

Milk reception

Dairies have special reception departments to handle the milk brought in from the farms. The first thing done at reception is to determine the quantity of the milk. The quantity is recorded and entered into the weighing system that the dairy uses to weigh the intake and compare it with the output. The quantity of the intake can be measured by volume or by weight.

Tanker reception

Tankers arriving at the dairy, drive straight into a reception hall, often large enough to accommodate several vehicles. The milk is measured either by volume or by weight.

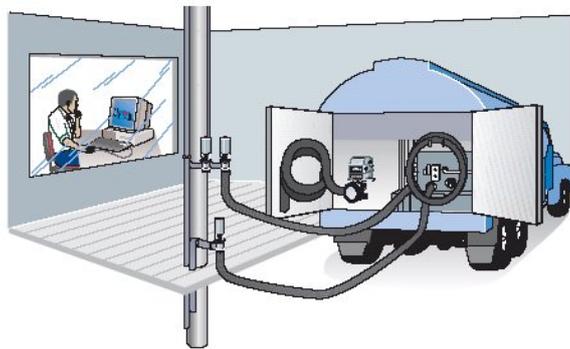


Figure 6.10 Measuring milk intake in a tanker reception hall.

Measuring by volume

This method uses a flowmeter. It registers the air in the milk as well as the milk, so the results are not always reliable. It is important to prevent air from entering with the milk. Measuring can be improved by fitting an air-eliminator before the flowmeter (Figure 6.11) The tanker outlet valve is connected to an air-eliminator and from this the milk –free from air– is pumped through the flowmeter, which continuously indicates the total flow. When all the milk has been delivered, a card is placed in the meter for recording the total volume.

The pump is started by the control equipment which senses when the milk in the air-eliminator has reached the preset level for preventing air from being sucked into the line. The pump is stopped as soon as the milk level drops below a certain level. After measuring, the milk is pumped to a storage (silo) tank.

Measuring by weight

Bulk-collected milk can be measured in two ways:

1. Weighing the tanker before and after unloading and then subtracting one value from the other (Figure 6.12)

2. Using special weighing tanks with load cells in the feet (Figure 6.13)

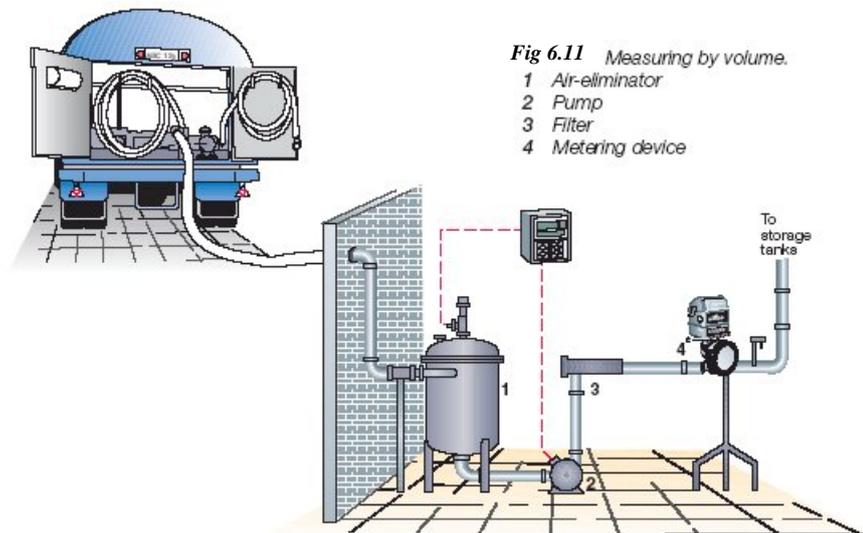


Fig 6.11 Measuring by volume.

- 1 Air-eliminator
- 2 Pump
- 3 Filter
- 4 Metering device

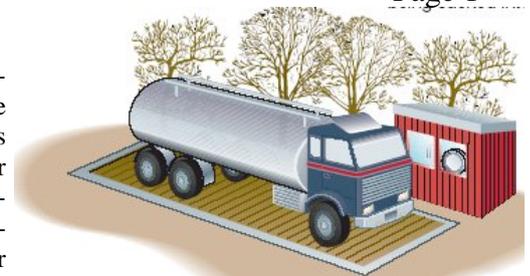


Fig 6.12 Tanker on a weighbridge.

Tanker cleaning

Tankers are cleaned every day, as a rule at the end of a collection round. If the tanker makes several rounds a day, cleaning should take place each round. Cleaning can be carried out by connecting the tanker to a cleaning system while in the reception area, or by driving it to a special cleaning station.

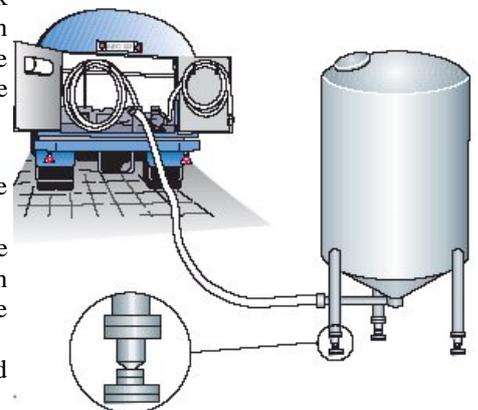
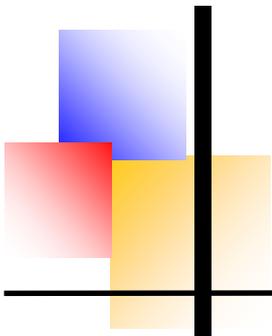


Figure 6.13 Tanks with load cells

Many dairies also clean the outside of their tankers every day so that they always look clean when they are on the road. In more and more countries new rules are introduced about disinfection of tankers to avoid spreading animal diseases.

Chilling the incoming milk

Normally, a temperature increase to slightly above +4°C (37°F) is unavoidable during transportation. Therefore, the milk is usually cooled to below +4°C (37°F) in a plate heat exchanger, before being stored in a silo tank to await processing.



Raw milk storage

The untreated raw milk –whole milk –is stored in large vertical tanks –silo tanks– which have capacities from about 50 000 to 100 000 litres. (13,209–26,417 gallons) Smaller silo tanks are often located indoors while the larger tanks are placed outdoors to reduce building costs. Outdoor silo tanks are of double-wall construction, with insulation between the walls. The inner tank is of stainless steel, polished on the inside, and the outer wall is usually of welded sheet metal.

Agitation in silo tanks

These large tanks must have some form of agitation arrangement to prevent cream separation by gravity. The agitation must be very smooth. Extreme agitation causes aeration of the milk and fat globule disintegration. This exposes the fat to attack from the lipase enzymes in the milk. Gentle agitation is therefore a basic rule in the treatment of milk. The tank in Figure 6.14 has a propeller agitator, often used with good results in silo tanks. In very high tanks it may be necessary to fit two agitators at different levels to obtain the required effect.

Outdoor silo tanks have a panel for ancillary equipment. The panels on the tanks all face inwards towards a covered central control station.

Tank temperature indication

The temperature in the tank is indicated on the tank control panel. Usually, an ordinary thermometer is used, but is becoming more common to use an electric transmitter, which transmits signals to a central monitoring station.

Level indication

There are various methods available for measuring the milk level in a tank. The pneumatic level indicator measures the static pressure represented by the head of

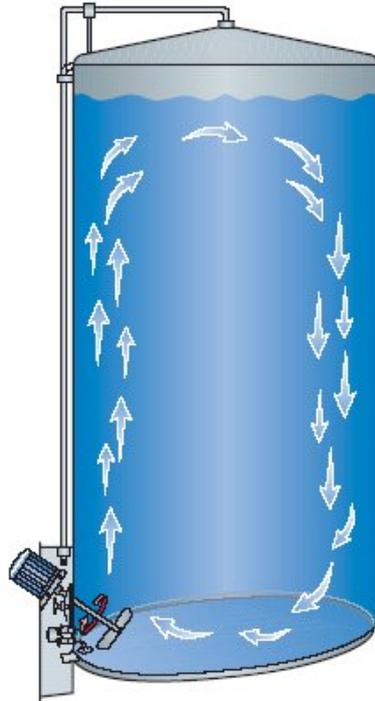


Fig 6.14 Silo tank with propeller agitator.

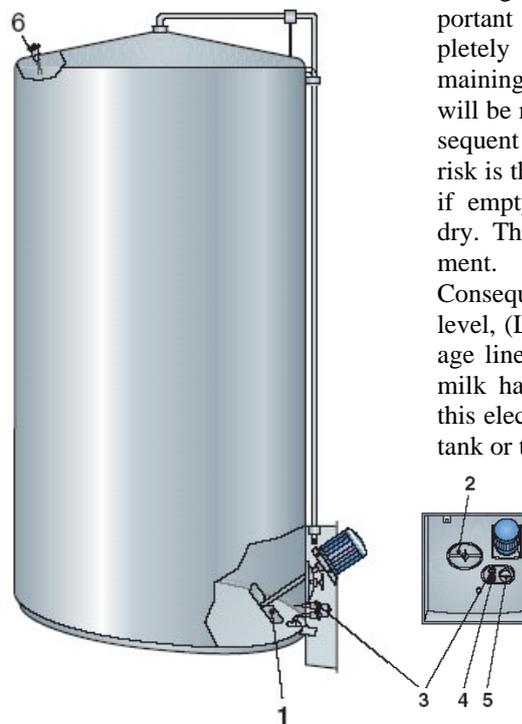


Fig 6.15 Silo tank with alcove for manhole, indicators, etc.

- 1 Agitator
- 2 Manhole
- 3 Temperature indicator
- 4 Low-level electrode
- 5 Pneumatic level indicator
- 6 High-level electrode

liquid in the tank. The higher the pressure, the higher the level in the tank. The indicator transmits readings to an instrument.

Low-level protection

All agitation of milk must be gentle. The agitator must therefore not be started before it is covered with milk. An electrode is often fitted in the tank wall at the level required for starting the agitator. The agitator stops if the level in the tank drops below the electrode. This electrode is known as the low-level indicator (LL).

Overflow protection

A high-level electrode (HL) is fitted at the top of the tank to prevent overflowing. This electrode closes the inlet valve when the tank is full, and the milk supply is switched to the next tank.

Empty tank indication

During an emptying operation, it is important to know when the tank is completely empty. Otherwise, any milk remaining when the outlet valve has closed will be rinsed out and lost during the subsequent cleaning procedure. The other risk is that air will be sucked into the line if emptying continues after the tank is dry. This will interfere with later treatment.

Consequently an electrode, lowest low level, (LLL) is often located in the drainage line to indicate when the last of the milk has left the tank. The signal from this electrode is used to switch to another tank or to stop emptying.