College of Veterinary Medicine
Department of Vet. Public Health

Milk and Dairy Science

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Fifth lecture
(Theoretical)

College of Veterinary Medicine
Department of Vet. Public Health

Milk From Farm to Dairy Plant

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- Milk is **a highly delicate biological fluid**. Milk from multiple farms is collected in tankers typically every other day and delivered to a processing in dairy plant.

- The **safety** of milk products is of major concern in dairy processing, through the regulations of production and storage of milk at the farm and transportation from farm to the dairy plant.

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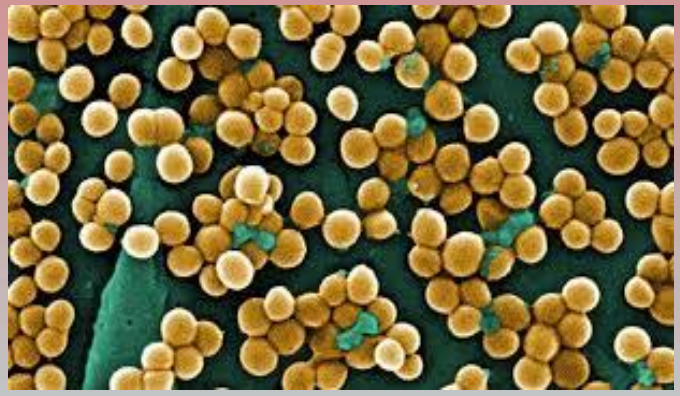
- Regulations also apply for standardized food products that have to meet compositional requirements as well as the use of approved ingredients and processes.

- Today the trend is towards gradually larger dairy units. The demand is for **increased production** without **reduction in the quality** of the finished product.

1. Keeping the Milk Cool

- The milk should be chilled to **below + 4°C** immediately after milking and be kept at this temperature all the way to the dairy.



- If the **cold chain is broken** somewhere along the way, e.g. during transportation, the microorganisms in the milk will start to multiply. This will result in the development of various metabolic products and enzymes.

- Subsequent, chilling will rest this development, but the damage has already been done. The bacteria count is higher and the milk contains substances that will affect **the quality of the end product.**

2. Design of Farm Dairy Building

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

- The place where cows are milked is called the **milking parlour**. The parlour is cleaned each time after the cows have been milked.

- **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 (Figure 1).
- These tanks, with a capacity of **250 - 10 000 liters**, chilled to below +4°C within **2 hours** of milking.

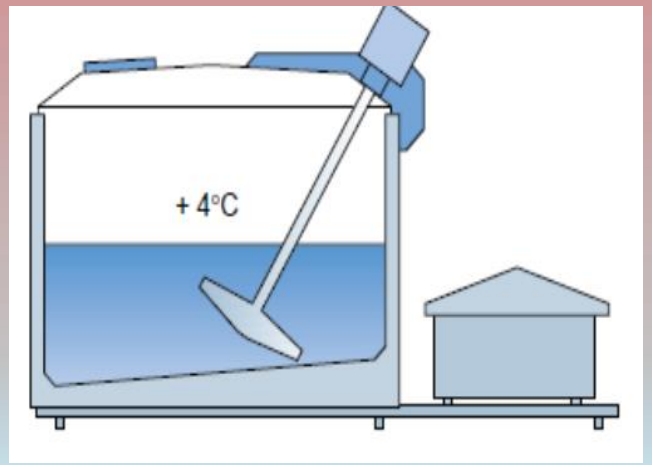


Fig. 1. Bulk cooling tank with agitator and chilling unit

- Larger farms, producing large quantities of milk, often install separate coolers for chilling the milk before it arrives in the tank (Figure 2).
- The dairy room should also contain equipment for **cleaning and disinfecting** the utensils, pipe system and bulk cooling tank.

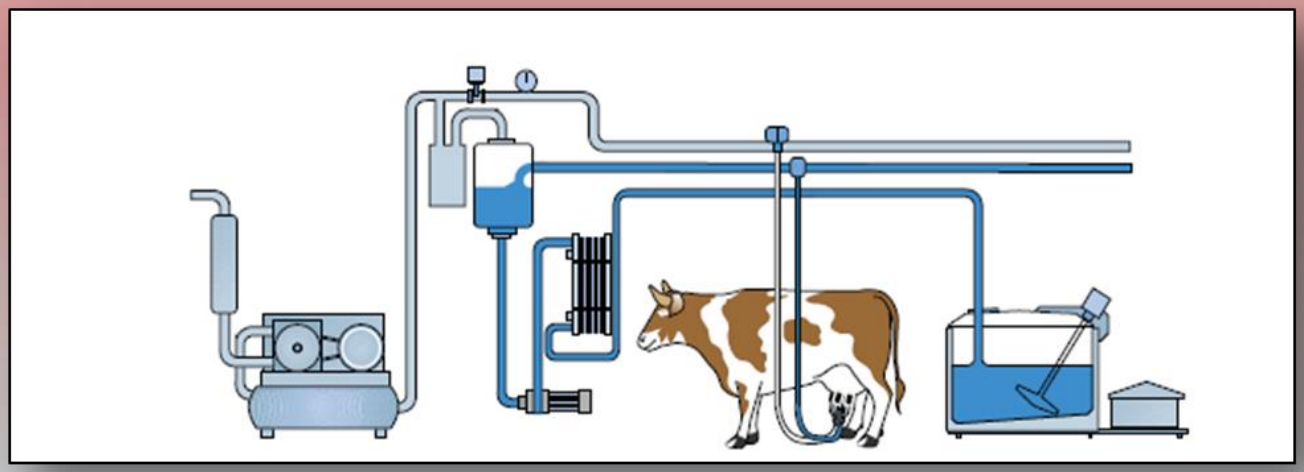


Fig. 2. The milk run in a closed system from cow to cooling tank

3. Delivery to the Dairy

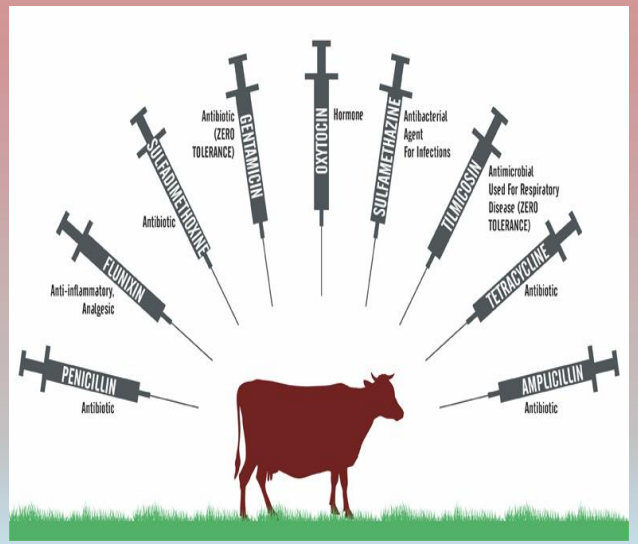
Fig. 3. Churn collection

- The raw milk arrives at the **dairy in churns or tankers,** the milk must be kept well chilled and free from air and treated as gently as possible (Figure 3).

- Each farm usually has a **code number** which is stamped on the churns. It is used by the dairy when calculating how much money the farmer should be paid.

- Milk from **diseased cows** must not be supplied to the dairy together with milk from healthy animals.

- Milk from stock **treated with antibiotics** must be kept separate from other milk. Such milk cannot be used for products, based on bacteria cultures, the antibiotic will **kill the bacteria**. This applies to cultured milk products, cheese and butter, etc.



4. Bulk Collection

- When milk is collected by tanker it must be possible to drive all the way to the **farm dairy 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** (Figure 4).

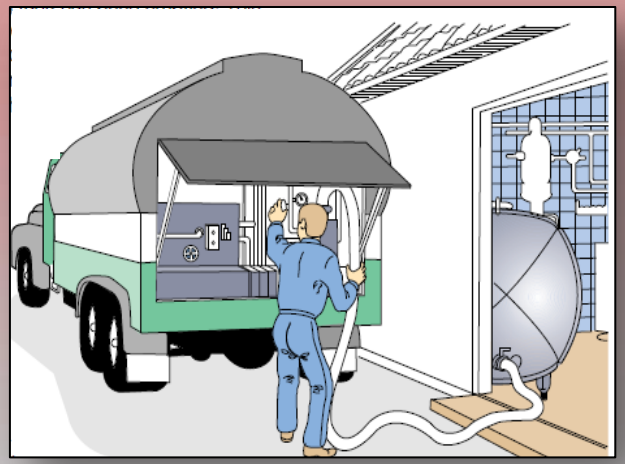
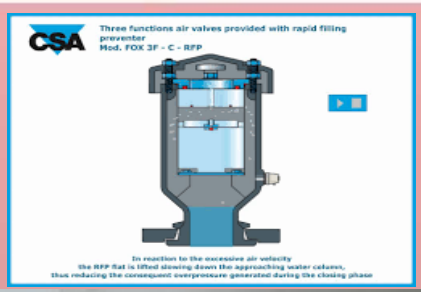


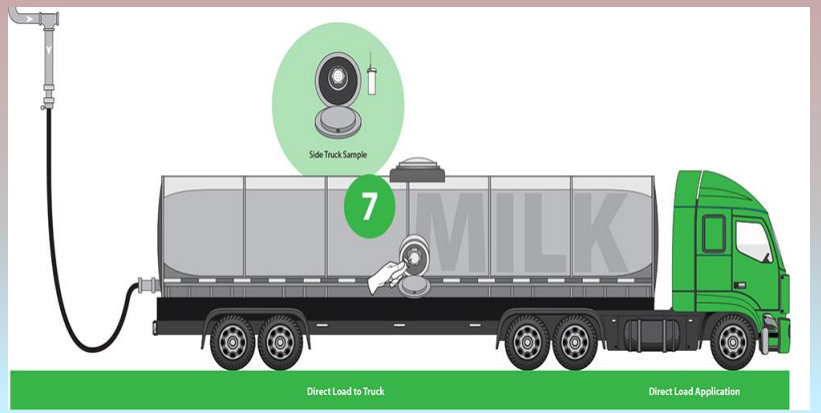
Fig. 4. Bulk collection at the farm

- In many cases the tanker is equipped with an **air eliminator**.



- **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.



5. 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 products which are acidified by the addition of bacteria cultures, e.g. yoghurt and cheese (Figure 5).

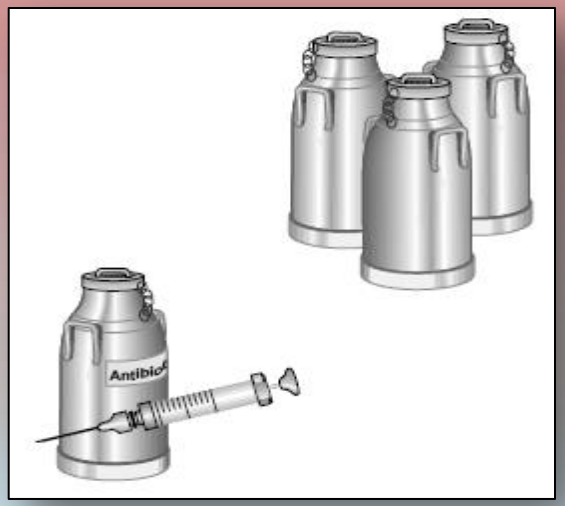


Fig. 5. Milk from animals treated with antibiotics must be kept separate from other milk

- 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 out- come of some of these tests has a direct bearing on the money paid to the farmer.