## CHAPTER II

## DAIRY PLANT

### 1.1 DAIRY PROJECT

The composite milk plant under investigation was started in 1968 under able guidance of **Hon'ble Shri.V.A. alias Tatyasaheb Kore.** The main objectives of this Dairy Project were to improve quality and quantity of milk and for social and all round development. To increase the facilities to produce more milk. Dairying is side business to the farmers so that they can improve their living standared.

The cost of the project alongwith brief information is as follows at the year ended March 1993.

**Name : SHREE WARANA SAHKARI DUDH UTPADAK PRAKRIYA SANGH LTD., AMRUTNAGAR, P.O.WARANANAGAR, DIST.KOLHAPUR, M.S.**

| | | |
|---|---|---|
| Total cost of the project | : | Rs. 1386 lac. (Amrutnagar Plant)<br>Rs. 170 lac. (New Bombay Plant) |
| Total cost of civil works | : | Rs. 175 lac. |
| The cost of Transportation, Vehicles & Miscellaneous | : | Rs. 107 lac. |
| The cost of Milk Powder Plant | : | Rs. 238 lac. |

The cost of Malted Foods Plant : Rs. 240 lac.

Handling Capacity : 2 lac. litres per day *

* extendible to 3 lac. liters.

Total area of the project : 40 acres

## 2] WORKING OF DAIRY PLANT

### DEFINITION OF MILK

Milk may be defined as the whole, fresh clean, lacteal secretion obtained by the complete milking of one or more healthy milch animals, excluding that obtained within 15 days before or 5 day after calving or such periods as may be necessary to render the milk practically colostrum free, and containing the minimum prescribed percentages of milk fat and milk solids not-fat.

Warana Sahkari Dudh Utpadak Prakriya Sangh is situated at Amrutnagar, in Kolhapur District. The Dairy plant brought was commissioned in 1968. Raw milk is collected in cans from nearby 66 villages by Dairy owned and contracted vehicles. Collected raw milk is of Buffalo and Cow. This milk is collected from different collecting centers varied in fat content. The range of fat and SNF is 3.5% to 13% and 6% to 10% respectively. Every day 1 lac. 35 thousand to 1 lac. 40 thousand liters of milk is collected and stored in silo's at Central Dairy Plant for further processing.

The milk stored in silo's is then taken to the processing unit. The milk passes through the plate and frame type heat exchanger, where the milk is heated at a sudden temperature 72 degree celcious to 80 degree celcious in one compartment and in other compartment it is cooled down to 7 degree celcious to 4 degree celcious. In processing the fat and SNF percentage is maintained to certain standards. For standardised milk this requirement is 4.5 and 8.5. In dairy plant this percentage is increased to 6.5 and 9.5. Such a milk is called whole milk. This milk is also called Pasteurised Milk and it is sent for sale.

Pasteurised milk from Dairy Plant is sent either for sale or manufacturing milk products as per requirements. The pasteurised milk is used for milk products. Mainly in flush season the milk is required to be utilized in producing milk products and in lean season it is used for sale as well as milk products.

Processed milk is sent to Glycol Chiller and from this chiller it is sent to packing and dispatch unit. Processed milk is sent to Bombay and Indore. At nearby destination it is sent in polypack bags and is marketed through a network of distributors.

Using pasteurised milk cream is separated and it is used for production of butter. Butter is either sold or it can be used for Ghee production. Melting butter in Ghee vat, Ghee

is produced. After separating cream residual milk is of low fat and having high percentage of SNF. This type of milk is known as Skimmed Milk. Skimmed Milk is converted into Skimmed Milk Powder. For this production the Skimmed Milk is sent to evaporator unit, where water is removed through evaporators. After evaporating the water, milk is sent to Spray Dryer Unit. Applying centrifugal force and hot air the particles are separated. Particles of size 1000 um settled down, rest goes to Chimney and passes through gas. These very small particles are again sent to cyclone where it separates the milk powder particles. This milk powder is called Skimmed Milk Powder(SMP). Then it goes to packing in 25 kg bags and afterwards as per requirements, it is packed in 1 kg bags. Before packing sample of milk powder is taken for testing its quality.

For the production of Whole Milk Powder pasteurised Whole Milk is used. Production technology is same to the production of skimed milk powder.

Separation milk is also used for cultured products like Chakka, Shrikhand, Lassi etc. Processing is similar to domestic process. Pasteurised milk is heated at 42 degree celsius maintaining pH above 7, by using acidic medium. Then it is sent to Dahi Vat. Here milk is converted into Dahi or Curds. The time required for this conversion is 7 to 8 hours. Then using netted cloths the solid, i.e.Chakka is prepared by draining water(Whey) from Dahi. The Chukka is

stored at cold storage and it is used for Shrikhand Production. In Shrikhand Production, various dry fruits and permissible flavors, preservatives, sugar are used. Then it is sent for packing and dispatch. Shrikhand is produced in a large amount.

Pasteurised milk of cow is mainly used for Lassi Production as it contains low fat. It is also sent for sale. Pasteurised milk is sent to Lassi Vat and the milk is processed for Lassi Production. In processing first pasteurised milk is homonized and then sent to Chiller Unit, where sugar Syrup is added and then packed in 200 ml. polypack bags and sent for sale.

These milk products can be recycled for different milk producrts. The dairy plants each unit is operated to its optimum capacity.

## 3] MILK PROCESSING AND MILK PRODUCTS

### BUTTER

It may be defined as fat concentrate which is obtained by churning cream and gathering the fat into a compact mass and then working it.

BUTTER MILK

Genuine butter milk is the liquid that remains after the fat is removed from milk or cream by the process of churning butter.

CREAM

Cream may be defined as

i) that portion of milk which is rich in milk fat or

ii) that portion of milk into which has been gathered and which contains a large portion of milk fat.

STANDARDIZED MILK

For standardization, milk was standardized to 4.5.% fat and 8.5% SNF [solids not containing fats] and pasteurized at 73 degree celcious. After chilling it was filled in 1 litres polypack bags and is kept in cold storage till it was dispatched to the sale.

LASSI

For manufacture of lassi only cow milk or skim milk and cow milk is used. Procedure, starter culture one percent is added in pasteurized milk in vat at 40 degree celcious. Milk is then incubated under atmospheric temperature. The curd is set in about 7 to 8 hours. Required quantity of sugar syrup and flavor added, further if necessary cream or chilled water is added to maintain 3% fat in lassi and it is filled

in 200 ml polypack bags. Then it is stored at cold storage till dispatch for sale.

SKIM MILK POWDER OR WHOLE MILK POWDER [SKM OR WMP]

SKIM MILK [SKM]

Skim milk is that portion of milk that remains after the cream has been removed, in whole or in part. Condensed skim milk is made by evaporation of SKM to about one third of its original volume.

SKIM MILK POWDER (SMP)

Dried milk or skim milk powder is the milk product obtained by the removal of water from milk by heat or other suitable means to produce a solids containing 5 percent or less moisture.

WHOLE MILK POWDER (WMP)

The dried product obtained from whole milk is called dried whole milk or whole milk powder.

Milk powder is manufactured with the help of tabular type preheater, falling film condensing unit, spray drier, sugar grinder and powder packing equipments.

Falling film indexing unit is a double effect with economizer. It evaporated 2400 kg. water per hour and utilized 66.56 kg steam 8.875 kg SMP. Spray drying plant evaporated water 340 kg per hour and manufactured 300 kg/hr.

from condensed milk with 45% total solids. It consumes steam 1100 kg/hours. at 13 kg.cm.sq.

Milk for conversion into powder products is standardized and homogenised as per requirements of product with the help of machinery installed in main processing hall. It is then transferred to milk evaporation unit and spray dirier. Dairy plant manufacture two types of powders viz. SMP and WMP.

THE INDUSTRIAL PROCESS FOR GHEE MAKING :

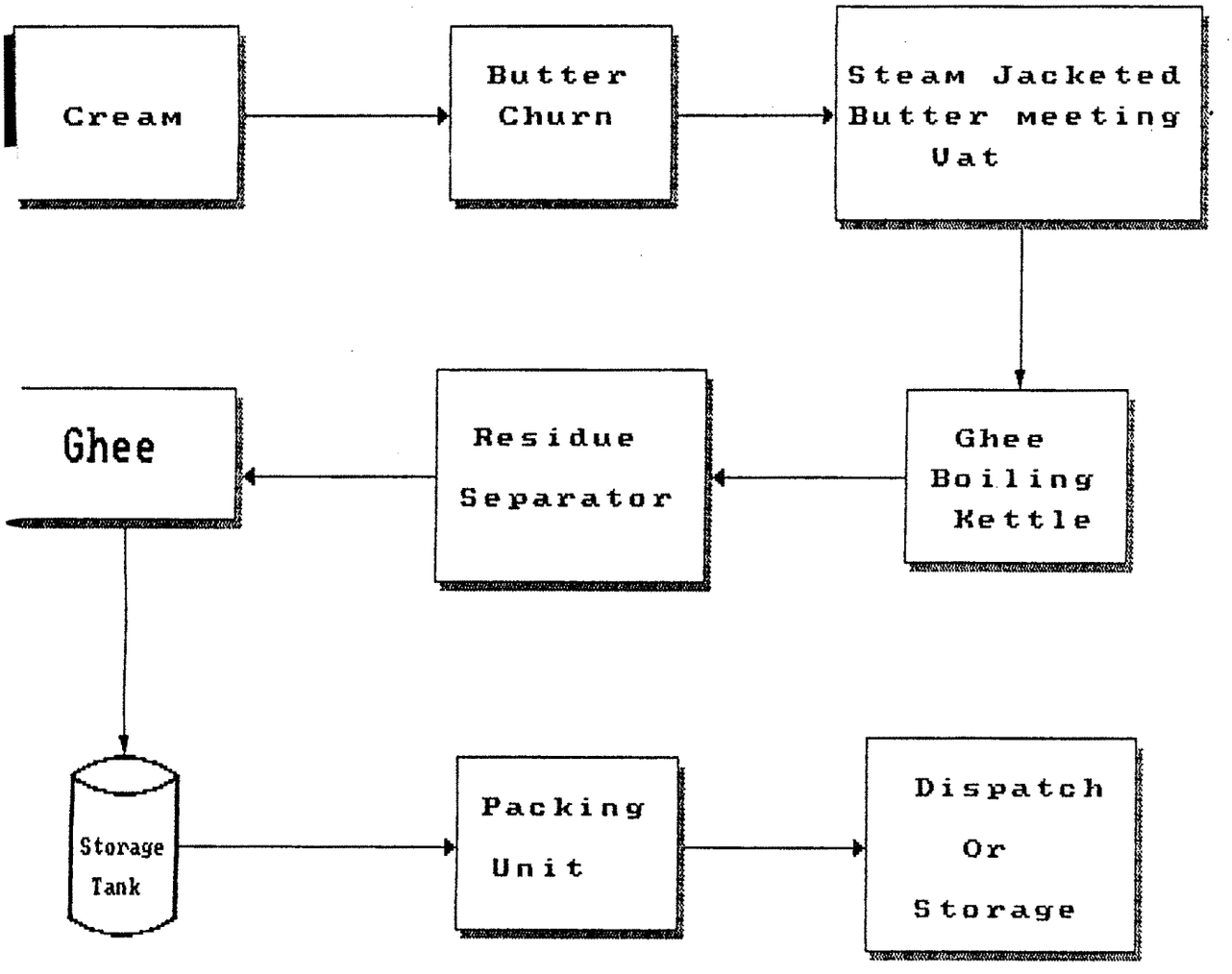
GHEE

Ghee may be defined as clarified butter fat prepared chiefly from cow or buffalo milk. [ To clarify means to make clear a liquid or something liquefied. ]

Ghee is the most important indigenous product. Dairy plant have not found it vary difficult to modify, scale up and adapt the traditional batch process for commercial production. The presently employed industrial process has been outlined in flow chart.

Although large quantity of ghee are made by this process, there is a long, felt need of a continuous plant. One of the ways is to adapt the established process for producing butter oil involving centrifugal separation of moisture followed by final dehydration under vacuum.

# The Industrial Process For Ghee Production



As an alternate to such a system a scraped surface falling film heat exchanger along with auxiliary equipment such as a meeting vat and mechanical clarified has been developed to serve as a continuous ghee making plant. Having a capacity of approximately 100 kg. per hour. This plant could produce a product of satisfactory quality with appreciably reduced labour and energy requirement.

SHRIKHAND MAKING PROCEDURE

CHAKKA

The curd or dahi (Dahi is the product obtained from pasteurized or boiled milk by souring, natural or otherwise, by a harmless lactic acid or other bacterial culture) is partially strained through a cloth to remove the whey and then produce a solid mass is called chhakka. This is the basic ingredient for shrikhand.

SHRIKHAND

Shrikhand is a semi-soft sweetish sour, whole milk product prepared from Lactic fermented curd.

Shrikhand a soft plastic product is obtained by removing whey from lactic fermented milk and kneading the resetting curd [ chakka ] together with sugar, flavoring material etc. commercial scale production of this product has been carried out at the sugam project NDDB Baroda. The essential part of

this process viz. separation of curd from whey is achieved by large scale quarg separators and whay seprations is done by cloths such a process is known as hanging chakka which is done by manual] flow chart outlines the production line for shrikhand by employing this system. [ see Sharma and Singhal, 1988]

Direct acidification of milk prior to separation of curd from whey can be an important step in making the process truly continuous for large scale production. However certain problems related to quality aspects of such a product remain to be solved to make it feasible.

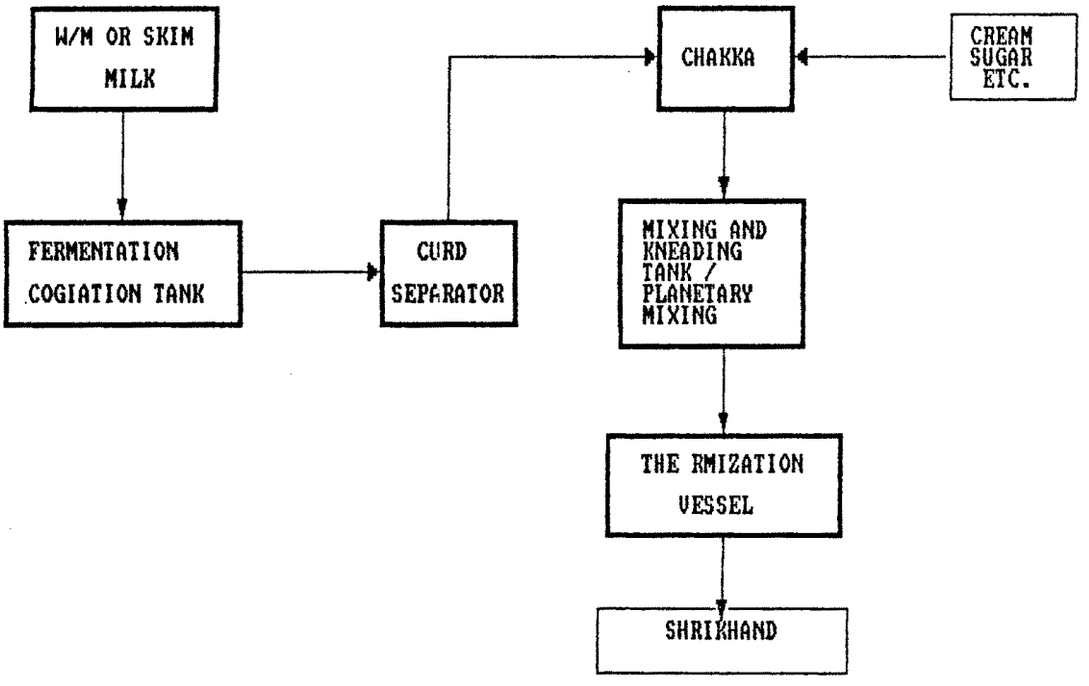



FIG.5 THE SUNGAM PROCESS FOR SHRIKHAND PRODUCTIONS

Flow chart representing the milk procured can be utilised for sale of milk or milk products.