Food and Agriculture Organization
of the United Nations

MILK HYGIENE & QUALITY CONTROL

A training guide for small scale milk traders in Somalia

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Food and Agriculture Organization of the United Nations
Rome, 2018

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ISBN 978-92-5-130528-7

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Contents

Acknowledgements

Trainer guidelines 1

Day 1: Milk spoilage and milk quality control 1

Day 2: How to ensure good quality milk 2

Day 3: Practical day out In the field 3

Part 1: Introduction 4

Part 2: Trainer guidelines 5

Day 1 6

Session 1: Factors related to milk spoilage (1 ½ hours) 6

Session 2: Why you need to know about milk quality control (½ hour) 9

Session 3: What is milk quality control? (½ hour) 12

Session 3.1: Day 1 summary and mini evaluation (¼ hour) 13

Session 3.2: Pre-evaluation on knowledge of milk quality control (¼ hour) 13

Day 2: How to ensure good quality milk 14

Session 1: Advice to give to farmers (½ hour) 14

Session 2: Hygienic milk handling 19

Session 3: How to test if milk is acceptable (1 ½ hours) 23

Session 4: How to preserve milk to reduce spoilage (1/2 hour) 29

Day 2 Summary and mini evaluation (¼ hour) 31

Day 3: Practical day out in the field 32

Session 1: Practical exercises in the field (whole day) 33

Other sources of information 34

Acknowledgements

This training manual has been designed for training small-scale milk traders in Somalia. It was pilot tested during the training on milk handling and hygiene. This resource material is as a result of the sustainable Peri-urban milk value chain project implimented jointly by FAO and ICIPE with funding from the EU.

The contribution of the following persons is highly acknowledged:
ROAD International staff who helped to come up with the training guide:
Ms. Dahabo Shalle
Mr. Caleb Ouma
Mr. Samuel Opiyo.
Mr. Abdullahi Salan
Mr. Victor Bett.

We also acknowledge the support of Mr. Saeed A. Bancie, Edwin Barasa, Abdi Jibril and Haji Osman of FAO Somalia Office for their valuable contribution in the production of the guide.

Trainer guidelines

Day 1: Milk spoilage and milk quality control

Objective for the day:

To equip participants with background knowledge on causes of milk spoilage and quality control.

Session 1: Introduction to the training program (1 hour)

Activity 1.1: To identify stakeholder relationships that affect milk business

Activity 1.2: To determine the relative importance of milk spoilage as a marketing constraint

Activity 1.3: To appreciate the causes and effects of milk spoilage

Session 2: To introduce the concept of good quality milk (1 ½ hours)

Activity 2.1: To discuss the constituents of milk

Activity 2.2: To demonstrate how multiplication of bacteria in milk causes spoilage

Activity 2.3: The cause and effects of milk spoilage

Session 3: Why you need to know about milk quality control (1/2 hour)

Activity 3.1: To recap the main learning points from Day 1

Activity 3.2: To obtain background information about the participants for record purposes.

Good quality milk

Day 2: How to ensure good quality milk

Objective for the day:

To educate participants on hygienic milk handling practices and quality control.

Session 1 Introduction to activities of day 2 (1/4 hour)

Session 2: Advice to give to farmers (1/2 hour)

- Activity 2.1: Sources of milk contamination at the farm
- Activity 2.2: Advice to give to farmers on avoiding contamination

Session 3: Hygienic milk handling (1/2 hour)

- Activity 2.2: Practices to reduce milk spoilage
- Activity 2.3: Hygienic milk handling practices by traders

Session 4: Milk testing (1 ½ hours)

- Activity 4.1: To introduce basic milk quality control methods
- Activity 4.2: Activities and resources for organoleptic (sight and smell) test
- Activity 4.3: Activities and resources for the basic milk tests
- Activity 4.4: Introduction to advanced milk tests

Session 5: How to preserve milk to reduce spoilage (1/2 hour)

- Activity 5.1: Importance of milk cooling
- Activity 5.2: Extending the shelf life of milk

Day 2 summary and mini evaluation (1/4 hour)

Preparation for practical exercises on day 3 (1/4 hour)

Good quality milk

Day 3: Practical day out in the field

Objective for the day:

To enable participants to practice the quality control and hygienic tests under normal milk marketing conditions and determine those that are viable in their businesses

Session 3.1: Practical exercises in the field (whole day)

Part 1: Introduction

As a milk trader, you are aware that no other food gets spoilt more easily than milk. Just as people like milk for its nutritive value, bacteria that cause milk spoilage also do. This guide is designed to help you learn how to reduce the losses caused by spoilage to allow you to increase your profits.

The unhygienic handling practices in traditional camel milk production and in the informal camel milk trade represent serious obstacles for the introduction of modern dairy processing and marketing. The successful adaptation of pastoral subsistence production to the needs of an improved camel milk production and marketing system will depend, to a large extent, on safeguarding the milk quality at production, during transport, processing and marketing.

The guide has been put together with the participation of a pilot group of small-scale raw milk traders in various parts of East Africa to ensure that the material and methods suggested are relevant, simple and practical, thus making them directly applicable within your circumstances. Improving your image as a quality milk trader should ensure customer satisfaction and more sales for your business. The guide is designed for use in a short formal training programme. However, any milk trader can also easily read and apply the illustrated instructions and methods.

Part 2: Trainer guidelines

This guide will help you learn

1. Factors related to milk spoilage
2. Why you need to know about milk quality control
3. What is milk quality control
4. How to ensure good quality milk
    - Advice to give to farmers
    - Hygienic milk handling
    - How to test if milk is acceptable
    - How to preserve milk to reduce spoilage.
5. Other sources on information

Day 1

Session 1: Factors related to milk spoilage (1 ½ hours)

Objectives for this session:

1.1 To identify stakeholder relationships that affect milk business
1.2 To determine the relative importance of milk spoilage as a marketing constraint
1.3 To appreciate the causes and effects of milk spoilage

Materials

Flip chart, flip chart stand or whiteboard, felt pens, cards made from manila paper, pins, masking tape and a pair of scissors.

Background

There are many constraints or problems that milk traders face in marketing their milk. Many of these constraints or problems cause milk spoilage or are the result of it. These may include the following factors:

- Long distance or time between collection and resale point
- Type of containers used.
- How the containers are washed
- Method of preservation
- Low profits
- Lack of training

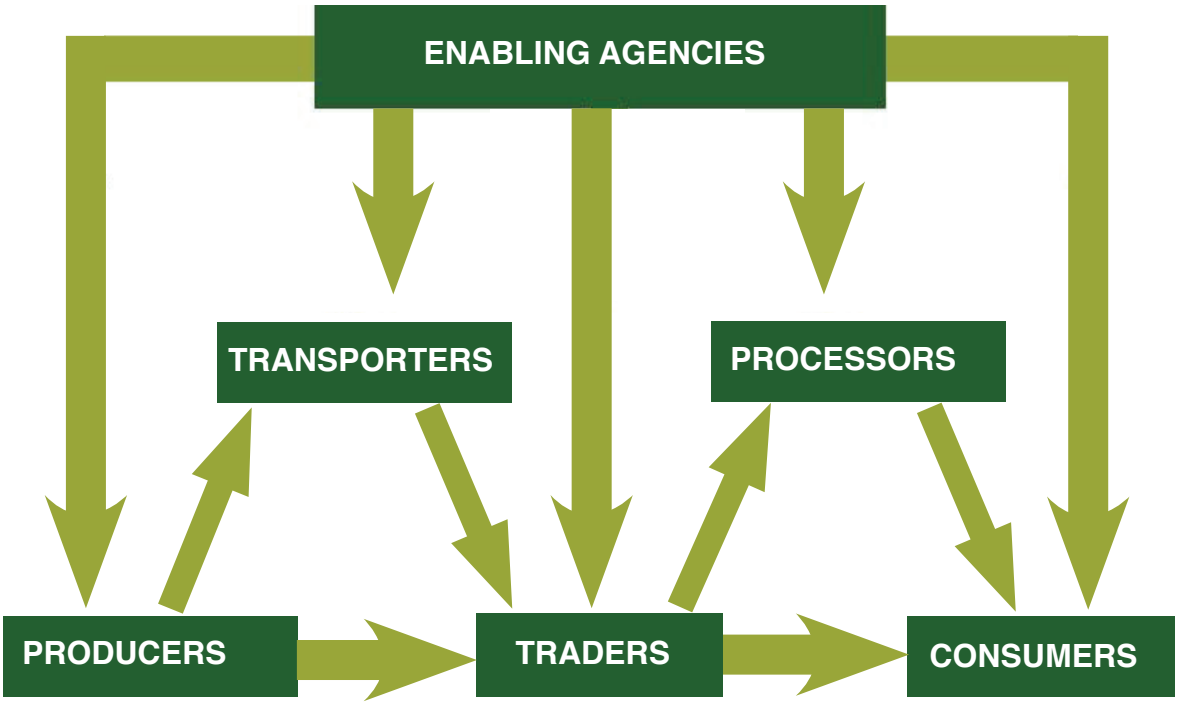
All these factors relate to milk spoilage. Traders are aware of most of the causes and effects of milk spoilage. The relationship between the traders and various stakeholders in milk marketing, whether positive (e.g. provision of training) or negative (e.g. arrests) also has an influence on their business and the quality of milk that they sell. In a formal training session, the trainer can discuss more examples of these relationships.

Activity 1.1: Stakeholder analysis

Specific objective: To enable traders to identify the stakeholder relationships that either promote or constrain their milk businesses.

Activities	Resources
Explain the meaning of the term "stakeholder" with the aid of the conventional commodity production/marketing flow diagram	A20 sheets, flip charts and marker pens
Explain that supposedly enabling agencies can also be disabling agencies!!! e.g. police, regulators.	
Produce the diagram: analysis of stakeholders within the milk marketing business, on an A20 sheet.	
= In a plenary group identify the main stakeholders. = Discuss briefly their main role and function. = Ask whether the relationship is friendly (positive) or hostile (negative).	
There is danger of spending too much time on this exercise - remember this is to be only a brief overview.	
Reinforce the effects by discussing the human diseases that can be passed through contaminated milk. If possible use the public health officer to address these concerns as they relate to the specific locality.	

Analysis of stakeholders within the milk marketing business:



Activity 1.2: General milk marketing constraints

Specific objective: To determine the relative importance of milk spoilage as a production and/or marketing constraint.

Activities	Resources
Group work 5-6 persons per group. Discuss the main constraints faced in marketing your milk	A20 sheets, flip charts and marker pens
List and explain the main constraints Trainer to demonstrate pair-wise ranking. Groups rank constraints using pair-wise ranking. Elicit reasons for the choices given from each group	

Activity 1.3: The causes and effects of milk spoilage

Specific objective: To enable the participants to appreciate the inter-relationship between causes and effects when addressing the main issue of milk spoilage.

Activities	Resources
Group work 5-6 persons per group. Discuss the main constraints faced in marketing your milk.	A20 sheets, flip charts and marker pens
Participants list the main causes and effects of milk spoilage on the A20 sheets provided	Work stations (desks and chairs) for three groups
Groups present their findings with plenary debate	
Discuss other factors (marketing, poor roads, transport, seasonal supply, etc.) that influence milk spoilage	
Reinforce the effects by discussing the human diseases that can be passed through contaminated milk. If possible use the public health officer to address these concerns as they relate to the specific locality	

Session 2: Why you need to know about milk quality control (½ hour)

Objectives for this session:

2.1 —To discuss the constituents of milk
2.2 —To demonstrate how multiplication of bacteria in milk causes spoilage
2.3 —To explain the factors affecting milk spoilage

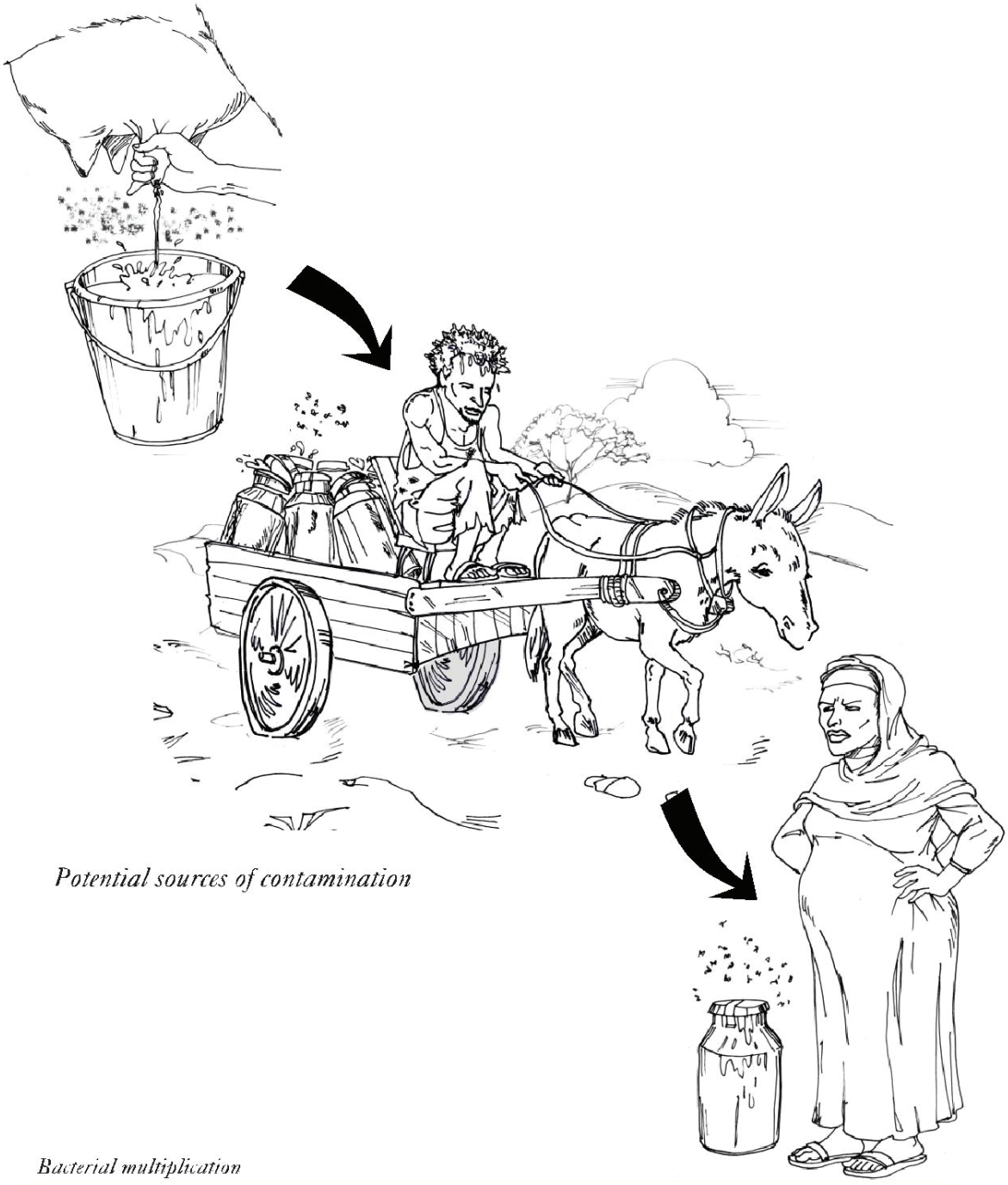
Materials

Flip chart, flip chart stand or whiteboard, felt pens, beans (in 4 packs of 0.5kg each).

Background

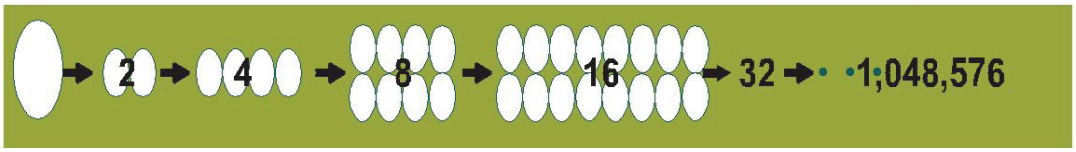
Milk has nutrients that make it suitable for the rapid multiplication of bacteria that cause spoilage. Unhygienic production, poor handling and undesirable practices such as addition of water or other substances can introduce bacteria or germs that cause spoilage. The resulting wastage can make you lose profits that you would have otherwise made. Unhygienic handling may introduce disease-causing bacteria into the milk and this can also adversely affect human health.

In addition, regulatory authorities will likely require that you undergo a training course that covers the contents of this guide before they issue you with a license to trade in milk. This course is therefore designed to provide the relevant knowledge and skills needed to handle milk hygienically.



Potential sources of contamination

Bacterial multiplication



Activity 2.1: The constituents of milk

Specific objective: To enable participants to understand the constituents of milk that make it susceptible to spoilage by bacteria.

Activities	Resources
Draw a plate and cup on an A20 sheet! Ask participants to describe their preferred meal. Draw the items on the A20 sheet as they name them and explain: = Carbohydrates (maize and rice) = Protein (meat and beans) = Fat (sauce) = Vitamins and minerals (vegetables) and = Glass of water!	A20 sheets, flip charts and marker pens
Open question to participants: "What is milk composed of?" (And later "In what proportions?")	
Record responses Use Overhead projector	Overhead projector
Many participants find graphs and pie charts difficult concepts so try to relate the proportions to milk found in a milk churn	
Draw on A20 sheet an outline of a milk churn with proportions of milk constituents, beginning with the highest percentage i.e. water at the bottom and minerals at the top	
Explain that just as human beings eat and grow from their food so milk has all the ingredients that enable bacteria to "eat" and grow	

Activity 2.2: Causes of spoilage

Specific objective: To demonstrate the contribution of multiplication of bacteria towards spoilage of milk.

Activities	Resources
Open question to participants: "What REALLY causes milk to spoil?" Record responses	A20 sheets, flip charts and marker pens
Explain the importance and nature of bacteria/micro-organisms	
Divide participants into two groups: Clean milk group Contaminated milk group	Chalk, two big bags of beans, 30 cm rulers
Summarize what group members learnt from the exercise: the rapid multiplication of bacteria over time especially in contaminated milk	

Activity 2.3: Factors affecting milk spoilage

Specific objective: To enable participants to understand the main factors that enable bacteria to multiply and spoil milk.

Activities	Resources
Discuss the main factors that cause bacteria to multiply and spoil milk - Time (for bacteria to multiply) - Temperature - Moisture - Milk constituents	A20 sheets, flip charts and marker pens
Use Annex 1.6 (Milk preservation) and show the graph as an overhead transparency to emphasize the effect of temperature on bacteria growth and hence the role of cooling in extending the shelf life of milk (Milk preservation will be discussed in more detail on day 2)	

Session 3: What is milk quality control? (½ hour)

Objective for the session:

To introduce the concept of good quality milk in preparation for Day 2.

Materials

Flip chart, flip chart stand or whiteboard, felt pens.

Background

Milk quality control is the practice of specified hygienic methods and use of approved tests to ensure good milk quality. The good hygienic practices and tests are designed to help reduce milk spoilage (See Section 1-3 for details on these methods and tests). You will need to practice the tests with a trainer to ensure that you are able to use them properly.

Activity 3.1: The basics of milk quality control

Activities	Resources
Brainstorming exercise to prepare for Day 2: - What do we mean by good quality milk? (Wholesome; safe; clean - looks and smells good - without foreign bodies, etc.). - How do we make sure that milk is of good quality? (Proper hygiene and testing etc). - These are the topics to be considered on Day 2	A20 sheets, flip charts and marker pens

Session 3.1: Day 1 Summary and mini evaluation (¼ hour)

Objective for the session:

To recap the main learning points from Day 1 and to get participants feedback on the training so far.

Activities	Resources
a) Use a playful game (e.g. with a ball) to involve all participants in recapping the main learning points from Day 1. All stand - one facilitator passes the ball in turn to participants who state what they have learnt during the day whilst the other trainer records the learning points on the A20 sheet	A20 sheets, flip charts and marker pens
b) Each participant is then given a post-it sheet to write a comment about day 1 and stick it on the prepared A20 sheet: - In the "happy" section if they are pleased - In the "neutral" section if they are indifferent and - In the "sad" section if they are disgruntled	A20 sheet with "happy"; "neutral" and "sad" faces, post it pads
Participants depart and trainers remain to conduct their own debriefing and assess the participants' evaluation comments	

Session 3.2: Pre-evaluation on knowledge of milk quality control (¼ hour)

Objective for the session:

To obtain background information about the participants for record purposes including assessment of the impact of the training at a later date.

Activities	Resources
Ask participants to complete the pre-evaluation questionnaire before the start of Day 2	
Many participants find completing this kind of questionnaire difficult and therefore it may be deemed unnecessary, in which case omit this session.	

Don't forget milk samples for use on Day 2, Session 3. These need to be prepared at the end of Day 1.

Day 2: How to ensure good quality milk

Objective for the day

To educate participants on hygienic milk handling practices and quality control.

Materials
Flip chart, felt pens, cards, fresh whole milk (5 litres for preparing samples), sour milk, milk adulterated with water, liquid detergent, hand brush, scrubbing material (e.g. Super-brite), water, three big troughs, dirty containers, ten 500ml sample jars, spirit lamp/candle, kerosene/methylated spirit, spoons (1 per group), 5ml disposable syringes (2 per group), 70% ethanol alcohol (500ml per group), small plastic/glass cups (1 per group), thermometer (1 per group), lactometer (1 per group), 100 ml measuring cylinder (1 per group), onions, tissue/ paper towels, tray.

Background

Milk from the udder of a healthy cow contains very few bacteria. Poor hygiene introduces additional bacteria that make the milk spoil quickly. To ensure that the milk remains fresh for a longer time it is necessary to practice good hygiene. Good hygiene needs to be observed at all stages of milk production, handling and marketing. Therefore you need to advise the farmer on hygienic milk production and handling after milking.

Session 1: Advice to give to farmers (½ hour)

Objectives for this session:

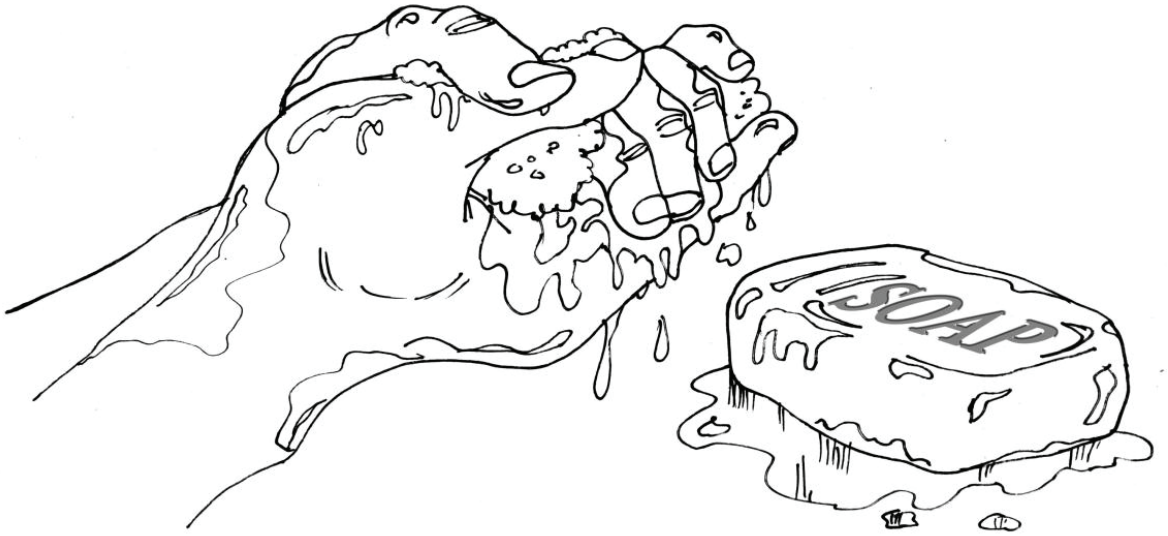
1.1 —To learn about sources of milk contamination at the farm

1.2 —To learn about advice to give to farmers on avoiding contamination

Activity 2.1: Sources of milk contamination at the farm

Specific objective: To enable the participants acquire background knowledge on sources of milk contamination at the farm

Quality control must begin at the farm3. That way, the milk that the traders collect will have fewer bacteria that cause spoilage. Below is some advice that milk traders can give to the farmers who supply them with milk, in order to ensure good quality



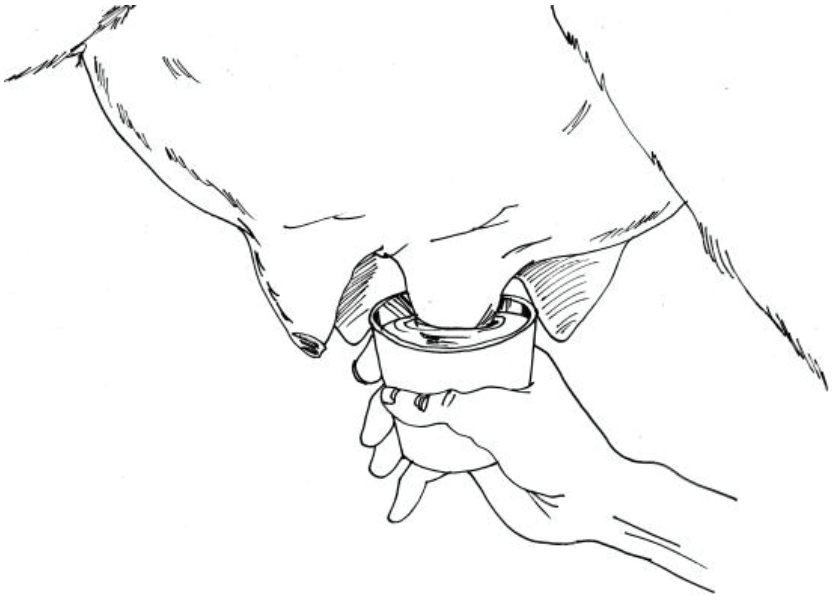
1. Maintain clean and healthy camels
2. Keep a clean milking environment
3. Wash hands with soap and clean water before milking
4. Wash the udder with a cloth and warm water
5. Dry the udder with a clean dry cloth
6. Make the first draw into a strip cup and throw away into a strip cup to check for mastitis and throw away from the milking area

Make the first draw into a strip cup and throw away

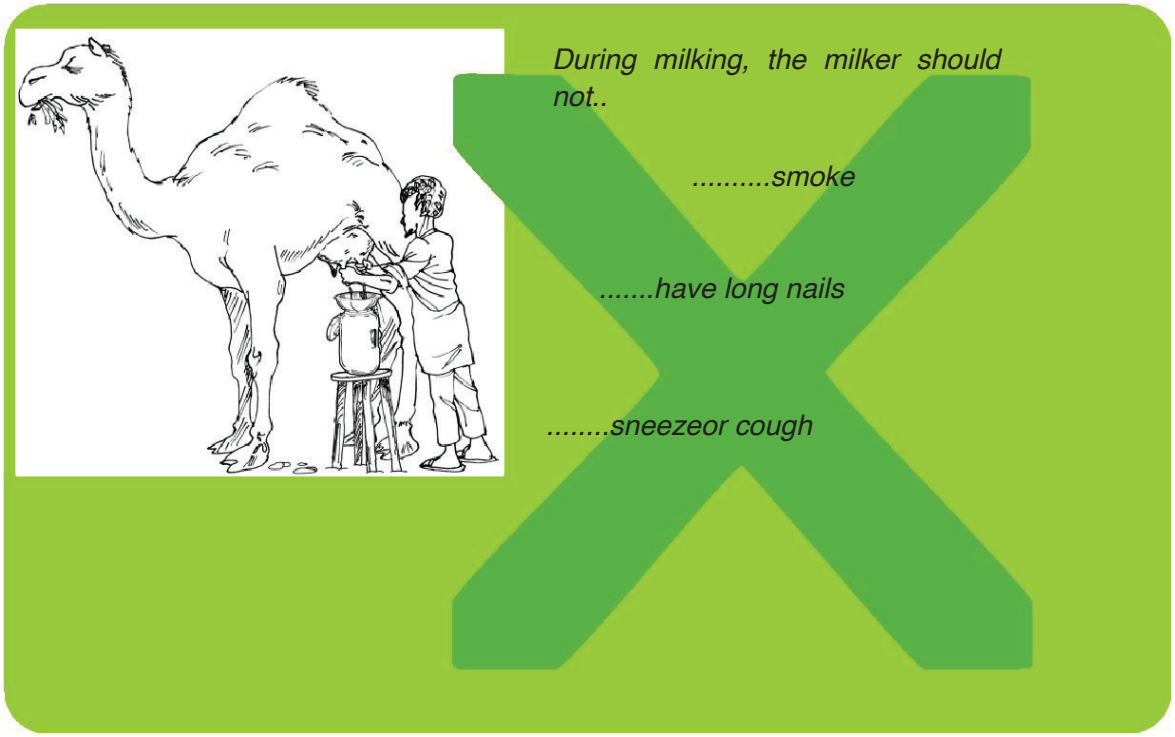
Milk hygiene and quality control

Use clean containers for milking

- Use clean containers for milking
- Camels with mastitis should be milked last and their milk discarded
- Milk from camels under antibiotic treatment should not be sold until 3 days after last treatment or as advised by the veterinarian
- After every milking, dip the teats into an “antiseptic dip”



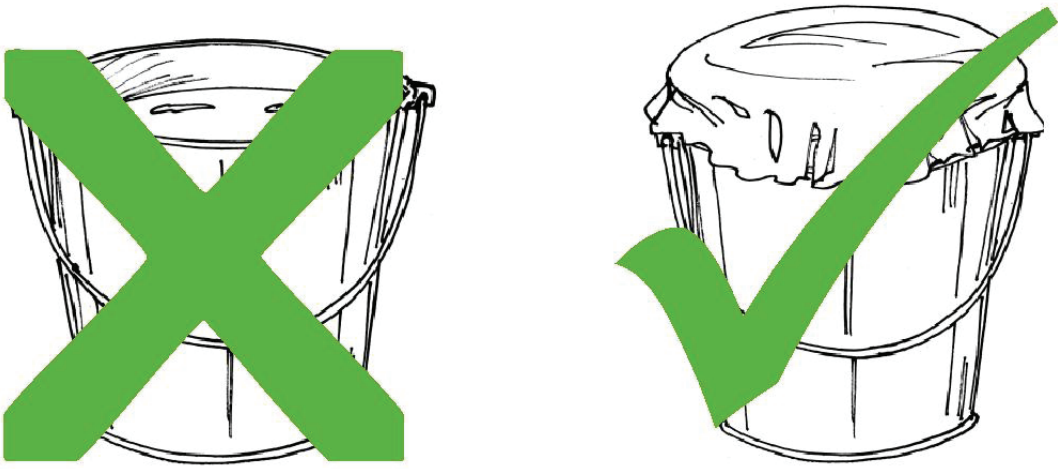
After every milking, dip the teats into an “antiseptic dip”



During milking, the milker should not:

a) have long nails, b) sneeze or cough, c) smoke

- Release the camel from the milking area as soon as milking is finished
- After milking, cover the milk to avoid contamination
- Move the milk to a clean and cool area



After milking, cover the milk to avoid contamination

Activity 2.1: Advice to give to farmers on avoiding contamination

Specific objective: To enable participants acquire practical knowledge on hygienic milk handling on the farm and pass the same knowledge to farmers who supply them with milk.

Activities	Resources
Divide into groups of 5 - 6 persons: Question to discuss (1): "How does milk become contaminated on the farm?" Question to discuss (2): "What advice would you give to farmers from whom you procure your milk?" Groups present their discussions concerning the two questions Group presentations: use Annex 2.1 (Sources of milk contamination) to cover any major points not covered by participants	A20 sheets, flip charts and marker pens
Facilitator illustrates their points using the following graphics: = Maintain clean healthy cows = Wash hands with soap = Wash udder with a clean cloth = Make the first draw into a strip cup and throw away = After every milking, dip teats into 'antiseptic dip' = During milking the milker should not... have long nails....smoke..... sneeze or cough = After milking, cover the milk to avoid contamination.	Overhead projector and transparencies of the main illustrations in the trainees and trainers training manual (Day 2 Session 2)

Session 2: Hygienic milk handling

Objectives for this session:

2.2 —To acquire knowledge on reducing milk spoilage
2.3 —To learn about hygienic milk handling practices

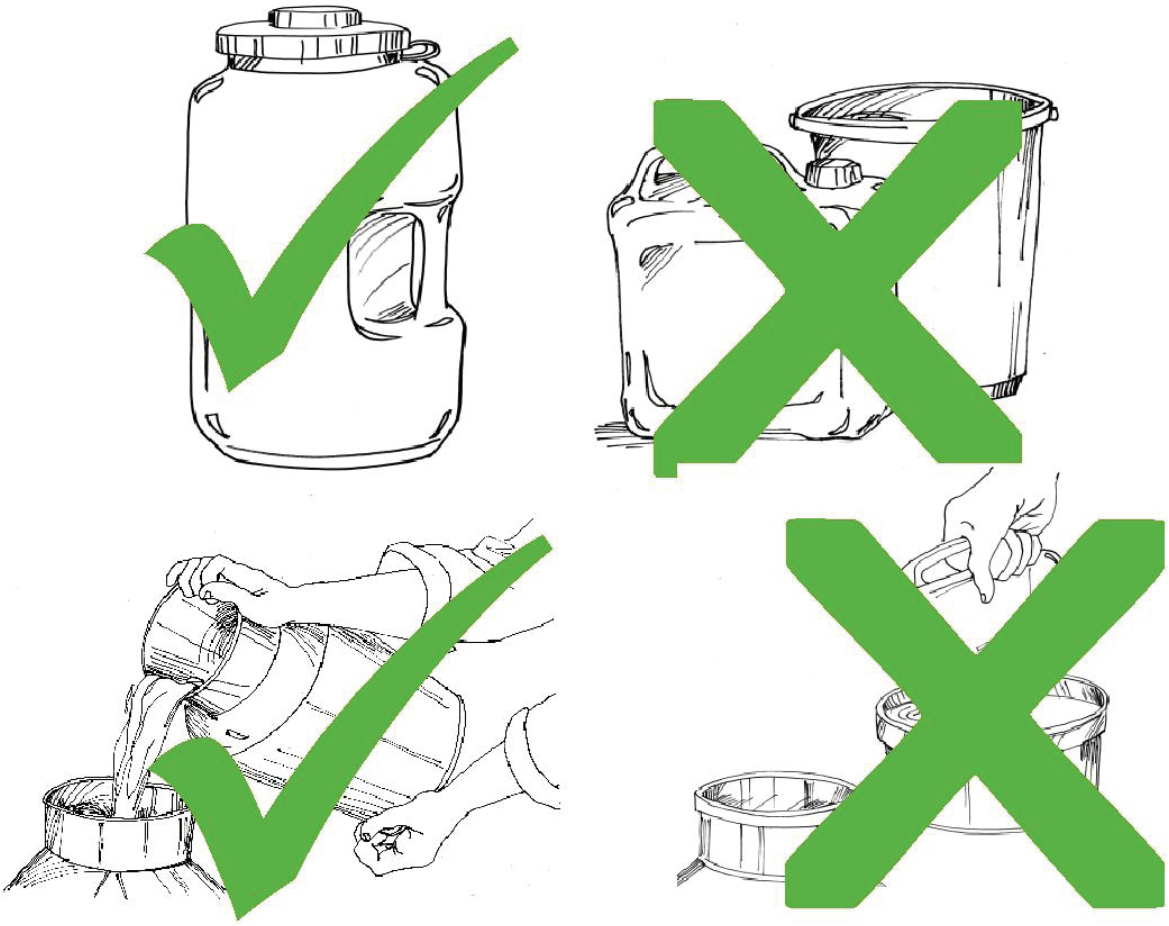
Activity 2.2 — Practices to reduce milk spoilage

Specific Objective: How to reduce milk spoilage through hygienic milk handling-after purchase

Below are some practical guidelines that you should follow in order to ensure good milking hygiene.

Always use metal (e.g. aluminium) containers and not plastic containers.

When transferring milk between containers, pour, do not scoop. Scooping may introduce spoilage bacteria.



When transferring milk between containers, try to pour, not scoop

Before re-using the milk container,

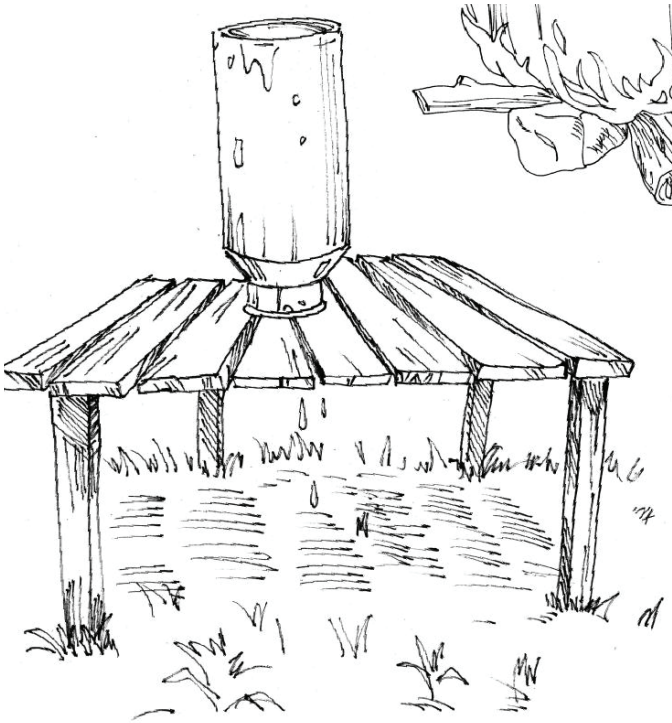
- Pre-rinse the container soon after use
- Thoroughly scrub the container with warm water and detergent or soap (using a stiff bristled hand brush or scouring pad e.g “Superbrite”)
- Rinse the container in running water

Rinse milk container in running water

Thoroughly scrub the milk container with warm water and detergent or soap (using something like a stiff bristled hand brush or scouring pad)

- Dip-rinse the container in boiling w
- Air-dry the milk container in the op

Dip rinse container in boiling water for at least one minute



Air-dry milk container in the open in inverted position

Activity 2.3 — Hygienic milk handling practices by traders

Specific objective: To emphasize practical skills on hygienic milk handling.

Activities	Resources
Open question for discussion in groups: "What can traders do to improve the hygienic handling of milk?"	A20 sheets, flip charts and marker pens
Group presentations. Facilitator uses the illustrations in the section on hygienic milk handling to emphasize the main points made by the groups' presenters: • Metal vs. plastic containers • Pouring vs. scooping • Thoroughly scrub the milk container • Rinse the milk container in running water • Dip-rinse container in boiling water • Air-dry the milk container If time permits: • Use Annex 2.2 (Evaluating the characteristics of a good milk container) to initiate a discussion about the merits and demerits of using metal and plastic containers • Conduct a direct ranking exercise comparing the metal and plastic container	Overhead projector and transparency of the main illustrations in the trainees training manual (Day 2 Session 2)

SESSION 3: How to test if milk is acceptable (1 ½ hours)

Objectives for this session:

2.4 —To introduce basic milk quality control methods
2.5 —To practice organoleptic (sight and smell) test :
2.6—To practice other basic milk tests
(clot on boiling, alcohol and lactometer tests)
2.7 —To introduce advanced milk tests

Activity 2.4: Milk quality control methods

Specific objective: To equip participants with knowledge and skills on milk quality control methods including testing and preserving.

During testing only a small amount (sample) of the milk is used. For the result of the give a true picture of the state of the milk, important to mix milk before obtaining the sample or testing. You can ensure that the milk that you receive from the farmer is of good quality by carrying out one or more of
the following four basic tests.

i) Organoleptic test (Using your senses of sight and smell)

This test should be performed first. It simply requires the use of the senses of sight and smell to test the milk. It is easy and straightforward, allowing you to segregate poor quality milk before you receive it. Milk that cannot be adequately judged this way should be subjected to other more sensitive and objective tests. No equipment is required, but the milk tester must have good sense of sight and smell.

Procedure:

- Open a can of milk
- Immediately smell the milk and establish the nature and intensity of smell, if any. The milk may smell non-fresh or foreign odours may be detected
- Observe the appearance of the milk. Look at the colour of milk, any marked separation of fat, colour and physical state of the fat, foreign bodies or physical dirt
- Touch the milk container to feel whether it is warm or cold. This may indicate to you how long milk has taken since milking (if not chilled thereafter) will influence the lactometer test adulteration (see below)

Judgment:

Abnormal appearance and smell that may cause milk to be rejected could be due to:

• Type of feed or atmospheric taint

• Camels in late lactation

• Chemical taints or discolouring

• Advanced acidification or souring

Marked separation of fat may be caused by:

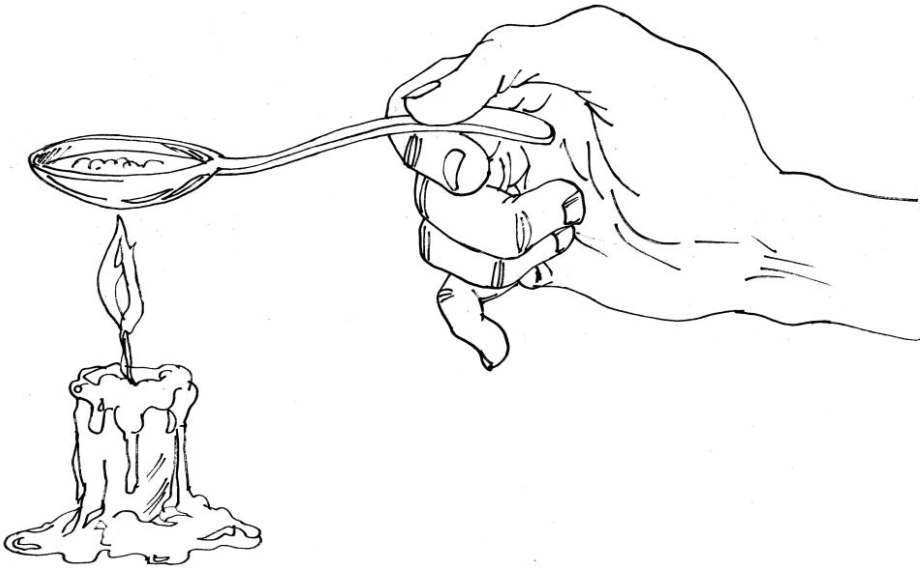
• Milk previously chilled and subjected to disturbance during transportation

• Adulteration with other solids (may also show as sediment or particles)

• Boiling, if milk fat is hardened

Ii) Clot on boiling test

This test is quick and simple. It allows you to detect milk that has been kept for too long without cooling and has developed high acidity, or cholesterol milk that has a very high percentage of protein. Such milk does not withstand heat treatment hence clot on boiling test could be positive at a much lower acidity.



Procedure and judgment:

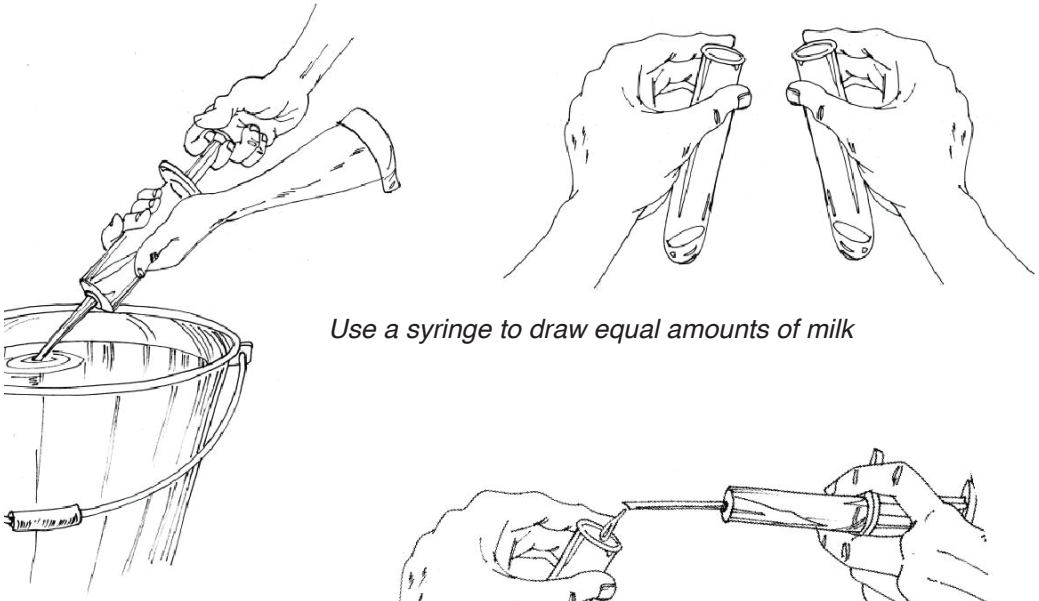
Boil a small amount of milk in a spoon or other suitable container. If there is clotting, coagulation or precipitation, the milk has failed the test and should be rejected.

iii) Alcohol test

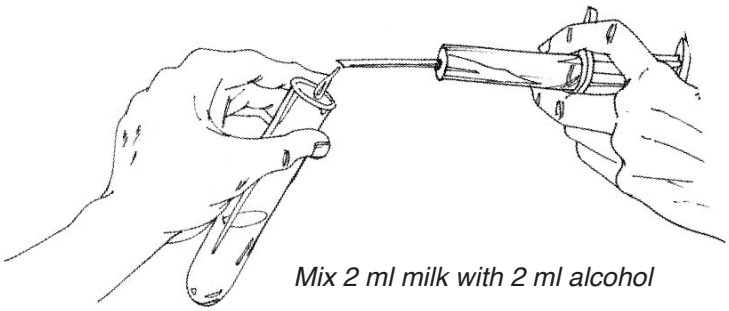
The test is quick and simple. The specific type of alcohol used is known as 'ethanol'. It enables you to detect bad milk that may have passed the previous two tests because it is more sensitive to lower levels of acidity. It also detects milk that has been kept for long without cooling, colostrum or milk from a cow with mastitis.

Procedure and judgment:

Use a syringe to draw equal amounts of milk and 70% alcohol solution in a small tube or glass cup (such as those used to administer medicine to children). Mix 2 ml milk with 2 ml 70% alcohol.

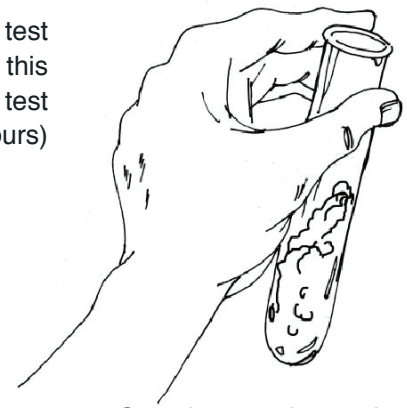


Use a syringe to draw equal amounts of milk



Mix 2 ml milk with 2 ml alcohol

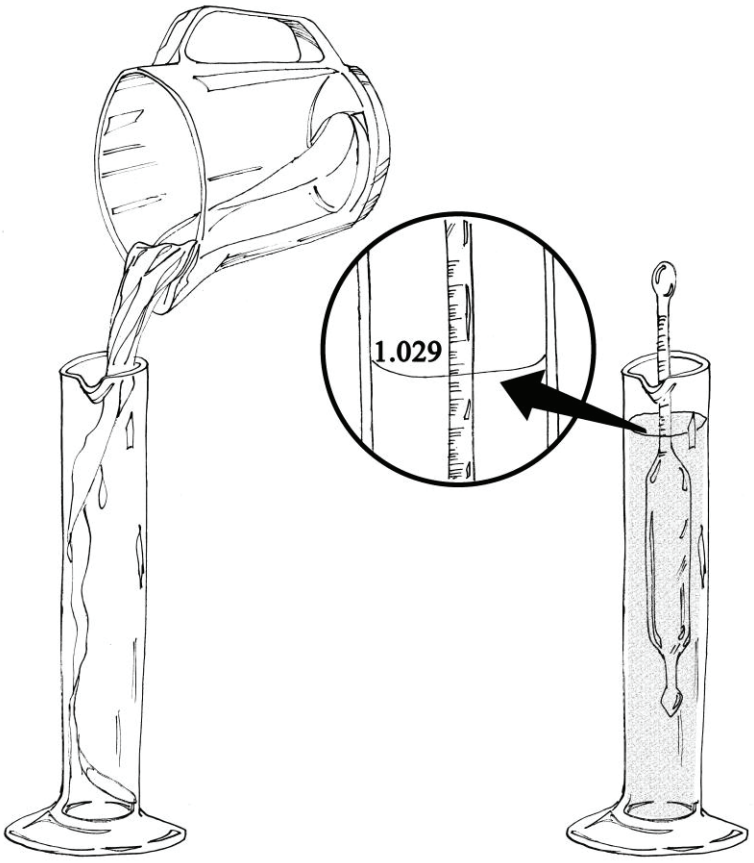
If the tested milk clots or precipitates, it the test and the milk should be rejected. Because this test is quite sensitive, milk that passes this test can keep for some hours (at least two hours) before it goes bad.



Sample coagulates, clots – failed the test

iv) Lactometer test

Some unscrupulous milk suppliers adulterate milk with added water to increase the volume or added solids to make it look thicker. Addition of anything to milk can introduce bacteria that will make it spoil quickly. Adulteration of milk is also illegal. Here is how to test the milk to check whether it has been adulterated. The test is based on the fact that milk has a heavier weight or density (1.026 - 1.032 g/ml) compared to water (1.000 g/ml). When milk is adulterated with water or other solids are added, the density either decreases (if water is added) or increases (if solids are added). If milk fat (cream) is added to milk, the density becomes lower. The equipment used to determine milk density is called a lactometer. Most lactometers are usually marked from "0" (representing density of 1.000 g/ml) to "40" (representing density of 1.040 g/ml).



Equipment used for determination of milk density

Procedure:

Ensure that the milk has been left to cool at room temperature for at least 30 minutes and its temperature is about 20oC. Stir the milk sample and pour it gently into a 200ml measuring cylinder (or any container deeper than the length of the lactometer). Let the lactometer sink slowly into the milk. Take the lactometer reading just above the surface of the milk.

If the temperature of the milk is different from the lactometer calibration temperature (20ºC), then use this correction factor: For each ºC above the calibration temperature add 0.2º lactometer "degrees" (ºL) to the observed lactometer reading, and for each ºC below calibration temperature subtract 0.2º lactometer "degrees" (ºL) from the observed lactometer reading. These calculations are done on the lactometer readings i.e. 29 instead of the true density of 1.029 g/ml.

Example of how to calculate the true lactometer readings when the milk temperature differs from the lactometer calibration temperature of 20ºC

Sample	Milk temperature ºC	Observed lactometer reading ºL	Correction ºL	True lactometer reading° L	True density g/ml
No.1	17	30.6	- 0.6	30.0	1.030
No.2	20	30.0	Nil	30.0	1.030
No.3	23	29.4	+ 0.6	30.0	1.030
No.4	20	29.0	Nil	29.0	1.029
No.5	21	29.8	+ 0.2	30.0	1.030
No.6	19	29.2	- 0.2	29.0	1.029

Judgment:
Normal milk has a density of 1.026 -1.032 g/ml (or 26 - 32 on the lactometer reading). If water has been added, the lactometer reading will be below 26. If any solid such as flour has been added, the reading will be above 32.

v) Other tests

There are other advanced tests that are beyond the scope of this course. These tests are more sensitive but they are not practical within the circumstances of most small-scale traders. Ask your trainer if you wish to know them or refer to the text listed in the section on “other sources of information”.

Activity 2.5: Activities and resources for organoleptic (sight and smell) test

Specific objective: To acquire practical knowledge on sensory evaluation of milk quality.

Activities	Resources
Open question for discussion: “How can you ensure that the milk you receive is of good quality? Record responses (Organoleptic or sensory evaluation of spoilt milk) to guide the trader in using sight and smell as the first step in evaluating milk	A20 sheets, flip charts and marker pens
Set milk samples around four tables with the necessary equipment: Conduct the practical exercise in four groups Tabulate the results on A20 sheets Review and evaluate the test	Milk samples and cards

Activity 2.6: Activities and resources for the other basic milk tests (clot on boiling, alcohol and lactometer tests)

Specific objective: To acquire practical knowledge on other milk testing procedures.

Activities	Resources
Demonstrate the milk testing methods (use Annex 2.4 Sample preparation and testing of adulteration and spoilage) for technical guidance	A20 sheets, flip charts and marker pens
 - Clot on boiling test - Alcohol test - Lactometer test Divide into four groups with four sets of equipment - Tabulate results on A20 sheets for the 3 new tests - Review and evaluate the tests It is important that each group analyses all the samples so that the facilitator can lead the follow-up discussion on the merits of each testing procedures. Prepare equipment for tests and Day 3 practical in the field.	

Recording sheet for sample milk testing

Sample No	Smell	Sight	Clot on boiling	Alcohol	Lactometer
1					
2					
3 etc					

Practical equipment for each group

- 2-3 samples (these are rotated in time so that each group tests ALL of the prepared samples)
- A20 sheet and marker pens
- Kitchen roll or cloth for cleaning spilt milk
- Basin and water jug
- Spoon

- Candle
- Match box
- Thermometer
- 2 test tubes
- 2 syringes
- Lactometer
- Small 300 ml container that fits the lactometer
- 70% ethanol alcohol

Activity 2.7: Introduction to advanced milk tests

Specific objective: To create awareness on advanced milk quality; tests not covered in this guide.

There are other advanced tests that are beyond the scope of this course. Refer anyone interested to the references on page 66.'°These tests are more sensitive, but they are not practical within the circumstances of most small milk traders. For example;

1. Acidity test: Determines developed acidity in milk (Lactic acid).
2. Resazurin test: Determines the keeping quality (Activity of spoilage bacteria).
3. Butterfat test: Determines fat content in milk.
4. Freezing point determination: Determines deviation due to adulteration or abnormal milk.

Session 4: How to preserve milk to reduce spoilage (1/2 hour)

Objectives for this session:

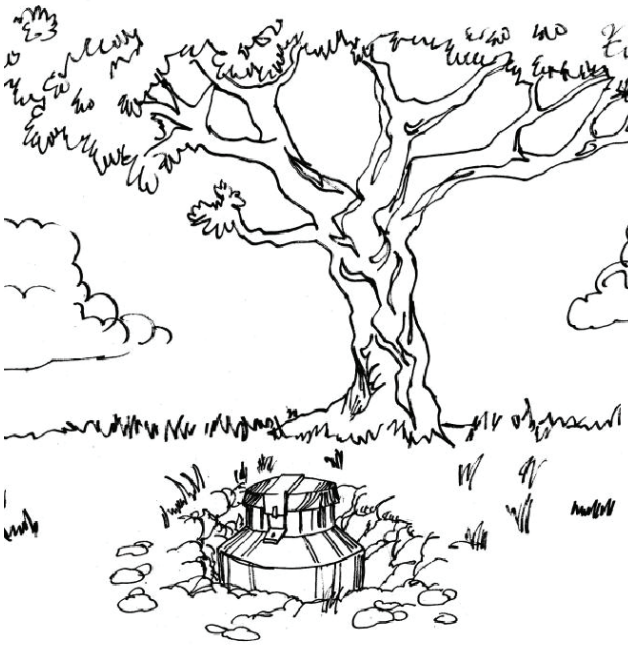
4.1 —To appreciate the importance of milk cooling

4.2 —To illustrate how cooling helps extend the shelf life of milk

Activity 4.1: Importance of milk cooling

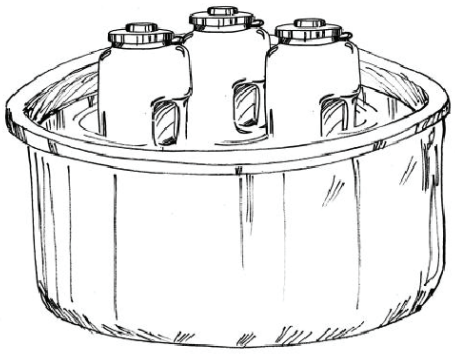
Specific objective: To enable participants learn and appreciate various milk preservation methods.
In order to ensure that traders further increase the shelf life of milk after receiving, it has to be kept in a cool place. Lowering of milk temperature reduces “speed” (rate) of bacterial growth. If there is no refrigerator, the milk may be kept in cold water or in a hole under a shade.

Lastly, ferry your milk quickly to your customers and make them happy. Remember that spoilage bacteria multiply very quickly in warm temperatures.



Keep the milk in a cool place

in a hole in a shade



in cold water

Ferry your milk quickly to your customers

Remind them to always boil milk before drinking it.

Activity 4.2: Extending the shelf life of milk

Specific objective: To emphasize practical skills in cooling

Activities	Resources
Open question for discussion in groups: “How can you increase the shelf life of your milk?”	A20 sheets, flip charts and marker pens
Discussion and feedback	
Use the illustrations on ‘How to preserve your milk to reduce spoilage’ to emphasize the group presentation: - Keep the milk in a cool place - .....in a hole in a shade - .....in cold water - Ferry the milk quickly to your customers - Remind the customer to always boil milk before drinking it	Overhead projector and overhead transparency of the main illustrations in the trainees training manual (Day 2 Session 2.5)
If necessary refer to the graph in Annex 1.6 (Milk preservation) to explain the effect of temperature on the growth of bacteria	

Day 2 summary and mini evaluation (¼ hour)

Specific objective: To recap the main learning points from Day 2 and to get participants’ feedback on the training so far.

Activities	Resources
Use a playful game (e.g. with a ball) to involve all participants in recapping the main learning points from Day 2	A20 sheets, flip charts and marker pens
All stand - one facilitator passes the ball in turn to participants who state what they have learnt during the day whilst the other trainer records the learning points on the A20 sheet.	
Each participant is then given a post-it sheet to write a comment about day2 and stick it on the prepared A20 sheet: - In the “happy” section if they are pleased; - In the “neutral” section if they are indifferent and; - In the “sad” section if they are disgruntled	A20 sheet with “happy”; “neutral” and “sad” faces, post it pads

Summary:

The most crucial aspects to maintain high quality fresh milk are summarized below:

- Hygienic milking and milk handling on farms;
- Good health status of the animals;
- Cooling of milk as soon as possible after milking;
- Transport of milk to the collection centre and/or processing plant within 2 - 3 hours after milking;
- Good quality and well cleaned milk equipment.

Maintaining a good quality of milk is beneficial to all; farmers, milk processing plants and consumers. It will result in the milk producer receiving the full value for his produce, in minimal losses during processing at the milk plant and in a reliable quality of the milk products for the consumer.

Day 3: Practical day out in the field

To enable participants to practise the quality control and hygiene tests under normal milk marketing conditions and determine those that are viable in their businesses.

Participants will be working in the field on Day 3 so go through the details of what needs to be done before they leave at the end of day 2 since they will reconvene on Day 4. Brief them on what they are expected to do. Give them a chance to ask questions on what is not clear especially if anyone has difficulty in carrying out milk tests covered in the previous session, in which case attend to him/her individually.

Ensure that each participant has a pack or bag with the relevant milk testing items/tools and a copy of the training guide for milk traders.

Materials
Each participant should have 70% ethanol alcohol (150 ml), two disposable syringes, a lactometer, a thermometer, a candle, a training guide for small-scale milk market traders, a jug, a small notebook and a container for all the items.

Session 1: Practical exercises in the field (whole day)

Specific objective: To practice (in the field) the lessons learnt during day 1 and 2 of the training program.

Activities	Resources
Activity 1.1 - advice to farmers	Participants need access to their own manuals (Training Guide for Milk
Activity 1.2 - hygienic milk handling	
Activity 1.3 - milk testing methods (1-4) used	See Session 2.4 70% ethanol alcohol (150 ml), two disposable syringes, a lactometer, a thermometer, a candle, a jug, a small notebook and a container for all the items

Other sources of information:

1. Milk Processing Guide Series Volume 2, FAO/TCP/KEN/ 6611Project. Training Program for Small-Scale Dairy Sector. Dairy Training Institute, Naivasha.

2. Code of Hygienic Practice for Production, Handling and Distribution of Milk and Milk Products Kenya Bureau of Standards, Nairobi.

3. Rural Dairy Technology, ILRI Manual No.1. International Livestock Research Institute, Nairobi.

4. Milk Producer Group Resource Book - a practical guide for establishing milk producer groups. FAO, 2002.

5. Milk Payment Resource Book- a practical guide for using incentives to improve milk quality. FAO, 2004.

Notes

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ISBN 978-92-5-130528-7
9 789251 305287
I9303EN/1/05.18