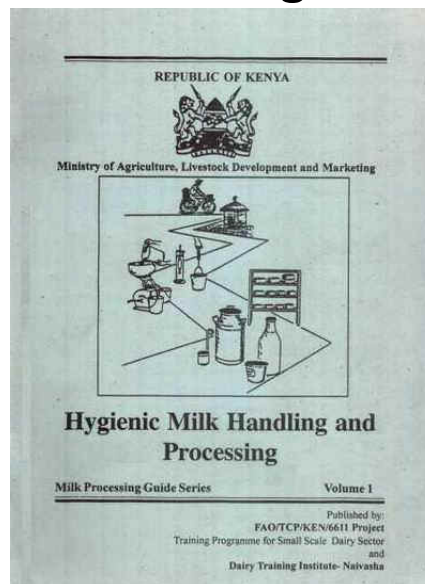


Hygienic Milk Handling and Processing



Milk Processing Guide Series Volume 1

Published by:

FAO/TCP/KEN/6611 Project

**Training Programme for Small Scale Dairy Sector and Dairy Training
Institute - Naivasha**

TABLE OF CONTENTS

1. INTRODUCTION *

2. HYGIENIC MILK PRODUCTION AT THE FARM *

3. MILK TRANSPORT TO PROCESSING FACTORY *

- 3.1 Bulk milk transport. *** [_](#)
- 3.2 In-can milk transportation. *** [_](#)
- 4. DAIRY SANITATION AT THE FARM *** [_](#)
- 4.1 Proper sanitation of milk cans. *** [_](#)
- 4.2 Milking machines *** [_](#)
- 4.3 The cows *** [_](#)
- 4.4 Milk transport vessels (cans and tanks) *** [_](#)
- 5. HYGIENIC MILK HANDLING AT DAIRY FACTORIES *** [_](#)
- 5.1 General guidelines *** [_](#)
- 5.2 Cleaning and disinfections of plant and equipment. *** [_](#)
- 5.3 Packaging. *** [_](#)
- 5.4 Hygienic Storage of finished products. *** [_](#)
- 5.5 Hygienic Transport *** [_](#)
- 5.6 Personnel Hygiene and Health. *** [_](#)
- 5.7 Laboratory Quality Control *** [_](#)

1. INTRODUCTION

Good quality milk is essential for production of good quality dairy products, taste and flavour, free from pathogens and long keeping quality.

GOOD QUALITY DAIRY PRODUCTS CANNOT AND CAN NEVER BE MADE FROM POOR QUALITY RAW MILK

Good quality raw milk must be:

- a. Free from debris and sediment.**
- b. Free from off-flavours.**
- c. Low in bacterial numbers.**
- d. Normal composition and acidity.**
- e. Free of antibiotics and chemical residues.**

In order for milk to reach the processor and ultimately the consumer still in good condition, a number of things must be observed right from the farm level to the processing factory, and thereafter to the retailers and consumer. This booklet will highlight the essential steps that must be taken at each level in order to preserve nature's best food- MILK.

2. HYGIENIC MILK PRODUCTION AT THE FARM

Whether milking by hand or machine, good hygiene is essential.

This requires that:

- a. The milkers hands and clothes are clean and he or she is in good health.**
- b. The milking machine and milk storage equipment such as milk churns are kept clean and are in good condition (i.e. without cracks or dents which are difficult to clean and can easily harbour bacteria.**
- c. Immediately after milking, the milk must be cooled preferably to 4°C. This requires mechanical refrigeration or milk cooling tanks. These are expensive and can usually be afforded by large scale commercial farms.**

For small scale dairy farmers, setting up a milk cooling centre centrally may be the ideal solution.

Where farmers bring their milk to a cooling centre through a co-operative, they should do so as soon as milking is completed.

A Milk cooling centre with a capacity of 1000 - 3000 litres will serve up to 300 small holder farmers ensuring that the quality of their milk when produced under hygienic conditions is well preserved and accepted at the processing plant.

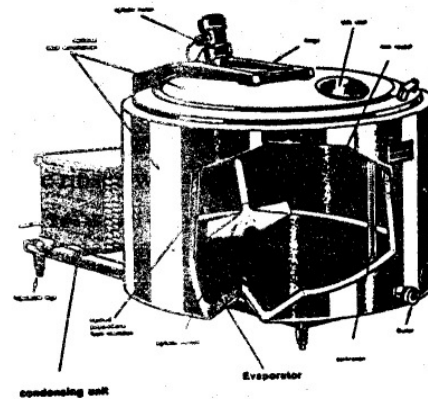


Fig. 1: A bulk (direct expansion) milk cooling tank (1000 - 3000 litres)

It is important to remember that under a hot environment milk will spoil within 3-4 hours. So any means of cooling that will lower the temperature of milk from 38◊ C at milking will help to prevent multiplication of bacteria. There are several options available.

In highland areas such as Kinangop, Limuru , Tiniboroa where the water temperature can be as low as 10◊ C, the milk may be cooled down to 2◊ C using water temperature by one of the following techniques.

- a. Immersing milk cans in a water trough connected to a water tap or water spring.**
- b. Using an in-can rotary cooler.**

TABLE OF CONTENTS

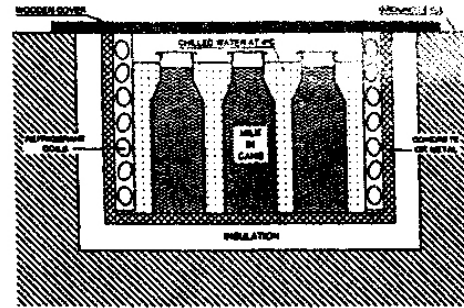


Fig. 2. Milk cooling by immersion in a trough with cool water.

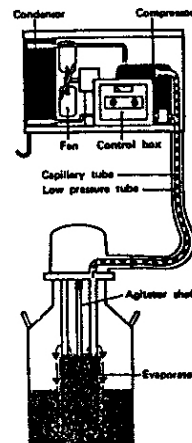


Fig. 3. In-can Rotary milk cooling.

c. Using a surface milk cooler

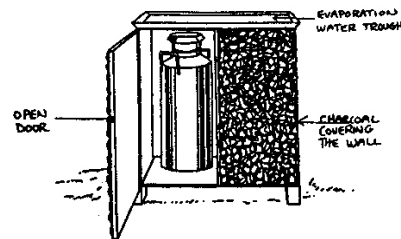


Fig. 4 Surface milk cooler

In hot areas like in the coast, Western Province, North Eastern, Nyanza, cooling of milk below 3-5°C below ambient temperature may be achieved through use of charcoal lined evaporative cooling cabinet.

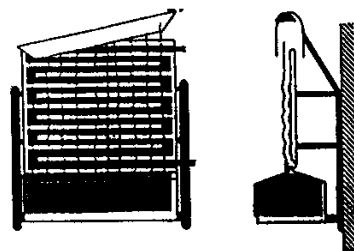


Fig. 5 evaporative charcoal lined cooler

3. MILK TRANSPORT TO PROCESSING FACTORY

3.1 Bulk milk transport.

Milk cooled on the farm or cooling centre may be transported in milk cans or in bulk tankers. Bulk tankers are insulated, so the milk will remain cold until it reaches the plant (provided the transport is fast, i.e. short distance or good roads enabling milk to be delivered before the temperature of milk rises above 10°C).

Fig. 5. Milk collection by bulk tanker.

3.2 In-can milk transportation.

Alternatively, such milk may be filled in cans and transported in milk cans. This has, the advantage that a farmer's can of POOR quality milk will not be mixed with other farmers' GOOD quality milk and spoil the lot!

Since the cans are not insulated, the transport to the factory must be efficient enough to enable milk reach the factory in acceptable condition.

Fig. 6. Milk transport in individual cans.

In the case of farmers delivering milk via pick-up (collection) points it is advisable that the milk cans are placed in a shaded area while awaiting pick-up by a milk transport vehicle.

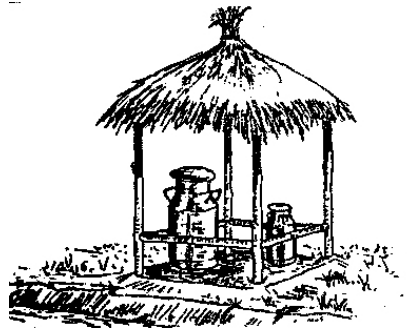


Fig. 7. Provision of shade at pick up-points is important.

Bad milk will be rejected at the dairy plant. The farmer will lose money, the milk transporter may lose money if the fault is his. The nation will suffer because its people will not have the high quality food. To avoid all these bad things happening, hygienic milk

handling is essential at each stage; at the FARM, COOLING CENTRE AND DURING TRANSPORT.

4. DAIRY SANITATION AT THE FARM

It is in the interest of every farmer and milk processor that the following are observed at the dairy farm

4.1 Proper sanitation of milk cans.

Immediately cans are emptied of milk they should be cleaned as follows:

- **Cold water rinse.**
- **Scrubbing with brush and warm detergent (any unperfumed liquid soap will do).**
- **Cold water rinse.**
- **Sterilization (sanitisation) with boiling water or steam if available or use dairy sanitising solution such hypochlorite or commercial brand preparations in accordance with manufacturer's instructions.**
- **Dry cans on a drying rack. Exposure to sunlight will enhance killing off bacteria during drip drying of cans.**

4.2 Milking machines

Milking machines should be cleaned according to recommended

practice:

- **Cold water rinse.**
- **CIP detergent circulation cleaning with dairy detergent in hot water.**
- **Hot water rinse.**

Timely replacement of worn out rubber parts should be undertaken regularly.

4.3 The cows

Follow proper milking hygiene; mastitis cows should be milked last and their milk discarded. Milk from cows treated with antibiotics should not be mixed with milk from healthy cows. Observe the required 4 day withdrawal period. Milk with antibiotics will affect consumers' health as well as spoiling activity of lactic starter cultures used in cheese, yoghurt and Mala manufacture.

4.4 Milk transport vessels (cans and tanks)

All milk transport vessels should be cleaned in the same way as outlined for milk cans above. There should be provision for water at milk cooling centres to enable ALL milk suppliers' vessels or cans to be rinsed with cold water.

Fig. 8. Can washing at milk cooling centre or dairy plant is essential for hygienic milk handling.

5. HYGIENIC MILK HANDLING AT DAIRY FACTORIES

5.1 General guidelines

- i. Floors of dairy buildings must be made of hard washable surface. Walls should be smooth and washable to about 2 meters from floor level and painted with light colour.***
- ii. Doors should be self shutting while windows should be rendered insect proof by mosquito netting to keep flies out.***
- iii. Rooms should be kept clean and in good repair.***
- iv. All product-contact surfaces should be kept cleaned immediately before use or as often as necessary, by cleaning techniques appropriate to the equipment and process.***
- v. Equipment and utensils should be disinfected immediately before use, and whenever there has been possibility of accidental contamination.***
- vi. Equipment repairs and maintenance should preferably be carried out after processing. Whenever machines have to be fixed during production runs, adequate precautions should be taken to prevent contamination of dairy products.***

5.2 Cleaning and disinfections of plant and equipment.

- i. Equipment used for handling liquid milk products should preferably be cleaned and disinfected after each period of use and at least daily.***
- ii. Equipment used in handling fat rich products such as butter and***

cheese should be cleaned as required, but in any case not less than once a week.

iii. The basic steps of cleaning plant and equipment are:

- ***Rinsing with water to remove excess soil Cold or tepid water (40-50 °C) may be used, but hot water of up to 85C maybe used for buffer nuking equipment.***
- ***Washing with a detergent should then follow until the surface of the equipment is clean. This may be used in conjunction with manual scrubbing or CIP cleaning depending on the type of equipment.***
- ***A final rinse with cold potable water should be done until the surface is free of detergent.***

iv) Disinfection

Disinfection of dairy equipment may be carried out by means of:

- ***Steam - Steaming should be done for 10- 15 minutes after the condensate has attained 85 °C.***
- ***Hot water - Hot water at 80 °C (use soft water only to prevent deposition of salts) for at least 20 minutes in circulation cleaning for 15 minutes at 85 °C***
- ***Detergents/disinfectants - used as part of the cleaning process at temperatures between 45-60 °C in manual cleaning and for cold milk lines, storage tanks and tankers.***

5.3 Packaging.

i) Packaging materials should be:

- ***Stored in a dry place away from manufacturing areas;***
- ***Used in a clean and sanitary manner;***
- ***Non-toxic.***

ii) Packaging should be carried out in away that:

- ***Avoids contamination of processed products.***
- ***Protects the product against contamination until the product reaches the consumer.***

5.4 Hygienic Storage of finished products.

Products should be stored in clean conditions at appropriate temperature and humidity to prevent deterioration or permit maturation (e.g. cheese).

5.5 Hygienic Transport

Products should be transported in clean vehicles under appropriate condition and be kept away from other goods.

5.6 Personnel Hygiene and Health.

- ***It is recommended that persons engaged in handling foods***

should be subjected to health checks in accordance with provisions of the Public Health laws of Kenya.

- ***Factory premises should be provided with clean running water and good washrooms.***
- ***Workers should wear clean protective clothing and working gear (e.g. gum boots, coats, overalls and caps).***

5.7 Laboratory Quality Control

Milk and other raw materials should be subjected as required to regular testing in order to ensure wholesomeness and freedom from pathogens.