

Technical Bulletin No. 1

# Hygienic Milk Processing: Clean Environment, Clean Utensils

by  
Abebe Tessema and Markos Tibbo



International Center  
for Agricultural Research  
in the Dry Areas



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## Project Partners

The IFAD-funded Women's Livelihoods and Dairy Goat Project is being implemented by ICARDA in partnership with institutions in Pakistan and Afghanistan.

**Pakistan:** Pakistan Agricultural Research Council, National Agricultural Research Centre (NARC), Barani Livestock Production Research Institute, University of Arid Agriculture, Rawalpindi, National Rural Support Programme, Centre for Advanced Studies in Vaccinology and Biotechnology, Arid Zone Research Centre, Animal Sciences Institute, Dairy Technology Section of NARC, Livestock and Dairy Development Department, Balochistan.

**Afghanistan:** Livestock Department of the Ministry of Agriculture, SERVE - Eastern Region Community Development Project, Dutch Committee for Afghanistan, Food and Agricultural Organization of the United Nations (FAO).



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## About the authors

**Abebe Tessema**, Dip Agric Sci, Dip Vet Sci, ONC Lab Sci., is a dairy consultant based in Debre Zeit, Ethiopia.

**Markos Tibbo**, DVM, PhD, is Field Research Coordinator for an ICARDA dairy goat project in Afghanistan and Pakistan. He is based at ICARDA headquarters in Aleppo, Syria.

Editor: Ajay Varadachary

Design and layout: George Chouha

Illustrations: Dr Fahed Hariri, Faculty of Fine Arts, University of Aleppo

## **Foreword**

This Technical Bulletin is the first in a series produced by the Women's Livelihoods and Dairy Goat Project being implemented in Afghanistan and Pakistan. This IFAD-funded project aims to improve rural livelihoods in marginal, conflict and post-conflict areas of the two countries.

Hygienic milk production, handling and processing are key issues in promoting livestock production. Better hygiene can significantly improve the health of producers as well as consumers, but in rural areas in Afghanistan and Pakistan there has been little or no effort to promote these simple technologies.

This Technical Bulletin is intended to serve as an extension aid for facilitators and livestock producers to improve the hygienic production and processing of milk. This is particularly important in areas where zoonotic infectious diseases such as tuberculosis and brucellosis are prevalent, affecting both animals and people. Transmission of such diseases can be greatly reduced by following the guidelines described in this booklet.

I would like to thank all those involved in the preparation, review and translation of this Technical Bulletin.

Barbara Rischkowsky  
Acting Director, DSIPS Program  
ICARDA

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## 1. What is 'clean milk'?

Clean milk means milk that is healthy, has a pleasant creamy smell and good flavor, white or creamy color, and is free from dirt, foreign matter and drug residues (e.g. sanitizers and pesticides). It contains relatively small numbers of bacteria, and no harmful pathogens. Clean milk comes from healthy animals.

## 2. Why is it important to produce clean milk?

- Clean raw milk has good keeping quality \*
- High quality dairy products can only be made from clean milk
- Clean milk protects the health of the consumer
- You can obtain higher prices for clean milk (raw milk as well as dairy products)

## 3. How to produce clean milk?

To produce clean milk, you must take care of personal hygiene and eliminate contamination from various sources, as listed below.

### *Personal hygiene*

- Wash your hands and nails with clean water and soap before handling milk
- Wear clean over-clothes and gumboots while handling milk
- Never handle milk if you are suffering from a communicable disease or have an open sore or wound on your arms, hands, head or neck.
- Do not cough or sneeze near milk or milk containers
- Bathe or take a shower regularly



\* Keeping quality or keeping power is a term to describe how long the milk remains sweet, palatable and suitable for direct consumption. Milk with good keeping quality fetches good market prices. Milk that is sour or otherwise unpalatable cannot be sold for direct use, however rich it may be in fat and other solids.

### **Sources of contamination**

- Udder and udder flanks
- Hands of the person doing milking
- Dirty milking equipment
- Dirty vessels to store and transport milk
- The environment, e.g. chemicals and dust
- Unhealthy cow, goat or sheep
- Disease or infection in the person doing milking

*Containers can be a source of contamination, if not properly cleaned*



## **4. Milking practices**

Animals should be milked at the same time every day. Before milking use post-teat dip disinfectant sodium hypochlorite (commonly known as bleach) at about 4% concentration, i.e. 1 teaspoon of bleach in 10 tablespoons of clean water. Washing the udder not only makes it clean, but also stimulates milk let-down.



*Remove the fore milk into a strip cup*



*Wash the udder with a clean towel*



*Milking should be completed in less than 10 minutes*

## 5. Common activities at the milk production and collection center

Once you form a milk producers group, the first step is milk collection. Milk from several group members is collected at one place, from where it can be processed or transported to processing centers or markets. Milk should be collected soon after milking, i.e. within two hours. Longer delay in transport reduces shelf life of the final products.



Before collection, each individual farmer's milk should be examined, using a sensory test. At the time of collection, a strainer, or a clean muslin cloth, should be used to remove dirt and suspended particles. The milk should then be weighed and recorded.

At the milk collection center, good quality and poor quality milk can be separated using an organoleptic test (i.e. looking, smelling and tasting). No special equipment is required.



*Sensory evaluation*



*Milk filtration*



*Milk weighing*

## 6. Guidelines for milk cooling

Proper milk cooling is essential to ensure good quality. Bacteria multiply rapidly when milk is cooled too slowly or if it is stored at temperatures above 4°C. Fresh milk, immediately after milking, is about 33°C. Cool the milk immediately, and keep it as cold as possible before processing. The best temperature is 2° to 4°C. Cooling and storage is very important, especially if there is a long delay (more than 2 hours) between milking and delivery at the collection center. This delay can happen for evening milk or for morning milk produced on farms far away from the collection center. In such cases, ideal storage temperature is 1-2°C. Cooling should be done in two stages. First, fresh milk is pre-cooled to 15-20°C or lower. Then, it is cooled to storage temperature. For any subsequent milk (arriving in batches) the mixed or blended temperature should not go above 10°C.

## 7. Milk handling equipment

All milk handling equipment must be made from food grade material. \* Make sure that equipment on your farm meets the following conditions.

\*Food-grade materials are safe, biocompatible and biodegradable. They can be used for storing and transporting milk and other food products.

- Equipment should not be made of copper or any copper alloy or any toxic material. Copper causes the milk to oxidize; it develops a bad flavor and becomes rancid.
- Equipment should have a smooth finish, without cracks or rust stains.
- Equipment should have a wide opening. This makes it easy to clean.
- The equipment should be used only for milk, not for anything else.

## 8. Water is very important

Water is needed for many operations in a dairy - washing, indirect heating, cooling, and for adjusting product composition (dilution). Make sure all the water is clean, with good bacteriological quality. This will protect your health, the health of your animals, and prevent contamination and deterioration in the quality of milk and milk products.



## 9. Cleaning and sanitization of milk containers and equipment

All equipment must be regularly cleaned and sanitized. Cleaning is the first step, i.e. removing dirt and residues. After cleaning, sanitization is done to remove micro-organisms. Water is not enough to achieve full sanitization, so chemicals have to be used, such as alkaline detergents (e.g. caustic soda or soda ash), acid detergents, sodium hypochlorite (or bleach at 80 ppm), chlorine, etc.

## 10. How to avoid quality problems during transportation?

Milk must be transported from producers to processors to consumers. Because milk is a very perishable product, transporters must ensure high levels of hygiene, speedy transport and careful handling. This will minimize losses due to spillage and spoilage, avoid contamination of milk by pathogens, and also increase the profits from your milk transportation business.

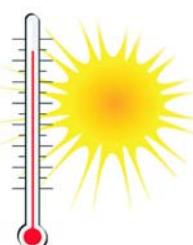
Five issues are important during transportation: contamination, storage temperature, time delays, exposure to light, and agitation of milk containers.



*Chemicals can cause severe contamination*



*Protect milk from dust*



*Never expose milk to heat or direct sunlight*



*Take care to avoid spillage*



*Dirty containers are dangerous to health*

### **Contamination**

Dirty vessels or entry of dust particles will increase the bacterial load in milk and reduce its shelf life. Make sure milk cans and other vessels are very clean. Keep the milk covered at all times during transportation.

### **Storage temperature**

The higher the temperature, the faster will bacteria grow, and cause the milk to become sour. If chilled milk is collected, try to maintain the temperature as cool as possible by using insulated containers or boxes, or by placing ice around the containers.

### ***Time delays***

The time from milk collection to cooling is very crucial. Bacterial multiplication is very slow during the first 2 hours. After that bacteria will multiply very fast, doubling every 20-30 minutes. If you are transporting unchilled milk, make sure the milk reaches its final destination within 2 hours from the time of milking. This is the secret to successful milk transportation.

### ***Exposure to light***

Milk is very sensitive to light. If exposed to direct sunlight, butterfat and some vitamins get oxidized, and the milk develops a bad, oxidized flavor.

### ***Excessive agitation***

When milk is agitated the milk fat is destabilized and tends to oxidize easily. Always handle milk containers carefully. One big reason for agitation is transporting half-full cans. Try and avoid this wherever possible.

## **11. Summary**

To maintain the quality of milk during transportation, always follow these simple guidelines:

- All containers and the transport vehicle should be very clean
- Do not use milk containers for storage of other goods
- Do not transport milk along with other goods. According to regulations, vessels and transport vehicles used for milk transport should be used for milk only and should be labeled "MILK ONLY"
- Keep the milk as cool as possible
- Keep the milk covered at all times to protect it from light and dust
- Transport your milk to the sales point or processing factory as quickly as possible
- Do not smoke, handle tobacco or other materials with strong odour (e.g. kerosene, petrol, diesel) when handling milk
- Avoid excessive agitation of containers.