Kyambogo University

In partnership with National Veterinary Institute of Sweden & Swedish University of Agricultural Sciences

A Gender-Based training manual for small holder milk producers in Greater Sanga Sub-county, Kiruhura District.

KYAMBOGO UNIVERSITY 2019
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Acknowledgement

This training manual has been designed for training small-scale milk producers in Greater Sanga Sub-County, Kiruhura District. This resource material is as a result of the extensive data collected from Sanga Sub-county in four parishes namely: Nombe I, Nombe II, Rwabarata and Sanga TC. The steering team engaged the district officials, sub-county officials, cooperative managers and community members through administering questionnaires, conducting FGDs and in-depth interviews.

We are totally convinced that the success of this manual was not by single efforts of our hands but the efforts of different players whose contributions are very instrumental to see us this far.

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The contribution of the following persons from the Department of Development Studies, Kyambogo University is highly acknowledged:

Ms. Judith Irene Nagasha (Project Coordinator)
Ms. Florence Asiimwe
Ms. Jackie Mbambu
Mr. Shadrack Natamba
Forward

In Uganda most smallholder dairy farmers, milk producers, milk traders, and processors account for more than 80 percent of the production, marketing and value addition in the dairy industry. However, government policies and regulations tended to focus on formal players of centralized, medium and large scale milk processors leaving the informal players who include framers, milk venders’ transporters, yet these remain key players in the dairy industry. Lack of training for these key informal players contributes to poor hygiene and low quality of milk and others processed dairy products.

Results from the research study conducted by the department of Development studies on Gender-based perspectives on milk safety among smallholder farmers around Lake Mbwuro National park indicated the need to improve milk handling and processing through training of various stakeholders in the milk value chain that included the milk traders, farmers, cooperatives, transporters and small scale processors in order to meet the quality and regulatory requirements. The research also indicated that much as women are key players in milk production, they benefited less and were not empowered to make key decisions in regard to milk production.

This resource material is a gender based training Manuel aimed at training both men and women involved in dairy production. It’s designed for training small scale milk producers, traders, transporters and processors on safe and hygienic practices during production and handling milk and other milk products throughout the value chain. It was pilot tested with a specified numbers of stakeholders both men and women during a training on milk handling and hygiene.

The Manuel is also designed to be used by other trainers of small-scale dairy farm workers, transporters, traders and processors. The guide will assist trainers to plan, organize and deliver effective short trainings on safe handling and hygiene of milk and milk products.
TOPIC ONE:

FACTORS RELATED TO MILK SPOILAGE

Objectives for this session:

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

Facilitators Notes

1.1 Background

There are many constraints that milk producer face throughout the value chain. Many of these problems cause milk spoilage or are the result of it. These may include the following factors:

1) Long distance or time between collection and resale point
2) Type of containers used.
3) How the containers are cleaned
4) Method of preservation
5) Low profits
6) 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: The causes and effects of milk spoilage**

**Specific objective:**

To enable the participants (men and women) to appreciate the inter-relationship between causes and effects when addressing the main issue of milk spoilage.

**Activities Resources**

- Divide participants into small groups
- Discuss the main constraints faced in production and marketing your milk.
- Participants list the main causes and effects of milk spoilage on an A20 sheets provided
- Groups present their findings in plenary debate
- Facilitator to Discuss other factors (marketing, poor roads, transport, seasonal supply, human diseases etc.) that influence milk spoilage

**1.2 Stakeholders Analysis**

Stakeholder analysis (also called stakeholder mapping) is an important step in designing training guide. This tool will be used to identify the stakeholders for a project, including their level of influence, which issues are important to them and how they will be engaged.

**Table 1: How participants (men and women) will identify key stakeholders in the milk chain**

<table>
<thead>
<tr>
<th>High Interest, Low Influence</th>
<th>High Interest, High Influence</th>
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</thead>
<tbody>
<tr>
<td>Farmers</td>
<td>Project coordinator</td>
</tr>
<tr>
<td>Consumers</td>
<td>Steering team</td>
</tr>
<tr>
<td>Traders</td>
<td>Project advisors</td>
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<td></td>
<td>Sub county government(Livestock offices)</td>
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<td></td>
<td>Cooperative Staff (Management)</td>
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<td></td>
<td>Diary Development Authority</td>
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<td></td>
<td>Kyambogo University</td>
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<td></td>
<td>Consultations (Experts)</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Low Interest, Low Influence</th>
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<tbody>
<tr>
<td>Dairy product consumers.</td>
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<tr>
<td>Vendors</td>
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<table>
<thead>
<tr>
<th>Low Interest, High Influence</th>
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<tbody>
<tr>
<td>Politicians</td>
</tr>
<tr>
<td>Diary Development Authority</td>
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</tbody>
</table>
Activity 1.2.1: Stakeholder Analysis

Specific objective:
To enable traders to identify the key stakeholders in the milk chain/production their relationships and how they either promote or constrain their milk businesses.

Open questions to the participants (men and women)
1) In a plenary group ask the participants to identify the main stakeholders.
2) Discuss briefly their main role and function.
3) Ask whether the relationship is friendly (positive) or hostile (negative).
TOPIC 2:

MILK QUALITY CONTROL

Objective for the session:
To introduce the concept of good quality milk and assurance by farmers groups, transporters and at collection centers in preparation for Day 2.

Facilitators Notes

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 and improve on its quality. This can be achieved through involving both men and women in using approved practices of milk production and handling.

2.1.1. Why you need to know about milk quality control

Facilitators Notes

- 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 one lose profits that would have otherwise made.
- Unhygienic handling may introduce disease causing bacteria into the milk and this can also adversely affect human health. This course is therefore designed to provide the relevant knowledge and skills needed to handle milk hygienically.
2.1.2: The basics of milk quality control

Activity 2.1: Brainstorming exercise

- 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 safe and of good quality? (Proper hygiene and testing).
- What good practices can farmers adopt to ensure production of good quality milk at farm level?
Objective:
To educate participants (men and women) on hygienic milk handling practices and quality control at farm level.

Facilitators Notes

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

3.2 Clean milk production on the farm
Good hygienic practice is very important in the production of clean milk. Clean milk has the following characteristics:
- Low bacterial count
- Pleasant creamy smell and color
• No obnoxious odors
• No dirt and extraneous matter
• No residues of antibiotics, sanitizers or pesticides

3.3. Sources of milk contamination at the farm

Specific objective:

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

Raw milk may be contaminated by bacteria from several sources. These include:
• Udder and udder flanks
• Miler
• Milking environment
• Milking equipment
• Vessels used for milk storage and transportation

3.4. Avoiding milk contamination on the farm

Maintain clean and healthy cows
1. Keep a clean milking environment
2. Wash hands with soap and clean water before milking
3. Wash the udder with a cloth and warm water
4. Dry the udder with a clean dry cloth
5. Make the first draw of milk into a cup to check for signs of mastitis and pour it away from the milking area.

3.5 Milk hygiene and quality control at the farm

Use clean containers for milking cow with mastitis should be milked last and their milk discarded
Milk from cows 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”
Release the cow 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

3.6 During milking, the milker should not:
1. Have long nails,
2. Sneeze or cough,
3. Smoke
3.7 Milk preservation on the farm

**Specific objective:**
To enable the participants (men and women) acquire background knowledge on simple methods of preserving milk.

**Facilitator’s notes**
While most smallholder farmers do not have cooling facilities, it is important to cool milk and store it at low temperature as is practically possible if it cannot be delivered within 2–3 hours after milking. This is particularly important for evening milk or where morning milk cannot be transported to the milk collection point within 2–3 hours. Simple means of cooling may be used. These may include;

- Immersing milk cans in ice blocks or cold water in a trough
- Domestic refrigerators may be used but avoid freezing milk as this destabilizes the fat.
TOPIC 4:
ADVICE TO GIVE TO FARMERS ON AVOIDING CONTAMINATION

Specific objective:
To enable participants (men women) 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 participants into small groups

Questions to discuss:
1. How does milk become contaminated on the farm?”
2. What advice would you give to fellow farmers to keep their milk safe?
3. What advice would you give to the farmers from whom you procure your milk (for traders)

Groups to present their discussions concerning the two questions

4.1 Good milking procedure

Facilitator’s notes
It is important to follow proper milking procedures in order to obtain milk of good and consistent quality. A properly executed routine milking procedure is part and parcel of clean milk production.
The following steps should be followed:

- **Milk at the same time every day**: Ensures consistent butterfat content. Usually, the longer the milking interval the higher the butterfat content and volume of milk; the reverse is true for shorter intervals.
- **Wash the udder with a clean towel**: This stimulates milk let-down and release of the hormone oxytocin which acts on the milk secretory (alveolar) cells, causing release of milk.
- **Remove the fore milk into a strip cup**: Helps to check for abnormal color or presence of blood clots. This may indicate infections like mastitis. The foremilk should be discarded.
- **Complete milking within 4–5 minutes**: After 5 minutes, the stimulation effect of release of oxytocin wanes away.
- **Dip teats in a post teat dip disinfectant**: This prevents infection of the udder.
- **Test cows regularly using the California mastitis test (CMT) or the Whiteside test**: Both of which are simple to use. Also perform clinical examination of the udders. This enables early detection and treatment of mastitis to avoid swollen and hard udders that cause pain to the cow.

### 4.2. Use of appropriate equipment

One of the major sources of contamination of milk is the use of equipment and storage vessels which cannot be easily cleaned and sanitized. These include:

- **Jerry cans and buckets made of non-food grade plastic**.
- **Whereas Metal containers such as aluminum and stainless steel cans are recommended under the code of hygienic practices**.

### 4.3. Hygienic milk handling by small-scale traders and transporters

**Specific Objective**: Enable participants acquire knowledge about factors that influence the quality of milk before and during transportation

### Facilitators Notes

#### 4.4 The perishable nature of milk

Transportation of milk constitutes a vital link between producers and consumers in the milk marketing chain. In an industry that is dominated by the informal sector, this function is carried out by thousands of itinerant milk traders and some specialized transporters. Given that milk is a very perishable product, milk transporters need to understand the need to observe high standards of hygiene, speedy transport and careful handling of milk. These basic requirements are necessary to minimize losses due to milk spoilage, avoid contamination of milk by pathogens and ensure a profitable milk transportation business.
4.5. Factors that can influence the quality of milk before and during transportation:

- Type of breed. Dairy cows with high milk yields, produce milk with lower fat content than lower yielding breeds such as local cattle.

- Contamination. Use of dirty vessels will increase the bacterial load of milk and shorten its shelf life. Hence it is important to use only very clean milk cans and other vessels, and to keep the milk covered at all times during transportation.

- Storage temperature. The higher the temperature, the faster bacteria will grow and cause the milk to sour. Chilled milk must be maintained at low temperatures during transport by using insulated containers or boxes, or transporting milk on ice where possible.

- Time since milking. Where milk is collected and cooled, the time elapsed since milking is very crucial. Milk will naturally resist bacterial multiplication within the first couple of hours. Thereafter, bacteria will multiply very fast, doubling every 20 to 30 minutes. Hence, the secret to a successful milk transport business involving un-chilled milk is to ensure that milk is transported within a maximum of three hours since milking.

- Exposure to light. Milk is very sensitive to light. Prolonged exposure of milk to light or ultraviolet radiation can lead to undesirable flavors.

- Chemical contamination. Contamination of milk with chemical compounds results in off odours and taints. Chemical contamination and taints from animal feeds, barn odors, kerosene, smoke and tobacco can lower the quality of raw milk so it is important to avoid exposing milk to these elements. Milk transporters need to check with their suppliers on the status of exposure of the milking cows to these elements in case of any abnormal milk odor.

- Excessive agitation: When milk is agitated, the milk fat is destabilized and becomes easily oxidized. Avoid excessive agitation/shaking such as may be caused by transporting half-full cans.

4.6 Hygienic cleaning and sanitation procedure

A very important item of the milk transport business is the vessel in which the milk is carried. Such vessels should satisfy the requirements outlined under the Uganda dairy industry Act (1998). In addition, all milk handling vessels should be washed and disinfected immediately after use as follows:

- Pre-rinse with clean potable water

- Thoroughly scrub the container with warm water and detergent/soap using a suitable brush or scouring pad (do not use steel wool or sand!)

- Rinse the container with clean running water

- Immerse the container in boiling water for at least one minute

- Sun-dry the container upside down on a drying rack
4.7 Personal hygiene

All persons handling milk should maintain high levels of personal hygiene. A milk transporter or handler should:

- wash hands and nails with clean water and soap before handling milk
- wear clean overalls/dust coat and gum boots while handling milk
- not be suffering from a communicable disease or have open sores or abscess on the arms, hands, head or neck
- not cough or sneeze over milk or milk containers
- bath or shower regularly

4.8 Ensuring Hygienic milk handling by small-scale producers and transporters

Specific objective:

To enable participants (men and women) acquire practical knowledge about safe and good practices during transportation of milk.

Divide participants into small groups

Questions to be asked

1. What transport means do farmers and traders use to transport milk from the farm to the collection centers?
2. What risks are involved during transportation that may lead to spoilage?
3. How do you ensure milk is transported in a more safe and hygienic way?
Specific objective:
To introduce to participants (men and women) milk testing techniques that can be used for ensuring quality at the collection centers

Facilitators’ notes

5.1 Background
Farmer groups and operators of milk collection points and centers need systems of quality control for the milk they receive from individual farmers. This enables segregation of poor quality milk at collection centers. Several simple tests, if carried out thoroughly and consistently, will enable the milk collection centre to ensure that only good quality milk is accepted. The following tests can be carried out at the collection centre or dairy processing factory.

5.2 Organoleptic test
This is the simplest test as it requires only the use of the senses of smell and sight. Milk which contains objectionable smells or particles or has an abnormal color can easily be detected.

- The milk grader must have a good sense of sight, smell and taste.

The organoleptic test should always be the first test to be carried out on all milk received at the collection centre and poor quality milk should be immediately rejected, obviating the need to proceed with other quality control tests.
Procedure for carrying out Organoleptic

- Open a can of milk.
- Immediately smell the milk and establish the nature and intensity of smell, if any. If the milk has foreign odours (e.g. smoky, burnt, weedy, chemical/drug smell) or smells sour, it should be rejected.
- Observe the appearance of the milk (colour of the milk, any marked separation of fat, colour and physical state of the fat, foreign particles or physical dirt).
- Check the cleanliness of the milk can and lid.
- If still unable to make a clear judgment, taste the milk but do not swallow it. Spit out the milk you have tasted into a bucket provided for that purpose or drain basin and flush with water.
- Touch the milk container to feel whether it is warm or cold. This will enable you to know whether or not the milk has been cooled since this will also influence the lactometer reading.

5.3 Clot-on-boiling test

This test is quick and simple. It allows you to reject milk that has developed high acidity or cholesterol milk that has a very high percentage of whey proteins, which do not withstand heating at high temperatures.

Materials

A test tube or spoon
A paraffin burner or Bunsen burner

Procedure

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

5.4 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, 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.
- If the tested milk clots or precipitates, it has failed the test and therefore should be rejected.
- Because this test is quite sensitive, milk that passes this test can keep for some hours before it goes bad. Always carry some water for rinsing the syringe between samples.
5.5. Lactometer test

Some dishonest 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. In this regard, lactometer can be used to determine the density of milk which checks whether the milk has been adulterated or not. 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.

Most lactometers are usually marked from “0” (representing density of 1.000 g/ml) to “40” (representing density of 1.040 g/ml).
TOPIC SIX:

RECORD KEEPING AND BUSINESS MANAGEMENT BY SMALL SCALE FARMERS, FARMER GROUPS, TRADERS AND PROCESSORS.

Objective:
To introduce participants (men and women) to the basic concepts of business management and the importance of record keeping

Facilitator’s notes

6.1 Background

Recording keeping is important in managing any business and therefore dairy farmers need to keep records regarding the number of cows, quantity of milk produced, production costs and sales. Milk producer groups need to keep records of their members, how much milk is supplied by individual members, raw milk quality, quantities of milk sold and how much is wasted, and payments received for milk sold to processors, transporters or traders. Similarly, milk traders or transporters who buy milk from individual farmers for sale to processors or consumers need accurate records of the quantities of milk traded and associated costs. Milk processing plants need to keep accurate records of the quantity and quality of each consignment of milk received from suppliers. Such records are required not only for business transactions but also for quality assurance, food safety and for future reference.
6.2. Importance of Record Keeping

- Records enable small-scale operators of milk businesses to keep track of all transactions carried out by the business. These include:
  - The amount of milk supplied
  - Payments made
  - Suppliers, creditors, debtors.

- Dairy farmers’ records help them keep track of the costs of inputs used in milk production (animal feeds, drugs, veterinary services, labor, milk cans, etc.)

- Keeps track of how much income they are getting from the sales of milk, heifers, cull cows, bulls, etc.

6.3. Records for small scale farmers, farmer groups, milk traders, transporters and processors.

- Milk supply records. Theses may include:
  - Daily milk supply records which indicate the name of supplier, volume of milk supplied, date and time the milk was supplied and the price paid for the milk.
  - The milk supplier payment record

- Financial records, these may include
  - Cash books
  - Ledgers
  - Delivery books
  - Invoice and receipts e.t.c

- Non financial records: these may include
  - Member registers
  - Constitutions e.t.c
Objective:
To enable participants (men and women) acquire knowledge on some key regulation as provided for by the Dairy Development Authority in Uganda

Facilitator’s notes

7.1. Background

In Uganda, the dairy sector is regulated by the Dairy Development Authority a statutory body under the ministry of Agriculture. The Authority provides sustainable dairy development & regulatory services for increased production, processing, marketing, consumption of milk & dairy products. The Authority therefore:

- Registers & licenses milk processors & traders.
- Supports dairy farmers’ marketing groups,
- Registers dairy farmers groups,
- Advises government on milk standards & co-ordinate enforcement of those standards in liaison with UNBS.
- Controls & regulates dairy & dairy related import & export

Milk regulation, standards & enforcement aims at safeguarding consumers of milk products, improving public health & better products which can compete nationally and internationally.
7.2. Enforcement of dairy standards and regulations

Specific objective:
Enable participants’ (men and women) knowledge about unhygienic practices that are not recommended.

Facilitators notes.

Enforcement of dairy standards and regulation Involves operations against non-conformities in the following areas:
- Processing/trading milk without registration certificates issued by DDA
- Adulteration of milk with chemicals/water/other substances
- Removal of cream (butter fat) from raw milk & offering it for sell as whole milk.
- Handling milk in unsuitable utensils/containers/equipment for example plastic, jerricans, buckets or drums
- Boiling milk in unhygienic environment for commercial purposes
- General poor hygiene & sanitation where milk is handled/sold
- Poor milk transportation practices.
- Non-compliance with dairy standards i.e. adulteration with water & chemicals, bacteriological contamination, spoilage, expiry, mislabeling, less volumes etc.

7.3 Consequences of non-compliance
- Registration licenses can be withdrawn/revoked
- The dairy premises can be closed down/ affected processing lines suspended/closed.
- Non complying milk/dairy products can be recalled from the market, confiscated/ destroyed.
- An arrest can be carried out by the police & culprits can be taken to courts of law & prosecuted.

Activity 6.2.1: Plenary discussion
Ask participants to mention and list regulations and standards regarding milk production they are aware of.
Ask what they would do to ensure these regulations are followed or adhered to.

Practical activity on safe and hygienic hand milking process (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
Materials required
- A group of 5 to 10 milking cows. (It would be useful to have at least one cow with known clinical mastitis)
- Milking buckets
- Clean towels
- One strip cup
- Warm water
- soap
- Record form/note book

Procedure
1. Clear the milking area of any dirt that may contaminate the milk
2. Select one of the milking cows and lead her to the milking area.
3. Wash the udder with a clean towel and tepid water, followed by chlorinated water.
4. Dry the udder with a clean towel.
5. Squeeze a few strips of milk onto the black surface of the strip cup.
6. Examine the milk for any clots or blood stains. Presence of clots or blood indicates the cow is suffering from any infection or mastitis.
7. Discard the milk in the 250 ml conical flask labeled “foremilk”.
8. If there are no clots or blood stains in the milk, proceed with the next step.
9. Take a clean, dry bucket and start milking by squeezing and releasing the teats.
10. Follow the demonstration given by an experienced milker.
11. Cool the milk by placing the milk can in one of the available cooling facilities at the farm.
12. Wash the milking utensils
Other sources of Information:


NOTES

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