.
- Observed the end point of milk white colour of milk is turned into light pink in colour.
- Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.9 Acidity factor.
- Generally, the acidity ranges maximum 1.5.
- Result – 1.6*0.9=**1.44**

2. Acidity of Whole milk Powder (WMP):

- 1gm of WMP was measured and 10ml boiled distilled water is added with pipette in beaker and mixed properly.
- Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
- Titrate it against N/10 solution of NaOH.
- Observed the end point of milk white colour of milk is turned into light pink in colour.
- Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.9 Acidity factor.
- Generally, the acidity ranges maximum 1.2.
- Result – 1.3*0.9=**1.17**

3. Sediment Test:

1. **For Skimmed milk powder (SMP):**

    - Weigh out the 10 of Skimmed milk powder.
    - 100ml of water was added in it at 27-32°C temperature.
    - Add the milk powder to the water in a clean, transparent container.
    - Mix thoroughly with mixer grinder for 90 seconds to ensure complete reconstitution, avoiding excessive agitation.
    - Let the reconstituted milk stand undisturbed for 5 minutes at room temperature.
    - Take out 50 ml of SMP solution and kept in sedimentation Tube.
    - Then Centrifuge the solution at 1500-2000 RPM for 5 minutes.
    - Take out 25 ml of SMP solution from the Sedimentation tube and 25 ml of Distilled water is added.
    - Then Centrifuge the solution at 1500-2000 RPM for 5 minutes.
    - Carefully examine the bottom of the container without disturbing the contents.
    - Observe and record the amount, colour, and nature of any visible sediment.
    - Result – **0.5 ml**

2. **For Whole milk powder (WMP):**

    - Weigh out the 10 of Whole milk powder.
    - 100ml of water was added in it at 27-32°C temperature.
    - Add the milk powder to the water in a clean, transparent container.
    - Mix thoroughly with mixer grinder for 90 seconds to ensure complete reconstitution, avoiding excessive agitation.
    - Let the reconstituted milk stand undisturbed for 5 minutes at room temperature.
    - Take out 50 ml of WMP solution and kept in sedimentation Tube.

- Then Centrifuge the solution at 1500-2000 RPM for 5 minutes.
- Take out 25 ml of WMP solution from the Sedimentation tube and 25 ml of Distilled water is added.
- Then Centrifuge the solution at 1500-2000 RPM for 5 minutes.
- Carefully examine the bottom of the container without disturbing the contents.
- Observe and record the amount, colour, and nature of any visible sediment.
- Result – **1.5 ml**

3. Moisture Test:

Procedure for Moisture Test of Skim Milk Powder (SMP):

- The moisture balance was turned on and allowed to warm up and stabilize.
- The empty sample pan was tared.
- 5gm grams of SMP were weighed onto the pan and spread evenly.
- The lid was closed and the analysis was started.
- The temperature was set to 102°C.
- The test was allowed to run until the instrument indicated completion.
- The final moisture percentage displayed was recorded.
- Range of moisture test of Skimmed milk powder is 4%
- Result- **3.96%**

Procedure for Moisture Test of Whole Milk Powder (WMP):

- The moisture balance was preheated and its calibration was ensured.
- The clean, dry sample pan was tared.
- 5 grams of WMP were weighed onto the pan and distributed evenly.
- The lid was closed and the analysis was initiated.
- The temperature was set to 100°C.

- The test was allowed to run until the instrument signaled completion (typically when weight stabilized).
- The final moisture percentage shown on the display was noted.
- Range of moisture test for Whole Milk powder is 4%.
- Result – **4%**

4. Coliform Test:

Preparation of Stock Buffer:

- 9 gm of NaCl was taken.
- 1l of Distilled water was added in it.
- Stock buffer is used in test tube for bench solution.

Media Preparation:

5.351 gm of MacConkey agar in 100 ml of Distilled water. The mixture was gently heated while stirring to dissolve the powder completely. Care was taken to avoid overheating. The flask was then plugged with non-absorbent cotton wool. The media was sterilized by autoclaving at 121°C (15 psi) for 15 minutes. After autoclaving, the media was allowed to cool to about 50°C in a water bath. Once cooled, the media was gently mixed to ensure uniformity. The media was then aseptically poured into sterile Petri dishes, filling them about 1/3 to 1/2 full.

Serial Dilutions:

- 1ml of sample was taken and added in 9 ml of bench solution.
- Prepare a series of decimal dilutions (e.g., 1/10) by transferring 1 ml of the previous dilution into 9 ml of sterile bench solution. Mix each dilution thoroughly by gentle shaking or vortexing.

Plating:

- For Milk powder we take 1gm of sample of SMP and WMP.
- Pour approximately 15-20 ml of the molten, cooled nutrient agar or appropriate agar medium over the inoculum in each plate.
- Gently swirl the plates to distribute the inoculum evenly throughout the agar.
- Allow the agar to solidify completely.

Incubation:

- Invert the plates and incubate them at 37°C for 24 hours, depending on the specific guidelines or standards followed.

Colony Counting:

- After the incubation period, remove the plates from the incubator.
- Count the number of colonies present on each plate using a colony counter or manual counting.
- Select plates with 25-250 colonies for counting, as this range provides statistically significant results.
- If necessary, calculate the average count from duplicate or triplicate plates.

Calculation of Coliform:

- Calculate the coliform using the following formula: Coliform (CFU/ml or CFU/g) = Number of presumptive coliform colonies counted * 10

Result:

There is **no colony formed** in SMP and WMP plate.

19.06.24

I gain knowledge about food processing and manufacturing of Peda. I learned about the production processes, ingredients, and techniques involved in making Peda. The dairy facility received fresh milk daily. Workers tested the milk for quality and fat content. They then transferred the milk to large cooking vats. The milk was heated to boiling point under controlled conditions. Sugar was added to the boiling milk in specific proportions. The mixture was continuously stirred to prevent burning. As water evaporated, the milk solids concentrated, and the mixture thickened. Operators monitored the consistency closely. When the mixture reached the desired texture, it was removed from heat. The warm peda mixture was then shaped into small, flattened balls. These were cooled and packaged for distribution.

20.06.24

1. Fat test of Dahi:

- 20gm of Curd was taken and 20ml of Distilled water was added in it and mixed properly.
- 1ml of ammonium buffer was added in it.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of curd solution at 27 ° C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Calculation of Fat% is done by Fat is multiplying by 2.05.
- Result –
  Premium dahi – 2.1*2.05= **4.305**
  p- 200= 1.5*2.05=**3.075**
  p-400 =1.5*2.05= **3.075**
  p1000= 1.5*2.05= **3.075**
  1kg dahi = 2.1*2.05= **4.305**

2. Fat test of Lassi:

- Measure 40 gm of Lassi in a beaker and mixed properly.
- 1ml of ammonium buffer was added in it.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of lassi solution at 27 ° C was added slowly along the walls of the butyrometer.

- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Calculation of Fat% is done by Fat is multiplying by 1.025.
- Result- Lassi – 2.8*1.025= **2.87**

20.06.24

1. Fat test of Butter:

For moisture:

- Weigh the empty dish and recorded. 5gm of butter was weighed. This is initial reading.
- Heat the butter in the heater until colour changes to brownish.
- Then dish was kept at desiccator for 30 minutes to cool down.
- Final reading was recorded.
- To calculate the Moisture = Initial reading – Final reading.
- Range of moisture is maximum 16 %.

For butter curd:

- 25 ml of petroleum ether was added in dish allow it for 10 minutes, then slowly wash the burn particle.
- Repeat the process wash with 25 ml of petroleum ether.
- Heat the burn particle in oven until it dry (30-40 minutes).
- Then dish was kept at desiccator for 30 minutes to cool down.
- Final reading was recorded.
- Range of butter curd is 1.5 %.

➢ **For Fat% of Butter = 100 – (Moisture+ Butter curd)**

➢ Range of Fat% is minimum 82%.

Observation:

Weight of Empty Dish (A)	Weight of full dish by adding butter (B)	Weight of dish after Heating(C)	Moisture	Weight of Dish after washing and second Heating (D)	Curd	Fat% = 100- Moisture - curd
33.070	33.070+5=38.070	37.372	38.070-37.372/5*100= 13.96	33.280	33.280-33.070/5*100= 4.2	100-13.96-4.2 =**81.84**

2.Ash test for milk powder:

Procedure of Ash test for Skimmed Milk powder And Whole Milk Powder:

- A clean, dry crucible was weighed and its weight was recorded.
- Approximately 3 grams of milk powder SMP and WMP were accurately weighed into the crucible and the exact weight was noted.
- The crucible with the sample was placed in a muffle furnace preheated to 540°C.

- The sample was incinerated for 4-5 hours at 540°C.
- After the incineration period, the furnace was turned off and the crucible was carefully removed using tongs.
- The crucible was immediately transferred to a desiccator and allowed to cool for 1-1.5 hours.
- Once cooled to room temperature, the crucible with ash was weighed accurately.
- The ash content was calculated as a percentage of the original sample weight using the for

Ash % =

(Weight of ash after heating - weight of empty dish / Weight of dish with milk powder - weight of empty dish) × 100

- The result was recorded and the crucible was cleaned thoroughly for the next test.
- Range for Ash test- For Skimmed milk Powder- 8.2% and For Whole Milk Powder – 7.3%.

Name	Weigh of Empty Dish (A)	Weight of Full Dish (B)	After Heating (C)	Difference C-A/B-A*100
SMP	76.736	79.736	76.959	**7.43**
WMP	79.121	82.121	79.274	**5.1**

22.06.24

1. Acidity of milk:

Procedure:

- 10ml of milk was measured with pipette and taken in beaker.
- Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
- Titrate it against N/10 solution of NaOH.
- Observed the end point of milk at which white colour of milk is turned into light pink in colour.
- Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.09 Acidity factor.
- Generally, the acidity ranges between 0.126-0.135.
- Result- 1.3*0.09= **0.117**

2. Acidity of Dahi

Procedure:

- 10gm of curd was measured with pipette and taken in beaker.
- 25ml of Distilled water was added and mixed properly.
- Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
- Titrate it against N/10 solution of NaOH.
- Observed the end point of milk at which white colour of milk is turned into light pink in colour.
- Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.09 Acidity factor.
- Generally, the acidity ranges between for plane curd – 0.7-1.26 and For Misti Doi - 0.6-0.8.
- Result- Premium Dahi= 10.3*0.09= **0.927**, and Misti Doi = 8.4*0.09 = **0.756**

3. Acidity test for Lassi:

Procedure:

- 10ml of Lassi was measured with pipette and taken in beaker.
- Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
- Titrate it against N/10 solution of NaOH.
- Observed the end point of milk white colour of milk is turned into light pink in colour.
- Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.09 Acidity factor.
- Generally, the acidity ranges maximum 0.54-0.72.
- Result- 7.7*0.09 =**0.693**

4. Acidity of Butter:

Procedure:

- 20gm of butter was measured and 90ml boiled distilled water is added with pipette in beaker and mixed properly.
- Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
- Titrate it against N/10 solution of NaOH.
- Observed the end point of milk white colour of milk is turned into light pink in colour.
- Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.045 Acidity factor.
- Generally, the acidity ranges maximum 0.06.
- Result – 1.2*0.045 =**0.054**

5. Acidity of Skimmed milk Powder (SMP):

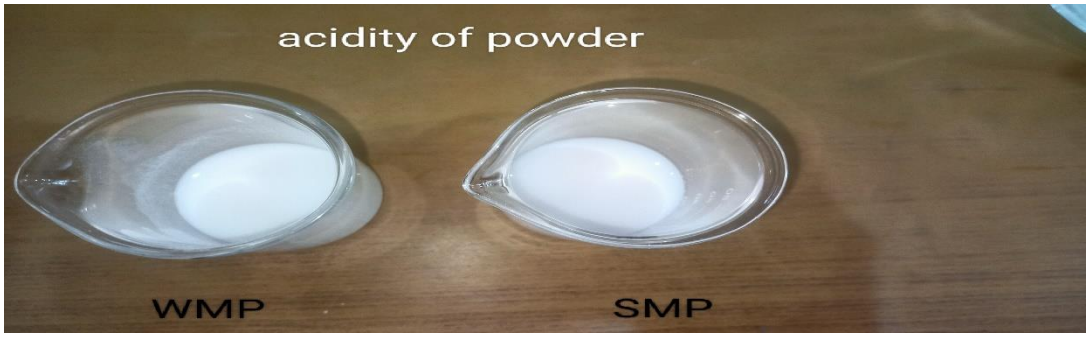
Procedure:

- 1gm of SMP was measured and 10ml distilled water is added with pipette in beaker and mixed properly.
- Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
- Titrate it against N/10 solution of NaOH.
- Observed the end point of milk white colour of milk is turned into light pink in colour.
- Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.9 Acidity factor.
- Generally, the acidity ranges maximum 1.5.
- Result – 1.6*0.9 =**1.44**

6. Acidity of Whole milk Powder (WMP):

Procedure

- 1gm of WMP was measured and 10ml boiled distilled water is added with pipette in beaker and mixed properly.
- Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
- Titrate it against N/10 solution of NaOH.
- Observed the end point of milk white colour of milk is turned into light pink in colour.
- Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.9 Acidity factor.
- Generally, the acidity ranges maximum 1.2.
- Result – 1.4*0.9 = **1.26**



24.06.24

1. STANDARD PLATE COUNT (SPC):

Procedure:

Preparation of Stock Buffer:

- 9 gm of NaCl was taken.
- 1l of Distilled water was added in it.
- Stock buffer is used in test tube for bench solution.

Media Preparation:

2.8 gm of Nutrient agar was added in 100ml of Distilled water. The mixture was gently heated while stirring to dissolve the powder completely. Care was taken to avoid overheating. The flask was then plugged with non-absorbent cotton wool. The media was sterilized by autoclaving at 121°C (15 psi) for 15 minutes. After autoclaving, the media was allowed to cool to about 50°C in a water bath. Once cooled, the media was gently mixed to ensure uniformity. The media was then aseptically poured into sterile Petri dishes, filling them about 1/3 to 1/2 full.

Serial Dilutions:

- 1ml of milk sample was taken and added in 9 ml of bench solution.
- Prepare a series of decimal dilutions (e.g., 1/10, 1/100, 1/1000) by transferring 1 ml of the previous dilution into 9 ml of sterile bench solution.
- Mix each dilution thoroughly by gentle shaking or vortexing.

Plating:

- Pipette 1 ml of the appropriate dilutions (e.g., 1/10, 1/100, 1/1000) onto separate sterile Petri dishes in duplicate or triplicate.
- Pour approximately 15-20 ml of the molten, cooled nutrient agar or appropriate agar medium over the inoculum in each plate.

- Gently swirl the plates to distribute the inoculum evenly throughout the agar.
- Allow the agar to solidify completely.

Incubation:

- Invert the plates and incubate them at 30-35°C for 48-72 hours, depending on the specific guidelines or standards followed.

Colony Counting:

- After the incubation period, remove the plates from the incubator.
- Count the number of colonies present on each plate using a colony counter or manual counting.
- Select plates with 25-250 colonies for counting, as this range provides statistically significant results.
- If necessary, calculate the average count from duplicate or triplicate plates.

Calculation of Standard Plate Count (SPC):

- Calculate the SPC using the following formula: SPC (CFU/ml or CFU/g) = (Number of colonies × Dilution factor) / Volume or Weight of sample plate.

2. COLIFORM TEST:

Procedure:

Preparation of Stock Buffer:

- 9 gm of NaCl was taken.
- 1l of Distilled water was added in it.
- Stock buffer is used in test tube for bench solution.

Media Preparation:

5.351 gm of MacConkey agar in 100 ml of Distilled water. The mixture was gently heated while stirring to dissolve the powder completely. Care was taken to avoid overheating. The flask was then plugged with non-absorbent cotton wool. The media was sterilized by autoclaving at 121°C (15 psi) for 15 minutes. After autoclaving, the media was allowed to cool to about 50°C in a water bath. Once cooled, the media was gently mixed to ensure uniformity. The media was then aseptically poured into sterile Petri dishes, filling them about 1/3 to 1/2 full.

Serial Dilutions:

- 1ml of sample was taken and added in 9 ml of bench solution.
- Prepare a series of decimal dilutions (e.g., 1/10) by transferring 1 ml of the previous dilution into 9 ml of sterile bench solution.
- Mix each dilution thoroughly by gentle shaking or vortexing.

Plating:

- Pipette 1 ml of the milk and lassi (e.g., 1/10) onto separate sterile Petri dishes.

- Pour approximately 15-20 ml of the molten, cooled nutrient agar or appropriate agar medium over the inoculum in each plate.
- Gently swirl the plates to distribute the inoculum evenly throughout the agar.
- Allow the agar to solidify completely.

Incubation:

- Invert the plates and incubate them at 37°C for 24 hours, depending on the specific guidelines or standards followed.

Colony Counting:

- After the incubation period, remove the plates from the incubator.
- Count the number of colonies present on each plate using a colony counter or manual counting.

Calculation of Coliform:

- Calculate the coliform using the following formula: Coliform (CFU/ml or CFU/g) = Number of presumptive coliform colonies count.

Result – No colony Formed

3. DETECTION OF YEAST AND MOLDS:

Procedure:

Sample preparation:

- 1ml of milk product sample was taken and added in 9 ml of bench solution.
- Prepare a series of decimal dilutions (e.g., 1/10, 1/100) by transferring 1 ml of the previous dilution into 9 ml of sterile bench solution.
- Mix each dilution thoroughly by gentle shaking or vortexing.

Media preparation:

3.9 gm of Potato dextrose agar was added in 100ml of Distilled water. The mixture was gently heated while stirring to dissolve the powder completely. Care was taken to avoid overheating. The flask was then plugged with non-absorbent cotton wool. The media was sterilized by autoclaving at 121°C (15 psi) for 15 minutes. After autoclaving, the media was allowed to cool to about 50°C in a water bath. Once cooled, the media was gently mixed to ensure uniformity. The media was then aseptically poured into sterile Petri dishes, filling them about 1/3 to 1/2 full.

Inoculation:

- Using aseptic techniques, pipette or spread a 1ml volume of the milk product sample onto the surface of the solidified PDA plate.
- 1 ml 10% Tartaric acid is added in plate, used to maintain the pH (3.5)

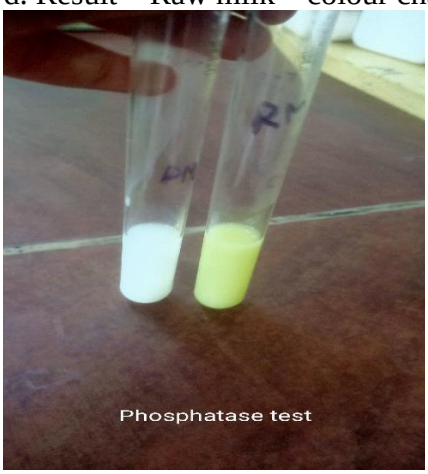
Incubation:

- Invert the inoculated PDA plates and incubate them at a temperature range of 25°C for 3-5 days.
- Count the number of distinct yeast and mold colonies on the plates, considering the dilution factor used during sample preparation.

4. Phosphatase Test:

Procedure:

a. 1ml of raw milk and pasteurize milk was taken
b. 5ml of nitrate phosphatase buffer solution was added and mix it
c. Incubate it in water bath at temperature 37° C for 2 to 3 hours
d. Result – Raw milk – colour changes to yellow and Pasteurize milk remain same colour.



25.06.24

1. Fat test of Dahi:

- 20gm of Curd was taken and 20ml of Distilled water was added in it and mixed properly.
- 1ml of ammonium buffer was added in it.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of curd solution at 27 ° C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Calculation of Fat% is done by Fat is multiplying by 2.05.
- Result –
  Premium dahi – 2.1*2.05= **4.305**
  Misti Doi – 1.45*2.05=**2.9725**
  p- 200= 1.5*2.05=**3.075**
  p-400 =1.5*2.05= **3.075**
  p1000= 1.5*2.05= **3.075**
  1kg dahi = 2.2*2.05= **4.51**

2. Fat test of Lassi:

- Measure 40 gm of Lassi in a beaker and mixed properly.
- 1ml of ammonium buffer was added in it.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of lassi solution at 27 ° C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Calculation of Fat% is done by Fat is multiplying by 1.025.
- Result- Lassi – 3.5*1.025= **3.5875**

26.06.24

1. Temperature:

The recommended temperature for transporting and receiving milk at the dairy plant is typically between 2-4°C (35.6-39.2°F). This low temperature helps slow down the growth of microorganisms and enzymatic activities that can cause spoilage.

Observation of incoming of Raw milk:

1. Kaimur- **8.5° C**

2. Bhagalpur- **10° C**

3. Muzaffarpur -**10° C**

4. Product Dairy – **8.5°C**

5. Barauni – **9° C**

2. Acidity:

1. Kaimur- 1.4 *0.09 = **0.126**

2. Bhagalpur- 1.5*0.09 = **0.135**

3. Muzaffarpur -1.4 * 0.09 =**0.126**

4. Product Dairy – 1.4*0.09= **0.126**

5. Barauni – 1.4 * 0.09 = **0.126**

27.06.24

1. Fat percentage of milk:

- I have taken Standard milk which is heated to 40° C and then cooled down to 27° C.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of milk at 27 ° C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Result- Fat percentage of milk = **4.4**

2. Clot on Boiling Test

Procedure:

- 3ml of milk sample was taken in test tube.
- It was boiled for 5 minutes.
- Observed the milk, if clot is present, it will be positive result, if not, then it will be a negative result.
- Formation of clots or curdling was checked on the sides of the test tube.
- Result – **No clot was formed** on boiling its means Milk is in good quality.

3. Alcohol Test

Procedure:

a. Take 2 Petri plate and 3ml of milk with two different sample.
b. Then 3ml of 72% ethyl alcohol was added on it.
c. Observed the milk if curdling occurs, it will be positive result, if not, then it will be a negative result.
d. The range of alcohol taste is 3ml to 9 ml.
e. Result – **1. Clot formed & 2. No Clot formed**

28.06.24

1. Acidity of milk:

Procedure:

a. 10ml of milk was measured with pipette and taken in beaker.
b. Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
c. Titrate it against N/10 solution of NaOH.
d. Observed the end point of milk at which white colour of milk is turned into light pink in colour.
e. Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.09 Acidity factor.
f. Acidity =1.35*0.09= 0.**1215**
g. Generally, the acidity ranges between 0.126- 0.135.

2. Acidity of Dahi

Procedure:

- 10gm of curd was measured with pipette and taken in beaker.
- 25ml of Distilled water was added and mixed properly.
- Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
- Titrate it against N/10 solution of NaOH.

- Observed the end point of milk at which white colour of milk is turned into light pink in colour.
- Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.09 Acidity factor.
- Generally, the acidity ranges between for plane curd – 0.7-1.26 and For Misti Doi - 0.6-0.8.
- Result- Premium Dahi= 10.5*0.09= **0.945**

3. Acidity test for Lassi:

Procedure:

- 10ml of Lassi was measured with pipette and taken in beaker.
- Then 4-5 drop of phenolphthalein indicator (pH- 8-10) and mix gently.
- Titrate it against N/10 solution of NaOH.
- Observed the end point of milk white colour of milk is turned into light pink in colour.
- Finally, the calculation for acidity is done by volume of N/10 NaOH is multiplying by 0.09 Acidity factor.
- Generally, the acidity ranges maximum 0.54-0.72.
- Result- 7.5*0.09 =**0.675**

4. Clot on boiling:

Procedure:

- 5ml of milk sample of toned milk, standard milk and double toned milk was taken in test tube.
- It was boiled for 5 minutes.
- Observed the milk, if clot is present, it will be positive result, if not, then it will be a negative result.
- Result – Toned milk – **no clot formed,** Double toned milk – **no clot formed** and Standard milk – **Clot formed.**

5. Alcohol Test

Procedure:

- Take 2 Petri plate and 3ml of milk with two different sample.
- Then 3ml of 72% ethyl alcohol was added on it.
- Observed the milk if curdling occurs, it will be positive result, if not, then it will be a negative result.
- The range of alcohol taste is 3ml to 9 ml.
- Result – **1. No Clot formed & 2. No Clot formed.**

29.06.24

1. Total hardness of Water:

- The sample was taken from-
- New Sopnier (NS) Boiler1 – 100ml of water
- Boiler Water (BFw) Boiler 2 – 100 ml of water
- Old Sopnier (O.S) Boiler 3 – 100ml of water
- Silo – 100 ml of water
- Raw water – 50 ml of water

- Total hardness tablet was added in the sample.
- After tablet are solubilised well in water, 5-6 drops of ammonia buffer solution were added.
- Then Titrate all with EDTA until light colour is observed.
- Result- For N.S- **5 ppm**, For BFw- **3 ppm**, For O.S – **1ppm,** For silo – **68 ppm.**

01.07.24

1. Fat test of Butter:

For moisture:

- Weigh the empty dish and recorded. 5gm of butter was weighed. This is initial reading.
- Heat the butter in the heater until colour changes to brownish.
- Then dish was kept at desiccator for 30 minutes to cool down.
- Final reading was recorded.
- To calculate the Moisture = Initial reading – Final reading.
- Range of moisture is maximum 16 %.

For butter curd:

- 25 ml of petroleum ether was added in dish allow it for 10 minutes, then slowly wash the burn particle.
- Repeat the process wash with 25 ml of petroleum ether.
- Heat the burn particle in oven until it dry (30-40 minutes).
- Then dish was kept at desiccator for 30 minutes to cool down.
- Final reading was recorded.
- Range of butter curd is 1.5 %.

For Fat% of Butter = 100 – (Moisture+ Butter curd)

Range of Fat% is minimum 82%.

Observation

Weight of Empty Dish (A)	**Weight of Dish With butter(B)**	**Weight of Dish after 1st heating (C)**	**Moisture: (B-C)/ Weight of Empty Dish *100**	**Weight of Dish in 2nd Heating after washing (D)**	**Curd: D-A/ weight of butter *100**	**Fat %= 100- Moisture – Curd**
33.143	38.143	37.393	38.143-37.396/5*100 =14.94	33.280	33.280-33.143/5*100= 2.74	100-14.96-2.74= **82.3%**

2. Fat test of Paneer:

- Grated the paneer, measure 1.69gm of Paneer, paste was made with distilled water and make final volume of 10ml.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of Peda solution at 27° C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- The Range of Fat % in paneer is 26-28%.
- Result – 3.2*6.66=**21.312**

3. Fat Test of Peda:

- Grated the Peda, measure 1.69gm of Peda, paste was made with distilled water and make final volume of 10ml.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of Peda solution at 27° C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Result – 1.7*6.66=**11.322.**

4. Clot on boiling:

Procedure:

- 5ml of milk sample of toned milk, standard milk and double toned milk was taken in test tube.
- It was boiled for 5 minutes.
- Observed the milk, if clot is present, it will be positive result, if not, then it will be a negative result.
- Result – Toned milk – **no clot formed**, Double toned milk – **no clot formed** and Standard milk – **No Clot formed**.

5. Moisture Test Of Paneer And Peda using gravimetric method:

Procedure:

A) Moisture Test for Panner:

- A heat and dry moisture aluminium disc were weighed and 10 gm of grated paneer was taken.
- Then kept in desiccator for 10 minutes.
- Panner was dried by heating in water bath at 100 ° C for 1 hours.
- Cool down in Desiccator for 30 minutes.
- Then again heating in hot air oven at 102 ° C for 1 hours, the colour becomes brown in colour
- It was kept inside desiccator for 30 minutes. It was again weighed and reading was noted
- It can be done 2 times more until it becomes dry 50-52%.

B) Moisture Test for Peda:

- A heat and dry moisture aluminium disc were weighed and 10 gm of grated Peda was taken.
- Then kept in desiccator for 10 minutes.
- Peda was dried by heating in water bath at 100 ° C for 1 hours.
- Cool down in Desiccator for 30 minutes.
- Then again heating in hot air oven at 102 ° C for 1 hours.
- It was kept inside desiccator for 30 minutes. It was again weighed and reading was noted
- It can be done 2 times more until it becomes dry 12-16%.

Product Name	**Weight of Empty Dish in gram**	**Weight of Dish with product (I) in gram**	**Weight of Dish after 1st heating in gram**	**Weight of Dish after 2nd heating in gram**	**Weight of dish after 3rd Heating in gram (F)**	**Moisture Percentage%: I -F/ weight of product *100**
Peda 1	33.087	43.087	41.692	41.638	41.610	**14.77**
Peda 2	31.736	41.736	40.326	40.286	40.263	**14.73**
Paneer 1	30.492	40.492	40.492	35.526	35.488	**50.11**
Paneer 2	31.825	41.825	41.825	36.870	36.835	**50.15**

6. Moisture Test Of Paneer And Peda using moisture balance:

2-3 grams of product are taken in Moisture balance and Click start button and when the value remains constant. Then value is recorded.

Observation:

Paneer- **48.788%**

Peda – **9.414%**

02.07.24

1. 1. STANDARD PLATE COUNT (SPC):

Procedure:

Preparation of Stock Buffer:

- 9 gm of NaCl was taken.
- 1l of Distilled water was added in it.
- Stock buffer is used in test tube for bench solution.

Media Preparation:

2.8 gm of Nutrient agar was added in 100ml of Distilled water. The mixture was gently heated while stirring to dissolve the powder completely. Care was taken to avoid overheating. The flask was then plugged with non-absorbent cotton wool. The media was sterilized by autoclaving at 121°C (15 psi) for 15 minutes. After autoclaving, the media was allowed to cool to about 50°C in a water bath. Once cooled, the media was gently mixed to ensure uniformity. The media was then aseptically poured into sterile Petri dishes, filling them about 1/3 to 1/2 full.

Serial Dilutions:

- 1ml of milk sample of Standard Milk and Toned Milk was taken and added in 9 ml of bench solution in different testtube.
- A series of decimal dilutions was prepared (e.g., 1/10, 1/100, 1/1000) by transferring 1 ml of the previous dilution into 9 ml of sterile bench solution of each milk sample.
- Mix each dilution thoroughly by gentle shaking or vortexing.

Plating:

- Pipette 1 ml of the appropriate dilutions (e.g., 1/10, 1/100, 1/1000) onto separate sterile Petri dishes in duplicate or triplicate.
- Pour approximately 15-20 ml of the molten, cooled nutrient agar or appropriate agar medium over the inoculum in each plate.
- Gently swirl the plates to distribute the inoculum evenly throughout the agar.
- Allow the agar to solidify completely.

Incubation:

- Invert the plates and incubate them at 30-35°C for 48-72 hours, depending on the specific guidelines or standards followed.

Colony Counting:

- After the incubation period, remove the plates from the incubator.
- Count the number of colonies present on each plate using a colony counter or manual counting.
- Select plates with 25-250 colonies for counting, as this range provides statistically significant results.

Calculation of Standard Plate Count (SPC):

- Calculate the SPC using the following formula: SPC (CFU/ml or CFU/g) = (Number of colonies × Dilution factor) / Volume or Weight of sample plate.

2. COLIFORM TEST:

Procedure:

Preparation of Stock Buffer:

- 9 gm of NaCl was taken.
- 1l of Distilled water was added in it.
- Stock buffer is used in test tube for bench solution.

Media Preparation:

5.351 gm of MacConkey agar in 100 ml of Distilled water. The mixture was gently heated while stirring to dissolve the powder completely. Care was taken to avoid overheating. The flask was then plugged with non-absorbent cotton wool. The media was sterilized by autoclaving at 121°C (15 psi) for 15 minutes. After autoclaving, the media was allowed to cool to about 50°C in a water bath. Once cooled, the media was gently mixed to ensure uniformity. The media was then aseptically poured into sterile Petri dishes, filling them about 1/3 to 1/2 full.

Serial Dilutions:

- 1ml of sample was taken and added in 9 ml of bench solution.
- Prepare a series of decimal dilutions (e.g., 1/10) by transferring 1 ml of the previous dilution into 9 ml of sterile bench solution.
- Mix each dilution thoroughly by gentle shaking or vortexing.

Plating:

- Pipette 1 ml of the milk and lassi (e.g., 1/10) onto separate sterile Petri dishes.
- Pour approximately 15-20 ml of the molten, cooled nutrient agar or appropriate agar medium over the inoculum in each plate.
- Gently swirl the plates to distribute the inoculum evenly throughout the agar.
- Allow the agar to solidify completely.

Incubation:

- Invert the plates and incubate them at 37°C for 24 hours, depending on the specific guidelines or standards followed.

Colony Counting:

- After the incubation period, remove the plates from the incubator.
- Count the number of colonies present on each plate using a colony counter or manual counting.

Calculation of Coliform:

- Calculate the coliform using the following formula: Coliform (CFU/ml or CFU/g) = Number of presumptive coliform colonies count.

Result – No colony Formed

3. DETECTION OF YEAST AND MOLDS:

Procedure:

Sample preparation:

- 1ml of milk product sample was taken and added in 9 ml of bench solution.
- Prepare a series of decimal dilutions (e.g., 1/10, 1/100) by transferring 1 ml of the previous dilution into 9 ml of sterile bench solution.
- Mix each dilution thoroughly by gentle shaking or vortexing.

Media preparation:

3.9 gm of Potato dextrose agar was added in 100ml of Distilled water. The mixture was gently heated while stirring to dissolve the powder completely. Care was taken to avoid overheating. The flask was then plugged with non-absorbent cotton wool. The media was sterilized by autoclaving at 121°C (15 psi) for 15 minutes. After autoclaving, the media was allowed to cool to about 50°C in a water bath. Once cooled, the media was gently mixed to ensure uniformity. The media was then aseptically poured into sterile Petri dishes, filling them about 1/3 to 1/2 full.

Inoculation:

- Using aseptic techniques, pipette or spread a 1ml volume of the milk product sample onto the surface of the solidified PDA plate.
- 1 ml of 10% Tartaric acid is added in plate, used to maintain the pH (3.5)

Incubation:

- Invert the inoculated PDA plates and incubate them at a temperature range of 25°C for 3-5 days.
- Count the number of distinct yeast and mold colonies on the plates, considering the dilution factor used during sample preparation.

4. Swab test

Procedure:

Preparation of Stock Buffer:

- 9 gm of NaCl was taken.
- 1l of Distilled water was added in it.
- Stock buffer is used in test tube for bench solution.

Media Preparation:

1. For SPC - 2.8 gm of Nutrient agar was added in 100ml of Distilled water.
2. For Coliform – 5.351 gm of MacConkey agar in 100 ml of Distilled water.

The mixture was gently heated while stirring to dissolve the powder completely. Care was taken to avoid overheating. The flask was then plugged with non-absorbent cotton wool. The media was sterilized by autoclaving at 121°C (15 psi) for 15 minutes. After autoclaving, the media was allowed to cool to about 50°C in a water bath. Once cooled, the media was gently mixed to ensure uniformity. The media was then aseptically poured into sterile Petri dishes, filling them about 1/3 to 1/2 full.

Sample Preparation:

Take Sterile Test Tube containing 25 ml of bench solution in which 25ml sterile pipette bounded with cotton plug in top and bottom area. Then Sterilized the area with burner. Sample was taken between the area of 30cm*30cm. Sample was taken from Milk storage tank

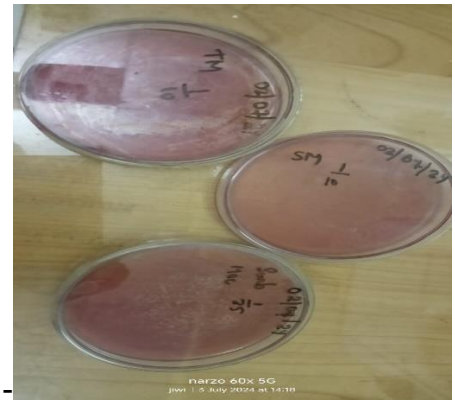
Plating:

- Pipette 1 ml of the appropriate dilutions (e.g., 1/25 dilution) onto separate sterile Petri dishes.
- Pour approximately 15-20 ml of the molten, cooled nutrient agar and MacConkey agar medium over the inoculum in each plate.
- Gently swirl the plates to distribute the inoculum evenly throughout the agar. Allow the agar to solidify completely.

Incubation:

- Invert the plates and incubate SPC plate at 30-35°C for 48-72 hours and for Coliform Plate at 30-37°C for 24 hours, depending on the specific guidelines or standards followed.

Result

- 

<u>4. Methylene blue reduction test:</u>

- 10 ml of raw milk is taken in sterilized MBR tube.
- 1 ml of MBR Solution was added in milk sample and mix well by gently swirling the tube.
- The tube was placed in a water bath or incubator maintained at 37°C.
- The timer was started as soon as the tube is placed in the water bath or incubator.
- Observe the colour change in the milk sample at regular intervals (e.g., every 30 minutes).
- Record the time taken for the blue colour to completely disappear or become colourless.
- This recorded time is the reduction time or decolourization time for the MBRT.
- A longer reduction time (e.g., more than 5 hours) indicates lower bacterial activity and better keeping quality of the milk.
- Result – The raw milk start changing its colour blue to white after 1 hours.

5. Fat Percentage of Dahi

- 20gm of Curd was taken and 20ml of Distilled water was added in it and mixed properly.
- 1ml of ammonium buffer was added in it.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of curd solution at 27 ° C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Calculation of Fat% is done by Fat is multiplying by 2.05.
- Result –
  Premium dahi – 2.0*2.05= **4.1**
  p- 200= 1.5*2.05=**3.075**
  p-400 =1.5*2.05= **3.075**

03.07.24

1. Fat Percentage of Dahi:

- 20gm of Curd was taken and 20ml of Distilled water was added in it and mixed properly.
- 1ml of ammonium buffer was added in it.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of curd solution at 27 ° C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Calculation of Fat% is done by Fat is multiplying by 2.05.
- Result –
  Premium dahi – 2.2*2.05= **4.51**
  p- 200= 1.5*2.05=**3.075**
  p-400 =1.5*2.05= **3.075**
  p-1000= 1.6*2.05= **3.28**
  1kg dahi = 2.2*2.05= **4.51**
  Misti Doi =1.6*2.05= **3.28**

2. Fat percentage of Skimmed Milk Powder (SMP):

- Measure 1.69gm of SMP, paste was made with 5 ml of distilled water.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of SMP solution at 27 °C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Result – 0.1 *6.66= **0.66**

3. Fat percentage of Whole Milk Powder (WMP):

- Measure 1.69gm of WMP, paste was made with 5 ml of boiled distilled water.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of WMP solution at 27 °C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.

- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Result - 3.5*6.66=**23.31**

4. **For Skimmed milk powder (SMP):**

  - Weigh out the 10 of Skimmed milk powder.
  - 100ml of water was added in it at 27-32°C temperature.
  - Add the milk powder to the water in a clean, transparent container.
  - Mix thoroughly with mixer grinder for 90 seconds to ensure complete reconstitution, avoiding excessive agitation.
  - Let the reconstituted milk stand undisturbed for 5 minutes at room temperature.
  - Take out 50 ml of SMP solution and kept in sedimentation Tube.
  - Then Centrifuge the solution at 1500-2000 RPM for 5 minutes.
  - Take out 25 ml of SMP solution from the Sedimentation tube and 25 ml of Distilled water is added.
  - Then Centrifuge the solution at 1500-2000 RPM for 5 minutes.
  - Carefully examine the bottom of the container without disturbing the contents.
  - Observe and record the amount, colour, and nature of any visible sediment.
  - Result – **0.4 ml**

5. **For Whole milk powder (WMP):**

  - Weigh out the 10 of Whole milk powder.
  - 100ml of water was added in it at 27-32°C temperature.
  - Add the milk powder to the water in a clean, transparent container.
  - Mix thoroughly with mixer grinder for 90 seconds to ensure complete reconstitution, avoiding excessive agitation.
  - Let the reconstituted milk stand undisturbed for 5 minutes at room temperature.
  - Take out 50 ml of WMP solution and kept in sedimentation Tube.
  - Then Centrifuge the solution at 1500-2000 RPM for 5 minutes.
  - Take out 25 ml of WMP solution from the Sedimentation tube and 25 ml of Distilled water is added.
  - Then Centrifuge the solution at 1500-2000 RPM for 5 minutes.
  - Carefully examine the bottom of the container without disturbing the contents.
  - Observe and record the amount, colour, and nature of any visible sediment.
  - Result – **1.5 ml**

04.07.24

I visited the refrigeration and packaging sections of the dairy today. In the refrigeration area, I observed the cool temperature maintained to preserve dairy products by nitrogen. Large refrigeration units hummed steadily, keeping the storage area at the optimal temperature. Workers moved efficiently through the area, restocking products, and checking temperature gauges.

After touring the refrigeration section, I proceeded to the packaging area. Here, I witnessed the final stages of dairy product preparation. The packaging line was in full operation, with machines filling pouches and cartons with milk and other dairy products. Workers monitored the process, ensuring proper sealing and labelling of each item. The packaging area was notably louder than the cold storage section due to the machinery in use. I noticed strict hygiene protocols being followed, with all personnel wearing appropriate protective gear.

05.07.24

1. Adulteration:

1. Nitrate Fertilizer Detection Test:

- 1 ml of milk sample was taken in a test tube.
- 2ml of nitrate reagent was added along the sides of tubes
- Presence of a blue colour indicates the presence of nitrates (from fertilizers).

2. Glucose Detection Test:

- 1 ml of milk sample was taken in a test tube.
- 1ml of Glucose reagent- 1 was added
- Heat the mixture gently for 3minutes and then again cooled down the solution
- Then 1ml of glucose reagent -2 was added
- Presence of deep blue colour indicates the presence of glucose.

3. Sugar/Sucrose Detection Test:

- 1 ml of milk sample was taken in a test tube.
- 1ml of sugar reagent was added in it.
- Heat the mixture gently for 3 to 5 minutes.
- Presence of a brick-red colour indicates the presence of added sugar or sucrose.

4. Ammonia Fertilizer Test:

- 1 ml of milk sample was taken in a test tube.
- 2 ml of ammonia reagent was added in it and mixed gently.
- Brownish colour indicates the presence of ammonia (from fertilizers).

5. Neutralization Test:

- 2 ml of milk sample was taken in a test tube.
- 2ml of neutralizer reagent was added and mixed well.
- If the milk turns pink or red colour, it indicates the presence of neutralizers or alkaline substances.

6. Urea Detection Test:

- Take 2 ml of milk sample in a test tube.
- 2ml of urea reagent was added to it and mixed well.
- Distinct yellow colour indicates the presence of urea.

7. Hydrogen Peroxide Detection Test:

- 5 ml of milk sample was taken in a test tube.
- A few drops of potassium iodide solution was added.
- Formation of a pink or red colour indicates the presence of hydrogen peroxide.

8. Salt Test:

- 1 ml of milk sample was added in a test tube.
- Few drops of salt reagent -2 was added due to which it turns to red colour.
- Yellow colour appears that indicates the presence of added salt or sodium chloride.

9. Starch Test:

- 5ml of milk sample was added in test tube.
- 2 drop of solution was added in it
- Presence of blue or bluish violet colours indicates the presence of starch.

2. Alcohol test:

Procedure:

- Take 2 Petri plate and 3ml of milk with two different sample.
- Then 3ml of 72% ethyl alcohol was added on it.
- Observed the milk if curdling occurs, it will be positive result, if not, then it will be a negative result.
- The range of alcohol taste is 3ml to 9 ml.
- Result – **1. No Clot formed & 2. No Clot formed.**

3. Fat Percentage of Dahi:

- 20gm of Curd was taken and 20ml of Distilled water was added in it and mixed properly.
- 1ml of ammonium buffer was added in it.
- 10 ml of 90% Sulphuric acid (H2SO4) was taken in a butyrometer.
- 10.75 ml of curd solution at 27 ° C was added slowly along the walls of the butyrometer.
- 1ml of amyl alcohol was added to the butyrometer.
- Butyrometer was stop- corked, mixed thoroughly in a locked test tube stand, shakes it and the solution was centrifuged at 1000- 1200 rpm for 5 minutes.
- Calculation of Fat% is done by Fat is multiplying by 2.05.
- Result –
  Premium dahi – 2.2*2.05= **4.51**
  p- 200= 1.5*2.05=**3.075**
  p-400 =1.5*2.05= **3.075**
  p-1000= 1.6*2.05= **3.28**
  1kg dahi = 2.2*2.05= **4.51**
  Misti Doi =1.6*2.05= **3.28**

List of Instrument in the laboratory:

1. MBRT Chamber (Methylene Blue Reduction Test Chamber):

Principle: The MBRT Chamber provides a controlled environment for conducting the Methylene Blue Reduction Test, which assesses the microbiological quality of milk.

Temperature control: The chamber maintains a constant ambient temperature, typically around room temperature (20-25°C or 68-77°F). It does not provide incubation temperatures.

Light exclusion: The chamber is designed to keep samples in complete darkness, as light can interfere with the reduction of methylene blue.

2. Hot Air Oven:

Principle: Uses dry heat for sterilization, drying, and heating. Hot air circulates to maintain uniform temperature throughout the chamber. The oven maintains a specific temperature (usually between 50°C and 300°C) for a set duration.

3. Water Bath:

Principle: Maintains constant temperature for samples by using water as a heat transfer medium. Suitable for temperatures up to 100°C (boiling point of water). Heat is transferred from the water to the sample containers. A thermostat maintains the water at a constant temperature.

4. Weighing Balance:

Principle: Measures mass using a force restoration mechanism. An electromagnetic force balances the weight of the object being measured.

5. Centrifuge:

Principle: Uses centrifugal force to separate substances of different densities in a liquid medium. As the rotor spins, denser components move outward while less dense components remain closer to the center.

6. Induction:

Principle: Heats electrically conductive materials using electromagnetic induction. An alternating current in a coil creates a magnetic field, inducing eddy currents in the material, which generate heat.

7. Muffle Furnace:

Principle: Provides high-temperature heating in an enclosed space. Electric heating elements surround a ceramic chamber, allowing for controlled, uniform heating of materials for processes like ashing or heat treatment.

8. Autoclave:

Principle: Sterilizes items using high-pressure saturated steam. The combination of heat, moisture, and pressure effectively kills microorganisms and spores. It sterilized the glassware, media at 121°C temperature for 15 min at 15 PSI.

9. Desiccator:

Principle: Maintains a dry environment to keep substances moisture-free. It uses a desiccant (like silica gel) to absorb moisture from the enclosed air, protecting hygroscopic materials or maintaining dry conditions for samples.

10. Incubators (25°C and 37°C):

Principle: Both incubators maintain a constant temperature environment for microbial growth. They use thermostats and heating elements to keep a stable temperature.

- 25°C incubator: Optimized for fungi growth on Potato Dextrose Agar (PDA).

- 37°C incubator: Set to human body temperature, ideal for bacterial growth on Nutrient Agar and MacConkey Agar.

11. Blender/Mixer:

Principle: Uses rotary blades to mix, emulsify, or homogenize samples by creating a vortex that pulls material through the blades.

12. Laminar Air Flow:

Principle: Provides a sterile work area by filtering air through HEPA filters and creating a unidirectional flow of sterile air across the work surface, preventing contamination.

13. Moisture Balance:

Principle: Combines a heating element with a precision balance to determine moisture content. It heats a sample to evaporate moisture while continuously measuring its mass.

14. Milkoscan:

Principle: Uses Fourier Transform Infrared (FTIR) spectroscopy to analyze milk composition. It measures the absorption of infrared light by milk components to determine fat, protein, and lactose content.

15. Standard Plate Count Machine:

Principle: Automates the counting of bacterial colonies on agar plates. It uses image analysis software and a camera to detect and count colonies, providing a standardized and efficient method for determining bacterial numbers.

16. Microscope:

Principle: Uses a series of lenses to magnify small objects or organisms. Light microscopes use visible light and optical lenses, while electron microscopes use electron beams for higher magnification.

8. Boiler Section

Boiler- Boiler is closed pressure vessel in which fuel is burn for produced stream under pressure.

Boilers in Dairy Operations:

1. Purpose

- Boilers are crucial in dairy processing for producing steam and hot water.
- They primarily serve to soften hard water, which is essential for various dairy processes.
- Steam is used for pasteurization, sterilization, cleaning equipment, and heating processing areas.

2. Water Softening Process:

- Hard water contains high levels of minerals, mainly calcium and magnesium.
- The softening process removes these minerals to prevent scale buildup in boilers and equipment.
- Common methods include ion exchange systems or chemical treatment.
- Softened water improves boiler efficiency and extends equipment lifespan.

Types of Boilers:

a) Fire Tube Boiler:

- Hot gases pass through tubes surrounded by water.
- Generally used for smaller capacity needs.
- More compact and less expensive than water tube boilers.
- Equipment includes:
  - Forced Draft Blower: Pushes air into the combustion chamber, increasing oxygen for better combustion.
  - Induced Draft Blower: Pulls exhaust gases out of the boiler, improving efficiency and controlling emissions.

b) Water Tube Boiler:

- Water passes through tubes surrounded by hot gases.
- Used for higher capacity needs and higher-pressure applications.
- More efficient for large-scale operations but typically more expensive.

Oil Fire Boiler:

- Uses oil as the primary fuel for combustion.
- Popular in dairy operations due to:
  - High energy efficiency
  - Readily available fuel source
  - Consistent heat output
- Requires proper maintenance to prevent oil contamination and ensure clean combustion.

Boiler Water Quality Control:

- Regular testing is crucial for maintaining boiler efficiency and preventing damage.
- Key parameters tested include:

  a) pH levels: Ideally between 8.5-9.5 to prevent corrosion.

  b) Total Dissolved Solids (TDS): Should be kept low to prevent scale formation.

  c) Hardness: Measure of calcium and magnesium ions; should be near zero after softening.

9. Packing Section:

1. For Milk-

The dairy used poly film for milk packaging. The process involved precise temperature control at different stages:

- The vertical sealing of the poly film packages occurred at a temperature range of 36-38°C.

- The cutting of the packages was performed at a higher temperature range of 55-68°C.

- After packaging, the milk was immediately transferred to cold storage, maintained at 6°C.

It was noted that the shelf life of the packaged milk is 2 days when stored at 8°C, emphasizing the importance of proper refrigeration for maintaining product freshness.

2.For paneer

Paneer, a popular dairy product, underwent a different packaging process:

- It was vacuum-packaged using high-density polyethylene (HDPE) material.

- The packaged paneer was stored at a temperature range of 5-8°C for subsequent sales and distribution.

- The shelf life of the packaged paneer was reported to be 10 days, significantly longer than that of liquid milk.

3. Dahi (Yogurt) Packaging:

The dahi packaging process involved several crucial steps:

- Cooling: Once the dahi reached the desired acidity and texture, it was cooled to halt further fermentation.

- Packaging: The cooled dahi was then carefully packaged into sterile containers to maintain hygiene and extend shelf life.

- Cold Storage: Packaged dahi was stored at 6°C to preserve its quality until distribution to consumers.

- Shelf Life: Under proper refrigeration conditions (below 5°C), Sudha Dahi has a shelf life of approximately 7 days.

4. Lassi Packaging:

The packaging process for lassi, a popular yogurt-based drink, was also observed:

- After preparation, the finished lassi was packaged into pouches.

- These pouches were then stored under refrigerated conditions.

- Distribution was handled through Sudha Dairy's established network.

5. Peda Packaging:

Unlike the liquid dairy products, peda (a sweet milk solid) had a different packaging approach:

- Peda was packed in paper boxes, likely to maintain its shape and texture.

10. Refrigeration section

I visited the refrigeration section of the dairy today, which plays a crucial role in maintaining product quality and extending shelf life. The main function of this section is to control the temperature of the cold storage and chiller units.

Key observations:

1.Capacity: The refrigeration system has a substantial capacity of 20 kiloliters, allowing for large-scale storage of dairy products.

2.Temperature Control: The primary purpose of this system is to maintain optimal temperatures for various dairy products, thereby increasing their shelf life.

3.Components:

a. Condenser: Part of the refrigeration cycle, likely used to convert ammonia gas back into a liquid.
b. Compressor: Compresses the ammonia to 180 psi, transforming it into a gas.
c. Suction Apparatus: Designed to remove heat from the storage areas, crucial for maintaining low temperatures.
d. Vilter:
e. Booster: Used to further lower temperatures when needed.

4.Refrigerant: The system uses ammonia as the refrigerant, which is common in industrial refrigeration due to its efficiency.

5.Pressure: The system operates at high pressure, with ammonia being compressed to 180 psi.

The refrigeration section demonstrated the complex engineering required to maintain proper temperatures for dairy products. The use of ammonia, while efficient, also indicated the need for strict safety protocols due to its potential hazards.

Conclusion

This project report provides an overview of Sudha Dairy's whole milk processing and quality control procedures. Lab tests are conducted to monitor product quality. Milk brought in by tankers is first tested and validated to meet quality standards before going into manufacturing. All milk products produced in organization are tested and verified for quality before being released. Water used in many industries is evaluated for hardness and pH. All these standardized methods ensure that their products are pure and safe to consume. Overall, it was a fantastic experience to work hands-on in an industrial-scale quality control laboratory.