

## Collection and reception of milk

### Milk Collection

The milk is brought from the farm (or collecting centre) to the dairy for processing. All kinds of receptacles have been used, and are still in use, throughout the whole world, from 2-3 litre ( 0.44 –0.66 gallons ) calabashes and pottery to modern bulk-cooling farm tanks for thousands of litres of milk.

Formerly, when dairies were small, collection was confined to nearby farms. The micro-organisms in the milk could be kept under control with a minimum of chilling, as the distances were short and the milk was collected daily.

Today the trend is towards progressively larger dairy units. There is a demand for a higher production and increased quality of the finished product. Milk must be brought from farther away and this means that daily collection is generally out of the question. Nowadays, collection usually takes place every other day, but the interval can sometimes be three days and

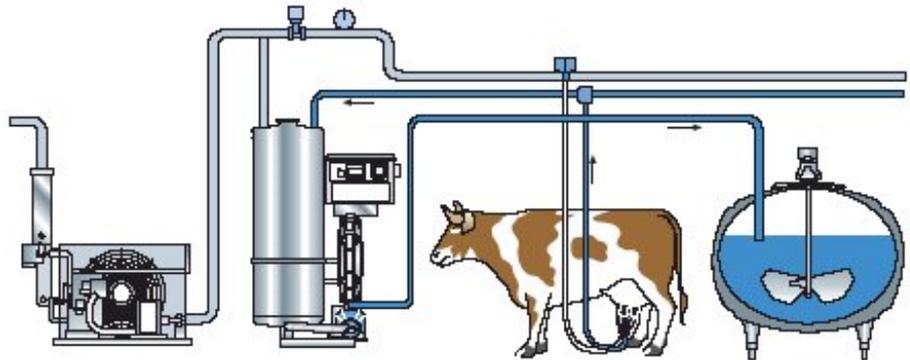


Fig. 5.1 The milk flow in an instant cooling system from cow to cooling tank.

at this temperature all the way to the dairy.

If the cold chain is broken somewhere along the way, e.g. during transportation, the micro-organisms in the milk will start to multiply. This will result in the development of various metabolic products and enzymes. Subsequent chilling will arrest this development, but the damage will already be done. The bacteria count is higher and the milk contains substances that will affect the quality of the end product.

### Design of farm dairy premises

The first steps in preserving the quality of milk must be taken at the farm.

Milking conditions must be as hygienic as possible; the milking system designed to avoid aeration, the cooling equipment correctly dimensioned.

To meet the hygienic requirements, dairy farms have special rooms for refrigerated storage. Bulk cooling tanks are also becoming more common. These tanks (Figure 5.2) with a capacity of 300 to 30,000 litres ( 79—7925gallons ), are fitted with an agitator and cooling equipment to meet certain stipulations—for example that all the milk in the tank should be chilled to +4°C ( 37°F) within two hours after milking.

Larger farms, producing large quantities

of milk, often install separate plate coolers for chilling the milk before it enters the tank (Figure 5.1). This saves mixing warm milk from the cow with already chilled contents of the tank.

The milk room should also contain equipment for cleaning and disinfecting the utensils, pipe system and bulk cooling tank.

### Delivery to the dairy

The raw milk arrives at the dairy in churns or in insulated road tankers, the latter being used only in combination with bulk cooling tanks at the farm which is how MilkoPet<sup>o</sup> milk is delivered. The requirements are the same for both methods—the milk must be kept well chilled and free from air and treated as gently as possible. For example, churns and tanks should be well fitted to prevent the milk from sloshing around in the container.

### Bulk collection

When milk is collected by tanker, it must be possible to drive all the way to the farm milk room. The loading hose from the tanker is connected to the outlet valve on the farm cooling tank.

The tanker is usually fitted with a flow meter and pump so that the volume is automatically recorded. Otherwise, the volume is measured by recording the level difference which, for the size of the tanker is equipped with an air-eliminator.

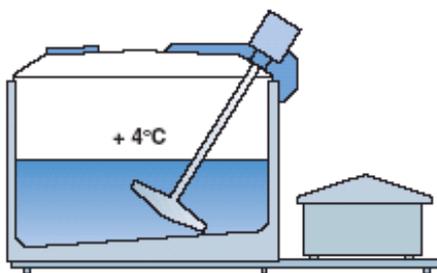


Fig. 5.2 Bulk cooling tank with agitator and chilling unit.

even four.

By world standards the dairy producing region where MilkoPet<sup>o</sup> milk is produced offers the unique advantage of large farms and daily collection for ideal UHT milk processing quality.

### Keeping the milk cool

The milk should be chilled to +4°C ( 37°F) immediately after milking and be kept

Pumping is stopped as soon as the cooling tank has been emptied. This prevents air from being mixed into the milk. The tank of the bulk collection vehicle is divided into a number of compartments to prevent the milk from sloshing around during transportation. Each compartment is filled in turn, and when the tanker has completed its scheduled round, it delivers the milk to the dairy.



Fig. 5.6 Bulk collection at the farm.

### Testing milk for quality

Milk from sick animals and milk which contains antibiotics or sediment must not be accepted by the dairy. Even traces of antibiotics in milk can render it unsuitable for the manufacture of the products which are acidified by the addition of bacteria cultures, e.g. yoghurt and cheese. Normally, only a general assessment of the milk quality is made at the farm. The composition and hygienic quality is usually determined in a number of tests on arrival at the dairy. The outcome of some of these tests has a direct bearing on the money paid to the farmer.

The industry/government integrated quality assurance system used in the production of MilkoPet® milk ensure a comprehensive test program occurs.

### Taste and smell

In the case of bulk collection, the driver takes a sample of the milk at the farm for testing at the dairy. Churn-collected milk

is sampled at the churn reception department. Milk that deviates in taste and smell from normal milk receives a lower quality rating. This affects the payment to the farmer. Milk with significant deviations in taste and smell should be rejected by the dairy.

### Cleaning checks

The inside surfaces of farm tanks and churns are carefully inspected. Any milk residue is evidence of inefficient cleaning and will result in a deduction in accordance with a quality payment scheme.

### Sediment tests

This applies only to churns. A sample is taken with a pipette from the bottom of a churn and is then passed through a filter. A quality deduction is made if visible impurities are retained by the filter.

### Hygiene or Resazurin Tests

The bacteria content of the milk is a measure of its hygienic quality. The Resazurin Tests are used frequently. Resazurin is a blue dye which becomes colourless when it is chemically reduced by the removal of oxygen. When it is added to the milk sample, the metabolic activity of the bacteria present has the effect of changing the colour of the dye at a rate which bears a direct relationship to the number of bacteria in the sample.

Two hygiene tests use this principle. One is a quick-screening test, which may form the basis for the rejection of a bad churn supply. If the sample starts to change shade immediately, the consignment is considered unfit for human consumption. MilkoPet® milk passes the fit for human consumption test before it is accepted for processing.

The other test is a routine test and involves storage of the sample in a refrigerator overnight, before a Resazurin solution is added. The sample is then incubated in a water bath and held at 37.5°C (99.5°F) for two hours.

### Somatic cell count

A large number (more than 500,000 per ml { 0.035 fl.oz } of milk) of somatic cells in the milk indicates that the cows are suffering from udder diseases. The cell content is determined with specially designed particle counters e.g. (Coulter counter).

### Bacteria count

A simplified form of bacteria count can also be used to assess the bacteria content. In this, the Leesment method, the bacteria are cultivated at 30°C (86°F) for 72 hours in a 0.001ml (0.000035 fl.oz) milk sample with a nutritive substrate. The bacteria count is determined with a special screen.

### Protein content

Many dairies pay the farmers according to the protein content of the milk. This is analysed by means of instruments operating with infrared rays. Up to 300 analyses per hour can be performed.

### Fat content

Various methods can be used to determine the butterfat content. The Gerber test is the most widely used method for whole milk.

### Freezing point

Many dairies check the freezing point of milk to determine whether or not it has been diluted with water. Milk of normal composition has a freezing point of -0.54 to -0.59°C (32.97°F—33.06°F). The freezing point will rise if water is added to the milk. Special instruments are used for this check.



Fig. 5.8 Analysing milk samples.

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