



**FOPMR303**  
**FOOD PROCESSING**

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# Raw Milk Reception

***TRAINER'S MANUAL***

*October, 2024*



# RAW MILK RECEPTION



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## ACRONYMS

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**%:** Percentage

**CIP:** Cleaning In Place

**CMT:** California Mastitis Test

**COP:** Cleaning Out of Place

**IC:** Indicative content

**Ind:** Indicator

**Ltd:** Limited

**MCC:** Milk Collection Center

**OC:** Degree Celsius

**pH:** Hydrogen Potential

**PPE:** Personal Protective Equipment

**RTB:** Rwanda TVET Board

**SCC:** Somatic Cells Count

**SNF:** Solid Not Fat

**TQUM Project:** TVET Quality Management Project

## INTRODUCTION

This trainer's manual includes all the methodologies required to effectively deliver the module titled "**Raw Milk Reception.**" Students enrolled in this module will engage in practical activities designed to develop and enhance their competencies.

The development of this training manual followed the Competency-Based Training and Assessment (CBT/A) approach, offering ample practical opportunities that mirror real-life situations.

The trainer's manual is organized into Learning Outcomes, which is broken down into indicative content that includes both theoretical and practical activities. It provides detailed information on the key competencies required for each learning outcome, along with the objectives to be achieved.

As a trainer, you will begin by asking questions related to the activities to encourage critical thinking and guide trainees toward real-world applications in the labour market. The manual also outlines essential information such as learning hours, didactic materials, and suggested methodologies.

This manual outlines the procedures and methodologies for guiding trainees through various activities as detailed in their respective trainee manuals. The activities included in this training manual are designed to offer students opportunities for both individual and group work. Upon completing all activities, you will assist trainees in conducting a formative assessment known as the end learning outcome assessment. Ensure that students review the key reading and the points to remember section.

## MODULE CODE AND TITLE: FOPMR303 RAW MILK RECEPTION

**Learning Outcome 1:** Prepare workplace, tools, material and equipment

**Learning Outcome 2:** Perform raw milk testing

**Learning Outcome 3:** Store raw milk

## Learning Outcome 1: Prepare Workplace, Tools, Materials and Equipment



**Indicative contents**

**1.1 Selection of Tools, equipment and materials used in raw milk reception.**

**1.2 Cleaning of the work area**

**1.3 Preparation of testing reagents**

**Key competencies for learning outcome 1: Prepare Workplace, Tools, Materials and Equipment**

<b>Knowledge</b>	<b>Skills</b>	<b>Attitudes</b>
<ul style="list-style-type: none"> <li>• Description of tools, equipment and materials for raw milk sampling, testing, storage and for cleaning</li> <li>• Explanation of selection criteria for tools, equipment and materials for raw milk reception</li> <li>• Description of cleaning methods and techniques used to clean the work area for raw milk reception</li> </ul>	<ul style="list-style-type: none"> <li>• Selecting Tools, Equipment and Materials</li> <li>• Preparing cleaning products</li> <li>• Cleaning the workplace</li> <li>• Arranging the work area for raw milk reception</li> <li>• Checking the effectiveness of cleaning</li> <li>• Adjusting tools and equipment used in raw milk reception.</li> <li>• Preparing reagents for milk testing</li> </ul>	<ul style="list-style-type: none"> <li>• Being accurate while preparing reagents for milk testing.</li> <li>• Being vigilant while testing raw milk.</li> <li>• Being careful while handling cleaning products.</li> <li>• Being attentive while using tools and equipment.</li> <li>• Being accurate while adjusting tools and equipment for raw milk testing and storage</li> </ul>



**Duration: 10 hrs**

**Learning outcome 1 objectives:**



By the end of the learning outcome, the trainees will be able to:

1. Identify correctly tools, equipment and materials used in raw milk reception.
2. Explain correctly the selection criteria of tools, equipment and materials used in raw milk reception.
3. Describe clearly cleaning methods and techniques used in cleaning work area for raw milk reception.
4. Select appropriately tools, equipment and materials used for raw milk reception.
5. Adjust properly tools and equipment used in raw milk reception.
6. Clean effectively the workplace for raw milk reception according to standards operating procedures and cleaning methods.
7. Arrange appropriately the work area for raw milk reception.
8. Prepare properly reagents for raw milk testing according to testing protocol.



**Resources**

<b>Equipment</b>	<b>Tools</b>	<b>Materials</b>
<ul style="list-style-type: none"> <li>• Lactoscan</li> <li>• Incubator</li> <li>• PPE</li> <li>• Weighing scale</li> <li>• Balance</li> <li>• Gerber centrifuge</li> <li>• Cooling tank</li> <li>• Table</li> <li>• Milking can</li> <li>• Pump</li> <li>• Water bath</li> <li>• Refrigerator</li> <li>• Watch</li> <li>• Autoclave</li> <li>• Gas cooker</li> <li>• Pressure cleaner</li> </ul>	<ul style="list-style-type: none"> <li>• Lactometer</li> <li>• Thermometer</li> <li>• PH meter</li> <li>• Alcoholmeter</li> <li>• Alcohol gun</li> <li>• Test tube</li> <li>• Mastitis kits</li> <li>• Antibiotic kits</li> <li>• Brush</li> <li>• Mops</li> <li>• Bucket</li> <li>• Broom</li> <li>• Spoon</li> <li>• Measuring cylinder</li> <li>• Filters</li> <li>• Bunsen burner</li> <li>• Cup</li> </ul>	<ul style="list-style-type: none"> <li>• Raw milk</li> <li>• Raw milk testing reagents</li> <li>• Water</li> <li>• Detergents</li> <li>• Disinfectants</li> <li>• Record forms</li> <li>• Sample labels</li> <li>• Raw milk sampling bottles</li> </ul>

	<ul style="list-style-type: none"><li>• Waste bin</li><li>• Micropipette</li><li>• Beaker</li><li>• Calculator</li><li>• Basin</li><li>• Milk sampler dipper</li><li>• Broom</li></ul>	
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**Advance Preparation:**

Before delivering this learning outcome, you are recommended to:

- Avail a classroom and workshop.
- Avail materials, tools and equipment for raw milk sampling, testing, storage and make sure that they are in good working condition and verify if they are not expired.
- Avail tools, materials and equipment for cleaning workplace.
- Prepare teaching aids and didactic materials (manuals/guides, task sheets, audio-visuals, protocols, ...)



## Indicative content 1.1: Selection of Tools, Equipment and Materials Used in Raw Milk Reception



Duration: 3 hrs



### Theoretical Activity 1.1.1: Description of tools, equipment and materials used in raw milk reception



#### Notes to the trainer:

- Trainer may use groups for describing tools, equipment and materials used in raw milk reception.
- The use of drawings, pictures or videos as didactic materials is required.



#### Key steps:

While delivering this activity, pass through the following steps:

**Step 1:** Introduce the activity and ask trainees to answer the following questions:

- What do you understand by the following terms?
  - Raw milk
  - Milk collection center
- What are the tools and materials used for:
  - Raw milk sampling
  - Raw milk testing
  - Raw milk storage
  - Cleaning raw milk reception workplace

**Step 2:** Asks trainees to write their findings on papers, flip chart, blackboard or white board.

**Step 3:** Engage trainees to present their findings.

**Step 4:** Provide the expert view and clarify ideas by using didactic materials.

**Step 5:** Address any questions or concerns.

**Step 6:** Ask trainees to read the key readings 1.1.1 in trainee manual.



#### Points to Remember

- While receiving raw milk, make sure that the tools, materials and equipment for raw milk sampling, testing, and storage are available, cleaned and in good working conditions.



### **Practical Activity 1.1.2: Selecting and adjusting tools, equipment and materials for raw milk reception**



#### **Notes to the trainer**

- The trainer may use individual based activity and he/she is supposed to demonstrate how to select and adjust tools, materials and equipment for raw milk reception.
- Avail materials, tools and equipment for being selected.
- Avail tools and equipment for being adjusted.



#### **Key steps:**

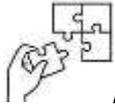
**While delivering this activity, pass through the following steps:**

- Step 1:** Introduce the activity and ask trainees to go in milk processing workshop to select and adjust the right tools, material and equipment to be used in raw milk reception.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated, ...)
- Step 3:** Demonstrate how to select and adjust tools, materials and equipment and explain the procedure to follow while selecting and adjusting tools and equipment.
- Step 4:** Asks trainees to select and adjust tools, materials and equipment used in raw milk reception and monitor the procedure.
- Step 5:** Verify whether tools, materials and equipment used in raw milk reception are correctly selected and adjusted and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 1.1.2 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learni



#### **Points to Remember**

- While receiving raw milk, make sure that the tools, materials and equipment for raw milk sampling, testing, and storage are selected accordingly, cleaned and in good working conditions.
- Before using any tool or equipment, you are recommended to adjust accordingly following instructions from the manufacturer to avoid failure. Remember to wear personal protective equipment while adjusting tools and equipment.



### Application of learning 1.1.

Organise a visit to a Milk Collection Center around your district and ask trainee to make a visit and select tools and equipment used for raw milk sampling, testing and storage and for cleaning workplace.

#### Checklist

SN	Criteria	Indicators	Yes	No
1	Tools and equipment are well-selected	1.1 Sampling tools are selected		
		1.2 Testing tools are selected		
		1.3 Storing tools are selected		
		1.4 Measuring tools are selected		
		1.5 Storing equipment is selected		
2	Cleaning products are well selected	2.1 Sanitizers are selected		
		2.2 Detergents are selected		
		2.3 Disinfectants are selected		
3	Tools and equipment are well-adjusted	3.1 Tools are adjusted		
		3.2 Equipment are adjusted		
4	Field visit report is well done	4.1 Trainee identification is mentioned		
		4.2 Company identification is mentioned		
		4.3 Key competencies gained are described		
		4.4 Recommendations are mentioned		



## Indicative content 1.2: Cleaning of The Work Area



Duration: 4 hrs



**Theoretical Activity 1.2.1: Description of methods and techniques used for cleaning workplace**



**Notes to the trainer:**

- Trainer may use small groups for describing the methods and techniques used for cleaning work area for raw milk reception.
- The use of videos while describing cleaning techniques is required.



**Key steps:**

**While delivering this activity, pass through the following steps:**

- Step 1:** Introduce the activity and ask trainees to answer the following questions:
- What is cleaning?
  - What is the importance of cleaning workplace?
  - What do you think could be taken into consideration in workplace to ensure safety?
  - Give the factors affecting cleaning.
  - What are the cleaning methods used in raw milk reception?
  - What are the cleaning techniques used in raw milk reception?
- Step 2:** Ask trainees to write the findings on papers, flip chart, blackboard or white board.
- Step 3:** Engage trainees to present their findings.
- Step 4:** Provide the expert view and clarify ideas by using didactic materials.
- Step 5:** Address any questions or concerns.
- Step 6:** Ask trainees to read the key readings 1.2.1 in trainee manual



**Points to Remember**

- Methods and techniques used while cleaning depend on the type of tool and equipment to be cleaned and type of debris/or waste to be removed. Remember to respect hygienic safety precautions while cleaning.

- The effectiveness of cleaning will depend on types of cleaning product used, Concentration of cleaning products, quality of water used during cleaning, and Technique used during cleaning.



### **Practical Activity 1.2.2: Cleaning and arranging the work area**



#### **Notes to the trainer**

- The trainer may use individual based activity and he/she is supposed to demonstrate how to clean and arrange the work area for raw milk reception.
- Avail tools, equipment and materials for work area cleaning.
- Avail photos for well-arranged work area and videos as didactic materials.
- Avail disorganized workshop.



#### **Key steps:**

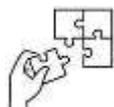
**While delivering this activity, pass through the following steps:**

- Step 1:** Introduce the activity and ask trainees to go in the milk processing workshop to prepare cleaning products, clean and arrange the work area for raw milk reception.
- Step 2:** Explain the task and provide clear work instruction (Task, PPE, Time allocated)
- Step 3:** Demonstrate and explain the procedures and guidelines to prepare cleaning products, to clean and arrange the work area for raw milk reception.
- Step 4:** Ask trainees to prepare cleaning products, to clean and to arrange the work area for raw milk reception and monitor the procedures.
- Step 5:** Verify whether the work area is well cleaned and arranged and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 1.2.2 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 1.2.



#### **Points to Remember**

- When you are going to clean work area, you are recommended to prepare cleaning products accordingly. Remember to respect hygienic safety precautions and respect the cleaning procedures.
- While arranging work area, you are recommended to follow guidelines. Remember to prioritize the accessibility and follow hygienic guideline.



### Application of learning 1.2.

The rehabilitation activities of your school milk processing workshop are ended. As trainer, request the trainees to go in raw milk reception unit to prepare cleaning products used in raw milk reception, Clean the work area, Check the effectiveness of cleaning and arrange work area.

#### Checklist

SN	Criteria	Indicators	Yes	No
1	Cleaning products are properly prepared	1.1 Water is available		
		1.2 Detergent is prepared		
		1.3 Disinfectants are prepared		
2	Working area is well cleaned	2.1 Safety precautions are respected		
		2.2 Cleaning products are used		
		2.3 Cleaning methods are applied		
		2.4 Cleaning techniques are applied		
3	Checking the effectiveness of cleaning is well done	3.1 Visual inspection is performed		
		3.2 Phenolphthalein indicator test is performed		
		3.3 SWAB test is performed		
4	Work area arrangement is well done	4.1 Unnecessary things are removed		
		4.2 Tools materials and equipment are in the appropriate position		



## Indicative content 1.3: Preparation of Testing Reagents



Duration: 3 hrs



### Practical Activity 1.3.1: Prepare testing reagent



#### Notes to the trainer

- The trainer may use individual based activity and he/she is supposed to demonstrate how to prepare reagent used in raw milk testing.
- Avail all materials needed for reagents preparation.
- Videos for alcohol preparation and protocols may be used as didactic materials.



#### Key steps:

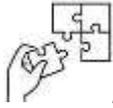
**While delivering this activity, pass through the following steps:**

- Step 1:** Introduce the activity and ask trainee to go in milk processing workshop and prepare reagent (alcohol) for raw milk testing.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated, ...)
- Step 3:** Demonstrate and explain the procedure for alcohol preparation for testing raw milk.
- Step 4:** Ask trainees to prepare alcohol for testing raw milk and monitor the procedure.
- Step 5:** Verify whether alcohol is properly prepared and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 1.3.1 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 1.3.



#### Points to Remember

- When preparing alcohol to be used in raw milk test, you are recommended to use high purity alcohol and distilled water. Be accurate while diluting ethanol.



### Application of learning 1.3.

Organise the milk processing workshop and ask trainee to prepare alcohol to be used in raw milk testing and prepare the report.

#### Checklist

SN	Criteria	Indicators	Yes	No
1	Reagents are properly prepared	1.1 Distilled water is used		
		1.2 Alcohol is selected		
		1.3 Dilution of alcohol is well done		
		1.4 Concentration of alcohol is respected		
2	Work report is well done	2.1 trainee identification is mentioned		
		2.2 Key competencies gained are described		
		2.3 Recommendations are mentioned		



## Learning outcome 1 end assessment

### Written assessment

1. The following table contains tools and equipment used in raw milk reception (column A) with their uses (column B). Match the two columns by writing the correct answer in the provided place (column C)

Tool/ equipment A	Use B	Answer
1.Filters	i. Used in measuring milk volume	1 <b>iii</b>
2.Thermometer	ii. Used to measure the density of milk	2 <b>V</b>
3.Butyrometer	iii. To separate raw milk and impurities	3 <b>iv</b>
4.Lactodensimeter	iv. Measure fat content in milk	4 <b>ii</b>
5.Dippers and Plungers	V. Used to measure temperature of milk	5 <b>viii</b>
	vi. Generate flame when perform clot on boiling test	
	vii.Used for heating	
	viii. Used to take sample	

2. Circle the letter corresponding to the right answer.

- A. Which of the following statements is **NOT** a correct criterion to select tools, material and equipment used in raw milk reception?

- i. Cause harm to the processor
- ii. It should be composed by materials that minimize corrosion / made in stainless steel.
- iii. Able to perform the task.
- iv. Easy to use

**ANSWER: i**

- B. The following are the purposes of work area arrangement **EXCEPT**
- a. Good presentation of work area
  - b. Facilitate effectiveness of process and protective

- c. Help you get your work done accurately
- d. Facilitate to make unsafe product

**ANSWER: d**

- C. Choose from the list below, the suitable solution for adjusting the concentration of alcohol of 95% to the appropriate concentration of alcohol to be used in raw milk quality testing at reception point
- a. Potable water
  - b. Distilled water
  - c. Chlorine
  - d. None above

**ANSWER: a**

3. Fill in the following sentences with appropriate cleaning techniques
- a. ....allows process plant and pipe work to be cleaned between process runs without the requirement to dismantle or enter the equipment.
  - b. ....operations involving the removal of small sections of piping, valve parts, filler parts, and other small appurtenances that are not normally cleaned in place and placing them into a cleaning vat. This cleaning occurs outside of the equipment.

**Answer: a. Cleaning in place (CIP); b. Cleaning Out of Place (COP)**

4. Calculate the concentration of 68% ethanol from 500ml of 96% concentration.

**Answer**

- Initial concentration= 96%
- Initial volume= 500ml
- Final/desired concentration= 68%
- Final volume=?
- Formula:  $C_1V_1=C_2V_2$
- Hence,  $96\% \times 500\text{ml} = 68\% \times V_2$ ,
- $V_2 = 96\% \times 500\text{ml} / 68\%$
- Final volume is 615,38ml
- i.e to dilute that alcohol from 96% to 68%, we need amount of water:  
 $705,88\text{ml} - 500\text{ml} = 205,88\text{ml}$

**NOTES: To prepare 68% alcohol solution, mix 68 ml of absolute alcohol (96% alcohol) with 28 ml of distilled water.**

5. The following are steps to follow when arranging workplace. Rearrange them according to their sequence: consider workflow efficiency, create designated storage areas, ensure proper ventilation and lighting, categorize tools and materials, implement a labelling system, follow hygiene guidelines, prioritize accessibility, regular maintenance check.

**Answer:** categorize tools and materials, create designated storage areas, implement a labelling system, prioritize accessibility, ensure proper ventilation and lighting, consider workflow efficiency.

6. Answer by **True** if the statement is correct and **False** if not
- During dilution of concentrated cleaning product, add water in the product. **False**
  - Sometimes employers can train workers on the use, storage and emergency spill procedure for cleaning chemicals. **False**
  - Phenolphthalein is a chemical indicator that turns pink/purple when it meets alkaline substances. **True**

### Practical assessment

ABC is a dairy company ltd located in Ngororero District and it is willing to open an MCC. Suppose that you are hired as an assistant technician on the post of milk receptionist.

You are requested to help the new company to:

- Select and adjust tools and equipment that will be used when receiving raw milk.
- Clean work area.
- Check the effectiveness of cleaning and arrange work area.
- Prepare testing reagents will be used while testing received raw milk.

### Checklist

SN	Criteria	Indicators	Yes	No
1	Tools, Equipment and Materials are well-selected	1.1 Sampling tools are selected		
		1.2 Testing tools are selected		
		1.3 Storing tools are selected		
		1.4 Measuring tools are selected		
		1.4 Sampling Equipment is selected		
		1.5 Testing Equipment is selected		
		1.6 Storing Equipment is selected		
		1.7 Raw milk is selected		
		1.8 Detergents are selected		
		1.9 Disinfectants are selected		
2	Tools and equipment are well-adjusted	1.10 Raw milk sampling bottles are selected		
		2.1 Lactoscan is adjusted		
		2.2 The cooling tank is adjusted		
		2.3 Refrigerator is adjusted		
3	Work area is well cleaned	2.4 Weighing balance is adjusted		
		3.1 Tools, equipment and materials for workplace cleaning are selected		
		3.2 Safety precautions are respected		
		3.3 Cleaning products are prepared		
		3.4 Cleaning methods are applied		
4	Checking cleanliness	3.5 Cleaning techniques are applied		
		4.1 Visual inspection is performed		

	and arrangement of work area are well done	4.2 Phenolphthalein indicator test is performed		
		4.3 Work area is arranged		
<b>5</b>	Alcohol is properly prepared	5.1 Reagents are selected		
		5.2 Concentration of alcohol is respected		
		5.3 Dilution is well done		



## Further information to the trainer

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## Learning Outcome 2: Perform Raw Milk Testing



### Indicative Contents

**2.1. Raw milk sampling**

**2.2. Sample Analysis**

**2.3. Grading of raw milk**

#### Key Competencies for Learning Outcome 2: Perform Raw Milk Testing

<b>Knowledge</b>	<b>Skills</b>	<b>Attitudes</b>
<ul style="list-style-type: none"><li>• Description of raw milk</li><li>• Description of sampling techniques</li><li>• Description of types of raw milk tests</li><li>• Description of raw milk grading parameters</li></ul>	<ul style="list-style-type: none"><li>• Sampling raw milk</li><li>• Handling raw milk sample</li><li>• Testing raw milk and interpreting result</li><li>• Grading raw milk</li></ul>	<ul style="list-style-type: none"><li>• Being accurate while sampling raw milk.</li><li>• Paying attention while testing raw milk.</li><li>• Being careful while handling raw milk samples</li><li>• Being vigilant while grading raw milk.</li><li>• Being organized while keeping records.</li></ul>



**Duration: 30 hrs**



**Learning outcome 2 objectives:**

By the end of the learning outcome, the trainees will be able to:

1. Describe clearly the characteristics of raw milk required in raw milk reception.
2. Describe properly sampling techniques used for raw milk testing.
3. Explain properly the types of tests applied while receiving raw milk.
4. Test appropriately raw milk as applied in raw milk reception.
5. Interpret correctly the results from raw milk test as required in raw milk reception.
6. Explain clearly grading parameters required in raw milk grading.
7. Grade effectively raw milk according to grading parameters.



**Resources**

<b>Equipment</b>	<b>Tools</b>	<b>Materials</b>
<ul style="list-style-type: none"> <li>• Lactoscan</li> <li>• Incubator</li> <li>• PPE</li> <li>• Weighing balance</li> <li>• Gerber centrifuge</li> <li>• Cooling tank</li> <li>• Table</li> <li>• Milking can</li> <li>• Pump</li> <li>• Water bath</li> <li>• Refrigerator</li> <li>• Watch</li> <li>• Autoclave</li> <li>• Gas cooker</li> </ul>	<ul style="list-style-type: none"> <li>• Lactometer</li> <li>• Thermometer</li> <li>• PH meter</li> <li>• Alcoholmeter</li> <li>• Alcohol gun</li> <li>• Test tube</li> <li>• Mastitis kits</li> <li>• Antibiotic kits</li> <li>• Spoon</li> <li>• Measuring cylinder</li> <li>• Filters</li> <li>• Bunsen burner</li> <li>• Cup</li> <li>• Waste bin</li> <li>• Micropipette</li> <li>• Beaker</li> <li>• Calculator</li> <li>• Milk sampler dipper</li> </ul>	<ul style="list-style-type: none"> <li>• Raw milk</li> <li>• Raw milk testing reagents</li> <li>• Record forms</li> <li>• Sample labels</li> <li>• Raw milk sampling bottles</li> </ul>



### **Advance Preparation:**

Before delivering this learning outcome, you are recommended to:

- Avail classroom and a milk processing workshop for raw milk reception.
- Avail materials, tools and equipment used in milk testing in good working condition and verify if they are not expired.
- Prepare teaching aids and didactic materials such as manuals/guides, task sheets, audio-visuals and protocols.



## Indicative content 2.1: Raw milk sampling



Duration: 6 hrs



### Theoretical Activity 2.1.1: Description of raw milk and raw milk sampling



#### Notes to the trainer:

- Trainer may use small groups for describing raw milk and raw milk sampling.
- The use of videos as didactic materials while describing raw milk and milk sampling is required.



#### Key steps:

While delivering this activity, pass through the following steps:

**Step 1:** Introduce the activity and ask trainees to answer the following questions:

- a. What do you understand about:
  - i. Raw milk?
  - ii. Milk sample?
- b. Suggest the types of raw milk sampling.
- c. How can you handle milk samples?

**Step 2:** Ask trainees to write the findings on papers, flip chart, blackboard or white board.

**Step 3:** Engage trainees to present their answers/findings.

**Step 4:** Provide the expert view and clarify ideas by using didactic materials.

**Step 5:** Address any questions or concerns.

**Step 6:** Ask trainees to read the key readings 2.1.1 in trainee manual.



#### Points to Remember

- To ensure quality and safety of raw milk samples, you are recommended to handle them properly before testing.



## Practical Activity 2.1.2: Sampling and handle raw milk



### Notes to the trainer

- The trainer may use individual based activity and he/she is supposed to demonstrate how to sample and handle raw milk sample.
- The trainer may avail workshop with equipment and tools for raw milk sampling and handling.



### Key steps:

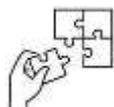
**While delivering this activity, pass through the following steps:**

- Step 1:** Introduce the activity and ask trainees to go in the milk processing workshop, take milk sample and handle it.
- Step 2:** Explain the task and provide clear work instructions (Task, PPE, Time allocated)
- Step 3:** Demonstrate and explain how to sample and handle raw milk samples and the procedures and guidelines to follow.
- Step 4:** Ask trainees to sample and handle raw milk samples and monitor the procedures.
- Step 5:** Verify whether milk sample is well taken and handled and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 2.1.1 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 2.1



### Points to Remember

- While sampling raw milk, make sure that your hands and sampling tools are cleaned, take the sample as soon as possible after mixing, cover sample and label with the necessary information and keep it cold at 4°C.



### Application of learning 2.1.

Organise a study trip and ask trainees to visit an MCC around your school and help them to take samples of raw milk from different locations and handle it accordingly.

#### Checklist

SN	Criteria	Indicators	Yes	No
1	Tools and equipment are well selected	1.1 Tools and equipment for sampling are selected		
		1.2 Tools and equipment for handling are selected		
2	Raw milk sample is well taken	2.2 Sampling techniques are applied		
		2.3 Sampling procedures are respected		
3	Raw milk sample are handled properly	3.1 Sample are labelled		
		3.2 Handling conditions are respected		
		3.3 Samples are recorded		
4	Field visit report is well done	4.1 trainee identification is mentioned		
		4.2 Company identification is mentioned		
		4.3 Key competencies gained are described		
		4.4 Recommendations are mentioned		



## Indicative content 2.2: Sample Analysis



Duration: 16 hrs



### Theoretical Activity 2.2.1: Description of the types of raw milk test



#### Notes to the trainer:

- Trainer may use small groups for identifying the types of raw milk tests.
- The use of pictures or videos as didactic materials while identifying types of raw milk tests is required.



#### Key steps:

While delivering this activity, pass through the following steps:

**Step 1:** Introduce the activity and ask trainees to answer the following questions:

- i. How can you define milk test?
- ii. What is the purpose of testing raw milk?
- iii. Suggest any three examples of raw milk test.

**Step 2:** Ask trainees to write the findings on papers, flip chart, blackboard or white board.

**Step 3:** Engage trainees to present their findings.

**Step 4:** Provide the expert view and clarify ideas by using didactic materials.

**Step 5:** Address any questions or concerns.

**Step 6:** Ask trainees to read the key readings 2.2.1 in trainee manual.



#### Points to Remember

- To ensure quality of raw milk, you are recommended to perform milk tests accurately to meet the accepted standard and regulations concerning milk and milk products.



## Practical Activity 2.2.2: Testing raw milk test and interpreting results



### Notes to the trainer

- The trainer may use individual based activity and he/she is supposed to demonstrate how to test raw milk and interpret the results.
- Avail milk processing workshop, tools, equipment and materials for raw milk testing.
- The use of videos as didactic materials is required.



### Key steps:

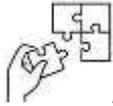
**While delivering this activity, pass through the following steps:**

- Step 1:** Introduce the activity and ask trainees to go in the milk processing workshop to perform raw milk tests and interpret the results.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated, ...)
- Step 3:** Demonstrate how and explain the procedures to test raw milk and interpret the results.
- Step 4:** Ask trainees to perform raw milk test and interpret the results and monitor the procedure.
- Step 5:** Verify whether milk testing and result interpretation is well performed and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 2.2.2 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 2.2.



### Points to Remember

- While performing raw milk test, follow the procedures required for each test to obtain accurate results.



## Application of learning 2.2.

Organise a milk processing workshop and ask trainees to perform raw milk tests using organoleptic, clot on boil test, alcohol test and lactometer test and interpret obtained results.

### Checklist

SN	Criteria	Indicators	Yes	No
1	Raw milk is well sampled	Tools, materials and equipment are well selected		
		Sampling techniques are applied		
		Raw milk sample is taken		
		Sample is handled		
2	Sample is correctly analysed	Organoleptic test is conducted		
		Clot-on boiling test is done		
		Alcohol test is conducted		
		Temperature is measured		
		Lactometer test is performed		
		pH is measured		
		Decision is taken		



## Indicative content 2.3: Grading of Raw Milk



Duration: 8 hrs



### Theoretical Activity 2.3.1: Description of raw milk grading



#### Notes to the trainer:

- Trainer may use small groups for describing raw milk grading parameters.
- The use of videos as didactic materials while describing raw milk grading parameters is required.



#### Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to answer the following questions:
- i. What do you understand about raw milk grading?
  - ii. Based on your understanding, what should be the purpose of raw milk grading?
  - iii. State any three grading parameters?
- Step 2:** Ask trainees to write the findings on papers, flip chart, blackboard, or white board.
- Step 3:** Engage trainees to present their findings.
- Step 4:** Provide the expert view and clarify ideas by using didactic materials.
- Step 5:** Address any questions or concerns.
- Step 6:** Ask trainees to read the key readings 2.3.1 n trainee manual.



#### Points to Remember

- Raw milk grading is a systematic process used to evaluate and classify raw milk based on its quality, safety and suitability for consumption or processing. It is performed to separate milk into similar classes that may be consumed or rejected unfit for food products according to different grading parameters such as bacterial count, density, fat content and microbial contamination (Resazurin test).



### Practical Activity 2.3.2: Grading raw milk

#### Notes to the trainer

- The trainer may use individual based activity and you are supposed to demonstrate how to grade raw milk.
- Avail materials, tools and equipment required in raw milk grading.
- Avail raw milk for being graded.



#### Key steps:

**While delivering this activity, pass through the following steps:**

- Step 1:** Introduce the activity and ask trainees to go in the milk processing workshop to perform raw milk grading.
- Step 2:** Explain the task and provide clear work instruction (PPE, Time allocated, ..)
- Step 3:** Demonstrate and explain the procedure of raw milk grading.
- Step 4:** Ask trainees to grade and monitor the procedures.
- Step 5:** Verify whether milk is properly graded and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 2.3.2 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 2.3.



#### Points to Remember

- While grading raw milk, you are recommended to follow carefully grading parameters as required.



#### Application of learning 2.3.

Invites trainees to visit an MCC around their respective Sector and participate in grading raw milk from different farmers.

## Checklist

SN	Criteria	Indicators	Yes	No
1	Raw milk is well graded	1.1 Grading parameters are respected		
		1.2 Grading procedures are respected		
		1.3 Graded milk is stored		
		1.4 Record is kept		
2	Field visit report is well done	2.1 trainee identification is mentioned		
		2.2 Company identification is mentioned		
		2.3 Key competencies gained are described		
		2.4 Recommendations are mentioned		



## Learning outcome 2 end assessment

### Written assessment

1. Cycle the right letter corresponding to the correct answer

a. Raw milk means:

- i. Pasteurized milk
- ii. Milk obtained during the first seven days after calving and thirty (30) days before next calving.
- iii. Is normal, clean and fresh secretions extracted from the udder of a healthy cow that has not yet undergone any kind of treatment

**Answer: iii**

b. The following are main characteristics of raw milk **EXCEPT**

- i. Be clean with foreign matters.
- ii. Be clean and obtained from healthy cow
- iii. Have white yellowish or creamy-white colour with natural odour and flavour
- iv. Not have added or removed substance

**Answer: i**

c. From the list of raw milk quality test below, distinguish tests that can be carried out on the platform from those that can be carried out in the laboratory

- i. Organoleptic test
- ii. Resazurin test
- iii. Clot-on boiling test
- iv. Gerber test for fat
- v. Alcohol test

**Answer:**

Platform test	Laboratory test
Organoleptic test	Resazurin test
Clot on boiling test	Gerber test for fat
Alcohol test	

d. The normal color of raw milk is:

- i. Yellow
- ii. White
- iii. White yellowish

**Answer: iii**

e. The correct density for normal raw milk is:

- i. 1.022-1.035
- ii. 1.028-1.034
- iii. 1.035-1.045

**Answer: b. 1.028-1.034**

- f. The following are reagents to be used in acidity titration test **EXCEPT**
- Sodium hydroxide 0.1N
  - Boiled water
  - Distilled water
  - Phenolphthalein indicator

**Answer:** ii

2. The following statements are explaining the results that occur while performing alcohol test. Answer by **True** or **False**
- If the milk clots or coagulates or there are lumps within it means that the milk pass the test.
  - If there is no coagulation, clots or lumps the milk pass the test

**Answer:** i. False; ii. True

3. The test results displayed from the Lactoscan shows the following information. Referring to the given results take a decision by responding by **Accepted** or **Rejected**.
- Water added: 6%
  - Density: 1.015
  - Protein: 2%

**Answer:** Rejected

1. Using the judgement for CMT in the column II, choose the right answer for the statement in column I and write it in the answer column.

Answer	Column I: Statement indicating the results	Column II: Judgement for CMT
i)..B..	i. Distinct thickening of the mixture, but no tendency to form a gel, if CMT paddle is rotated more than 20 seconds, thickening may disappear. 900,000 SCC	A. Strong Positive
ii)..C..	ii. No thickening of the mixture. 100,000 SCC	B. Distinct Positive
iii)..D..	iii. Immediate thickening of the mixture, with a slight gel formation, as mixture is swirled, it moves toward the center of the cup, exposing the bottom of the outer edge. When motion stops, mixture levels out and covers bottom of the cup. 2.7 million SCC	C. Negative
iv)..A..	iv. Gel is formed and surface of the mixture becomes elevated (like a	D. Weak positive

	fried egg). Central peak remains projected even after the CMT paddle rotation is stopped. 8.1 million SCC	
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### Practical assessment

ABC is cooperative of farmers located in Nyagatare District, Rwimiyaga Sector needs to start a milk processing industry. It needs qualified technician to help in daily activities. As a milk reception assistant technician, you are hired by the Management committee of the cooperative to sample, analyse and grade raw milk from different locations of Nyagatare District.

### Checklist

Element	Indicator	Observation	
		Yes	No
1. Raw milk sample is well taken	1.1 Raw milk samples are taken		
	1.2 Sampling techniques are applied		
	1.3 Samples are handled		
2. Sample is correctly analyzed	2.1 Organoleptic test is conducted		
	2.2 Clot-on boiling test is done		
	2.3 Alcohol test is conducted		
	2.4 Temperature is measured		
	2.5 Lactometer test is performed		
	2.6 pH is measured		
3. Raw milk is well graded	3.1 Grading parameters are respected		
	3.2 Graded milk is stored		
	3.3 Record is kept		

**END**



## Further information to the trainer

- CDC Features: *Raw (Unpasteurized) Milk*. (n.d.). Retrieved 7 29, 2024, from CDC: <https://www.cdc.gov/features/rawmilk/>
- Chocolate: Types (Unsweetened, Bittersweet, Semisweet, Milk), Selection, and Storage*. (n.d.). Retrieved 7 29, 2024, from <https://www.bhg.com/recipes/desserts/chocolate/chocolate-types-selection--storage/>
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## Learning Outcome 3: Store Raw Milk



### Indicative Contents

- 3.1 Filtration of raw milk**
- 3.2 Storing of raw milk**
- 3.3 Record keeping**

### Key Competencies for Learning Outcome 3: Store Raw Milk

Knowledge	Skills	Attitudes
<ul style="list-style-type: none"> <li>• Identification of types of raw milk filters</li> <li>• Description of measuring techniques</li> <li>• Explanation of storage conditions for raw milk</li> </ul>	<ul style="list-style-type: none"> <li>• Filtering raw milk</li> <li>• Measuring the quantity of raw milk</li> <li>• Storing raw milk</li> <li>• Keeping record</li> </ul>	<ul style="list-style-type: none"> <li>• Being accurate while measuring raw milk</li> <li>• Being attentive while filtrating raw milk</li> <li>• Being careful while storing raw milk.</li> <li>• Paying attention while keeping record for raw milk.</li> </ul>



**Duration: 10 hrs**

**Learning outcome 3 objectives:**



By the end of the learning outcome, the trainees will be able to:

1. Identify correctly the types of filters used in filtration of raw milk.
2. Describe clearly the filtration methods used in raw milk reception.
3. Filtrate properly raw milk as applied in raw milk reception
4. Measure accurately the quantity of raw milk as applied in raw milk reception
5. Store properly the raw milk according to storage parameters.
6. Identify correctly the list of data recorded in raw milk reception
7. Keep appropriately the records of raw milk received as required in raw milk reception



**Resources**

Equipment	Tools	Materials
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<ul style="list-style-type: none"> <li>• Cooling tank</li> <li>• Refrigerator</li> <li>• Milk can</li> <li>• Cold room</li> </ul>	<ul style="list-style-type: none"> <li>• Milk can</li> <li>• Filter</li> <li>• Record template.</li> <li>• Measuring cylinder</li> <li>• Graduated bucket.</li> <li>• Balance</li> </ul>	<ul style="list-style-type: none"> <li>• Raw milk</li> <li>• Book</li> <li>• Pen</li> <li>• Computer</li> </ul>
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**Advance Preparation:**

Before delivering this learning outcome, you are recommended to:

- Make sure that both classroom and milk processing workshop are available.
- Avail materials, tools and equipment used for storing raw milk in good working condition and verify if they are not expired.
- Prepare teaching aids and didactic materials (manuals/guides, videos audio-visuals, or protocols) for raw milk testing.



## Indicative content 3.1: Filtration of raw milk



Duration: 3 hrs



### Theoretical Activity 3.1.1: Description of raw milk filtration and measuring



#### Notes to the trainer:

- Trainer may use small groups for describing raw milk filtration and measuring process.
- Avail raw milk
- The use of didactic materials while describing raw milk filtration and measuring process is required.



#### Key steps:

While delivering this activity, pass through the following steps:

**Step 1:** Introduce the activity and ask trainees to answer the following questions:

- i. What do you think should be the purpose of filtration?
- ii. Suggest any types of filters for raw milk?
- iii. Which techniques should be used for raw milk filtration?
- iv. What should be the procedure for the raw milk measuring?

**Step 2:** Ask trainees to write the findings on papers, flip chart, blackboard or white board.

**Step 3:** Engage trainees to present their findings.

**Step 4:** Provide the expert view and clarify ideas by using didactic materials.

**Step 5:** Address any questions or concerns.

**Step 6:** Ask trainees to read the key readings 3.1.1 in trainee manual.



#### Points to Remember

- While filtering and measuring raw milk, you are recommended to apply appropriately filtration methods and following measuring procedures to obtain accurate results.



### Practical Activity 3.1.2: Filtering raw milk and measuring raw milk



#### Notes to the trainer

- The trainer may use individual based activity and he/she is supposed to demonstrate how to filter and measure raw milk.
- Avail tools, equipment and materials used for raw milk filtration and measuring.
- Avail raw milk for filtration and measuring is required.



#### Key steps:

**While delivering this activity, pass through the following steps:**

- Step 1:** Introduce the activity and ask trainees to go in the milk processing workshop to filter and measure raw milk.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate and explain the procedures of raw milk filtering and measuring.
- Step 4:** Ask trainees to filter and measure raw milk and monitor the procedure.
- Step 5:** Verify whether milk is properly filtered, and its quantity is well measured, and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 3.1.2 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 3.1.



#### Points to Remember

- While filtering raw milk, you are recommended to apply properly filtration methods. Use the balance or volume following measuring procedures.



### Application of learning 3.1.

The school manager request someone to supply raw milk for trainees. As trainer, ask trainees to go in milk processing workshop and help the school to filter and measure raw milk supplied. Avail materials, tools and equipment.

#### Checklist

SN	Criteria	Indicators	Yes	No
1	Raw milk is appropriately filtrated	1.1 Filter is used		
		1.2 Raw milk is filtered		
		1.3 Physical contaminants are removed		
2	Raw milk is accurately measured	2.1 balance or graduated container is used		
		2.2 Raw milk is measured		



## Indicative content 3.2: Storing Raw Milk



Duration: 4 hrs



### Practical Activity 3.2.1: Storing of raw milk



#### Notes to the trainer

- The trainer may use individual based activity and he/she is supposed to demonstrate how to store raw milk.
- Avail tools, equipment and materials used in raw milk storage.
- Avail raw milk to be stored.
- Prepare videos for raw milk storage.



#### Key steps:

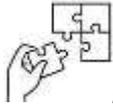
**While delivering this activity, pass through the following steps:**

- Step 1:** Introduce the activity and ask trainees to go in the milk processing workshop to store raw milk.
- Step 2:** Explain the task and provide clear work instruction (PPE, Time allocated, ...)
- Step 3:** Demonstrate how to store raw milk and explain the storage condition for raw milk.
- Step 4:** Ask trainees to store raw milk and monitor the procedures.
- Step 5:** Verify whether milk is properly stored and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 3.2.1 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 3.2



#### Points to Remember

- You are recommended to store properly raw milk to avoid spoilage and extend shelf life. Don't exceed 4°C while storing raw milk.



### Application of learning 3.2.

The school manager requested someone to supply milk for trainees. As trainer, ask trainees to go in milk processing workshop to store raw milk supplied to prevent spoilage. Avail tools, materials and equipment for raw milk storage.

#### Checklist

SN	Criteria	Indicators	Yes	No
1	Storage conditions are effectively monitored	1.1 Storing techniques are used		
		1.2 Storage conditions are set		
		1.3 Storage conditions are controlled		



## Indicative content 3.3: Record Keeping



Duration: 3 hrs



### Practical Activity 3.3.1: Apply methods of keeping record



#### Notes to the trainer

- The trainer may use individual based activity and he/she is supposed to demonstrate how to keep record for raw milk received.
- Avail tools, equipment and materials used in keeping record.
- The use of didactic materials such as record books and protocols is required.



#### Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go in the milk processing workshop and keep record for raw milk received.
- Step 2:** Explain the task and provide clear work instruction (PPE, Time allocated)
- Step 3:** Demonstrate how to keep record for raw milk. While demonstrating, explain the procedures of keeping records.
- Step 4:** Ask trainees to keep records and monitor the procedures.
- Step 5:** Verify whether records are well kept and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 3.3.2 in trainee manual
- Step 7:** Ask trainees to perform the task provided in application of learning 3.3



#### Points to Remember

- While recording raw milk received, both the quantity and quality testes are recorded. Don't forget to mention the main information and take decision accordingly.



### Application of learning 3.3.

Organise field visit and ask trainees to visit the nearest Milk Collection Center and help the milk receptionist to keep record for received raw milk coming from different locations.

#### Checklist

SN	Criteria	Indicators	Yes	No
1	Record keeping is well conducted	Milk quality control results		
		Quantity received		
		Decision taken		
		Supplier identification		
		Code number		
		Places		
		Records of dates		
		Record is kept		



### Learning outcome 3 end assessment

#### Written assessment

1. Read the following statements and answer by True if it is correct otherwise False.
  - i. The weight of received milk is determined using alcohol gun. **False**
  - ii. The quality of milk can be measured using balance. **False**
  - iii. Records keeping help to inform the farmers/producers about his production quality. **True**
  - iv. The main purpose of milk cooling is maximizing bacterial growth. **False**
  - v. If you need to measure the volume of raw milk received, you can use a graduated container. **True**
  - vi. The weight of received milk is determined by adding the weight of milk in container to the weight of container. **False**
2. Circle the letter corresponding to the right answer:
  - A. The following is the main objective of raw milk filtration.
    - i. To ensure that sediment or other extraneous matter is added to the milk.
    - ii. To remove hair, stones, and other physical contaminants.
    - iii. To improve the aesthetic quality of milk by removing invisible foreign matter.

**Answer: ii**

- B. The following are objectives for milk cooling **EXCEPT**
  - i. Maximizing bacterial growth
  - ii. Enhancing shelf life
  - iii. To ensure safety and quality preservation
  - iv. Contribute to customers satisfaction.

**Answer: i**

- C. Which of the following pieces of information are not included on the record form?
  - i. Milk quality control results
  - ii. Quantity received
  - iii. Decision taken
  - iv. Supplier identification
  - v. Reception tool
  - vi. Records of dates,
  - vii. Records of cow

**Answer: v, vii**

3. The following terms are used in filtration of raw milk: **diffusion, metallic (stainless steel), strainer, cloth** and **membrane**. Select the correct term to be completed in provided space.

During raw milk reception, filtration is an essential activity for receiving good quality of raw milk where (a).....is filter that can be used with desired pore size which can retain the smallest particles whereas (b).....is filter that consists of nylon filter bag which can retain the big particles.

**Answer:**

**a) Cloth**

**b) Metallic stainless steel**

### Practical assessment

ABC is a cooperative of farmers located in Nyagatare District, RWIMIYAGA Sector. As a qualified worker in milk reception, you are hired by the management of ABC cooperative to filtrate, store and keep record of raw milk.

### Checklist

Element	Indicator	Observation	
		Yes	No
1. Raw milk is accurately measured and filtrated	1.1 Raw milk is measured		
	1.2 Raw milk is filtered		
	1.3 Physical contaminants are removed		
2. Storage conditions are effectively monitored	2.1 Storing techniques are used		
	2.2 Storage conditions are set		
	2.3 Storage conditions are controlled		
3. Record keeping is well conducted	3.1 important data are recorded		
	3.2 Record is kept		



## Further information to the trainer

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