

Mother dairy company and their production

[Business](#), [Company](#)



ABOUT THE INDUSTRY

Mother Dairy is the well known company in India. Mother Dairy has a great share in milk sector and is well established in India. It is well known because of the quality and service it provides and selling about millions of litres of milk in a day through their outlets.

Mother Dairy Brand is a Hazard Analysis Critical Control Point(HACCP) and Environment Management System (EMS) certified Organization.

Mother Dairy is the only Dairy plant in the country to provide environment safety. The Mother Dairy provides assurance to the customer in safety by providing best quality of products.

Mother Dairy is the world's biggest dairy company developed to make India a milk providing nation. From long time, It has provided the objective to promote innovations and more development programs. Mother Dairy manufactures milk and it sells products like Ghee, Ice-cream and paneer etc. The Company has vast of products in edible oils, fruits & vegetables, frozen vegetables, pulses and processed food. A big contribution of it is to support and maintain the system. A little portion of its income is revert o back in the chain to maintain the system.

Safal, fruit and vegetable part of Mother Dairy is the Company to organize the fruits and vegetables business in India. Safal was also the first brand in India to introduce frozen fruits and vegetables. The company tag line is – Happy Food Happy People – tell us about the company goal ..

OBJECTIVE

TO UNDERSTAND MILK PROCESSING LINE

TO CHECK THE QUALITY OF MILK

OBJECTIVE 1- To understand the MILK processing line

Milk Processing

Milk was processed through BVM (bulk vending milk department). BVM department was all operated by computer software. Milk was processed through various components of the plant and in a well mannered process.

First Raw milk is received through insulated road tanker at a very low temperature to keep the milk fresh. The milk passes through quality tests before it is accepted for the processing of milk. Milk received from different producers is checked for all the company requirements. Milk is then supplied to different dairy units through insulated milk tankers at less than 4 degree C.

Unprocessed milk may contain small dirt particles, harmful microorganisms and enzymes that are not visible through our naked eyes. To kill harmful microorganism, the milk has to be processed. Thus pasteurization method is used to decreases pathogens present in milk and increases its shelf life.

Various steps are taken to process the raw milk. each process can be divided into different steps which combining lead to the complete process. In Mother

Dairy, the raw milk is first processed in the standard conditions to reach the final processed milk.

Milk is being stored in 12 tanks each having 1 lakh capacity and is called Silos. The first three Silos are called RM silo where raw milk is being collected and next two silos are skim milk silo and next 6 silos are called pm silo contain pasteurized milk. Cleaning of the silos is being done automatically and is called CIP which was done every 24 hours.

The standard for the process toned milk are as follows.

FAT CONTENT- 3.05%

SOLID NON-FAT CONTENT- 8.56%

TEMPERATURE- 2-4degree C

METHYL BLUE RE. COLERATION (MBR) TIME- 5hrs min

In mother dairy there are:

Name of Equipment Number of unit installed

Pasteurizer 05

Homogenizer 05

Clarifier 07

Silos 12

Raw milk Silos 03

Skim milk silos 02

Processed milk silo 07

PASTEURIZATION

Pasteurization process starts with the transfer of the raw milk into tank. The milk is then passed through different sections of pasteurization units. First it is passed to Regeneration 1 with the help of Feed Pump which maintains milk at constant pressure. This process involves heating of milk to 72-75 degree Celsius for 15seconds and then cooling it down to 2-4 degree Celsius. The process kills all pathogenic bacteria present in the milk and makes milk safe for consumption. Pasteurization does not affect the nutritive value of milk. This includes heating of every particle of milk to min. 70-73 degree Celsius holding at same temperature at least for 15 seconds followed by fast cooling

CLARIFICATION

After the milk is passed to regeneration 1 the milk is transferred to clarifier component. The milk is spinned in the clarifier at very high speed removing all the dust particles that are not visible through naked eyes. Clarifier is rotated at very high speed at 6000rpm at temperature 40-45 degree Celsius.

Regeneration-II: In this unit the milk is further heated hence raising the temperature of received milk . This increases the temperature of milk so as to allow homogenization which is the next step.

HOMOGENIZATION

In this process, the milk is processed at very high pressure by which the large fat molecules present in milk break down into small particles. Homogenization improves thickness and provides better milk. It is the process of passing milk through a small pore at a high velocity speed to make fat molecules to a smaller size of 2 microns or less so that no cream layer forms even if milk is stored. The milk is heated up to 70-75 degree Celsius.

STANDARDIZATION

To provide the milk to consumers as per the norms of FSSAI before delivering to the market, different varieties of milk are first standardized by checking the Fat & SNF percentage to a standard level.

CHILLING

Milk is finally chilled to 4-5 degree Celsius using chilled water which is being pumped. The chilled water temperature ranges from 1-3 degree Celsius and chilled milk temperature from 4-6 degree Celsius. After chilling, milk is pumped into silos.

VITAMIN A & D ADDITION

Toned milk during processing is enriched with vitamin A and D.

DISPATCH

When the Fat and SNF quality testing of PM silo is done, the silo is for dispatch but before dispatch, milk is passed to glycol chillers and the milk is chilled to 2-3 degree Celsius in glycol chillers. The chilled milk is then filled into the tankers and the tankers then go to the milk vending outlets.

Milk process flow of Mother Dairy

CIP SYSTEM

Cleaning In place is the system of cleaning without the need of any manual work or equipment. Containers & machines working on milk processing can lead to growth of microorganism with the time. In order to ensure that there is proper processing of milk & no microorganism passes to the processed milk containers i. e. silos and the plant has to be cleaned. So in order to maintain the proper cleaning CIP of plant is required in which cleaning in place is done.

The cleaning process in general has following steps:

Lye (NaOH)

Acid (Nitric acid)

Hot water

Soft water

Process of CIP:

Pre-rinsing with water to dispose of loose dust particles then cleaning with the detergent. Rinsing with soft water. the cycle ends with a ending rinse, if the water pleasant is good.

Step1- flow of cold water

Step2- stream of lye solution for 30 min

Step3- movement of warm water for 10 min

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Step4- circulation of acid solution for 20 min

Step5- flow of free water.

OBJECTIVE 2- TO CHECK THE QUALITY OF MILK

Dock Lab

Dock lab is the department where raw milk is collected and is being passed for testing on the basis of which milk is accepted or rejected . following are the tests which are being performed to test milk.

Seal & check for cleanliness

Presence of foreign matter

Temperature

Organoleptic evaluation

Clot of Boiling (COB)

Alcohol test

Neutralizer test

Acidity test

Ammonium compound test

M. B. R. T test

Urea test

Starch and cereal test

Salt test

Glucose test

Sugar test

Maltodextrin (enzymatic) test

Detergent test

Formalin test

Hydrogen peroxide test (H₂O₂)

Sodium ions PPM test

R. M. Value (Reichert Missal)

B. R. Value (Butyrometer Refractometer)

Fat test

Protein test

S. N. F. test

METHODOLOGY USED

SEAL AND CHECK FOR CLEANLINESS

PRESENCE OF FOREIGN MATTER:

10 to 14 litres of milk was taken out in a tub directly from the tanker valve.

The milk was filtered through a small plastic sieve. Presence of foreign matter was indicated in the milk by this method. If foreign matter is found, the tanker was rejected.

TEMPERATURE: checked by using thermometer. It should be less than 500 F.

ORGANOLEPTIC TEST: check taste & flavour of milk.

CLOT ON BOILING TEST:

Principle: This test is done to determine the stability of milk as heat processing is done. As milk is kept at room temperature the acidity of milk increases. Increase in acidity leads to coagulation of milk in heat treatment. This is due to the dissociation of calcium caseinate salt. Hence it is important to know the heat stability of incoming raw milk for further processing of milk.

Requirements:

Milk sample

Test tube

Test tube holder

Test tube stand

Procedure :

2ml of milk sample was taken in a test tube.

Boiled on the flame of spirit lamp. Formation of clots in the test tube indicates COB positive test and milk is unacceptable.

ALCOHOL TEST:

Principle: This test is performed to check the coagulation of raw milk on thermal processing. It is based on tendency of milk protein to attain instability as a consequence of disturbance in the mineral balance of milk. Milk with increased developed acidity, or having higher amount of calcium and magnesium compounds, will have high rate of coagulation when alcohol is added.

Procedure: 2ml of milk was taken in a test tube & 2ml alcohol was added with constant shake. formation of precipitates indicates alcohol test positive and such milk is unacceptable.

NEUTRALIZER TEST:

Principle: Neutralizers like sodium hydroxide, sodium carbonate or bicarbonate or hydrated lime are added in milk which are prohibited. These substances may be added to unfresh milk so as to correct its pH and acidity values & to show that the milk is freshly milked or perfectly preserved.

Reagent required: Rosalic acid solution

Procedure: 2ml of Rosalic acid solution was taken in a test tube & 2ml of milk sample was added. Rose red colour indicates presence of neutralizers in milk.

ACIDITY TEST :

Principle: This test is done to check the total acidity (titrable) in milk . There are 2types of acidity in milk. a) Natural acidity which is due to citrates and phosphates present in the milk and dissolved CO₂ during the process of milking. b) Developed acidity which is due to lactic acid produced by the action of bacteria on lactose in milk.

Procedure: 10ml milk sample and 10ml distilled water was taken in 100 ml conical flask; titrated against N/10 NaOH using phenolphthalein as indicator to check acidity. Acidity above 0. 153%is not acceptable.

Calculation:

% by weight = $0.9 \times N \times V$

Where ,

N= Normality of NaOH solution,

V= Volume of NaOH, W= weight of milk sample

AMMONIUM COMPOUND TEST :

Principle: This test is done to check the presence of sulphate in milk. Addition of ammonium containing compounds increases the lactometer reading thus maintaining the density of milk.

Reagent Required: Nessler's Reagent- prepared by

1. 8 g of HgCl₂ dissolved in 150 ml DW.
2. 60 g of NaOH dissolved in 150 ml DW.
3. 16 g of KI dissolved in 150 ml DW

Procedure: 1ml of milk sample was taken in a test tube and 2ml of Nessler's reagent was added. The contents were mixed. Presence of orange colour with brownish indicates positive test.

UREA TEST:

Principle: This test is done to determine the presence of urea in milk. Urea is added to raise the SNF value.

Procedure: 2ml milk was taken in a test tube, and 2ml DMAB solution was added and mixed. Appearance of yellow colour indicates the presence of urea and the milk is unacceptable.

STARCH TEST:

Principle: This test is done to determine the presence of starch in milk. Starch is added to increase SNF value.

Procedure: 3ml milk sample was taken in test tube. The tube was boiled and cooled under tap water and 2 drops of 1% iodine solution was added. Appearance of blue colour indicates the presence of starch.

SALT TEST:

Principle: To determine the presence of salt in milk.

Reagents Required: AgNO₃ solution (0.134%), potassium chromate (10% solution)

Procedure: 5 ml of AgNO₃ solution was taken in a test tube and 2 drops of potassium chromate were added. Brick red colour appeared. To this exactly 1ml of milk was added and mixed. Presence of yellow colour indicates salt is present.

SUGAR TEST:

Principle: To determine the presence of sugar in milk. Sugar is added to increase the S. N. F. value.

Reagents Required: dil. HCl (1: 2) containing resorcinol (0. 1gm resorcinol dissolved in 100ml dilute HCl).

Procedure: Take 3ml of Milk in test tube and add 5ml Mix well and keep the test tube in boiling water for 5min. Brick red colour formation indicates sugar is positive.

MALTODEXTRIN (ENZYMATIC) TEST:

Procedure: 25ml milk sample was taken in a 50ml beaker. To this 1ml lactic acid and 1ml enzyme (pH 4-4. 5) was added and mixed. The beaker was kept in a hot water bath for 5mins and cooled at room temperature. A dextrin strip was taken and dipped into beaker containing sample. Presence of green colour indicates the sample can be accepted

GLUCOSE TEST:

This test is confirmed by using a dextrin strip. If green colour is changed to brown colour then glucose is present.

DETERGENT TEST:

Principle: To determine presence of detergent in milk. It is added to emulsify the added fat/oil .

Reagents Required: Methylene dye, Chloroform

Procedure: 1 ml milk sample was taken in a test tube. To this 1 ml of Methylene dye was mixed and 2 ml of chloroform was added. The content

was vortexed for 15 seconds. The contents was centrifuged at 1500 rpm for 5 min. The layers of tube were observed after centrifugation. If Dark blue colour appears in lower ring then the sample is rejected, light blue colour ring appears on lower ring it is accepted.

FORMALIN TEST

Principle: To determine the presence of Formalin in milk. It is added to preserve the milk for longer time.

Procedure: 2 ml of milk sample was taken in a test tube and 2 ml of sulphuric acid was added slowly from the side of the test tube. Formation of purple ring at the indicates formaldehyde is present in the milk.

HYDROGEN PEROXIDE TEST

Principle: To determine the presence of hydrogen peroxide. It acts as a preservative and artificially increases the shelf life of milk.

Procedure: 10ml milk sample was taken in test tube and then add 5 drops of reagent was added and mixed. Development of pink or red colour indicates presence of hydrogen peroxide.

SODIUM ION PPM TEST

Principle : to determine the presence of sodium ion present in milk

Procedure: 25 ml of milk sample was taken in 50 ml of beaker with 2.5 ml of ISA & reading was taken. Final reading will be displayed in PPM.

R. M. VALUE (Reichert Missel) TEST

Principle : to check RM value of the milk

Procedure: Milk is collected and is converted into ghee. Take 5g of ghee in R. M. flask, add 20ml glycerol, add 2 ml sodium hydroxide(NaOH) after that saponify on flame by using glass beads. After then add 90 ml heated distilled water and 50 ml sulphuric acid then hold for heating. After 20 min. separate the R. M. flask and keep for cooling at 15 degree Celsius for 10mins and filter by using filter paper. After filter take 100 ml solution 250 ml conical flask, add 1 ml phenolphthalein and titrate with N/10 NaOH change the colour to pink.

B. R VALUE (Butyrometer Refractometer) TEST

Principle: to check BR value of milk

Procedure: Ghee was taken from milk sample. One drop of ghee was put on prism of butyrometer and was closed gently. The reading was noted down . If reading comes in the range of 40-43 then only milk is accepted or else its rejected.

MBRT TEST(Methylene Blue Dye Reduction Test):

Principle: To calculate the microbiological quality of raw and pasteurized milk.

This test is done on the principle that methyl blue which is blue in its tarnished state, gets condensed to colorless compound by the metabolic activities of bacteria in milk. When a solution of dye is added, the organisms present in milk consume the dissolved oxygen and lowers the potential to a level due to which methyl blue gets decolorized.

Procedure: 10ml of milk was taken in sterilized MBR tube. To this 1ml of MBR dye was added. The content was plugged with a sterilized cork and the tube was inverted to mix the content and incubated in water bath at 37degree.

The tube was checked for decolourization first after 10mins, then after 30mins and subsequently every hour.

Milk with MBR time of less than 30mins is unacceptable.