

## FUNDAMENTALS OF DAIRY TECHNOLOGY

**ISCED UNIT CODE: 0721 451 05A**

**TVET CDACC UNIT CODE: DA/CU/PM/CC/01/5/MA**

### Relationship to Occupational Standards

This unit addresses the Unit of Competency: Apply Fundamentals of Dairy Technology

**Duration:** 120 Hours

### Unit Description

This unit specifies the competencies required to apply fundamentals of dairy technology. It involves application milk composition and dairy microbiology knowledge and also dairy equipment operations principles

### Summary of Learning Outcomes

By the end of this unit, the learner should be able to:

S/No	Learning Outcomes	Duration (Hours)
1.	Apply milk composition knowledge	30
2.	Apply dairy microbiology knowledge	40
3.	Apply dairy equipment operational principles	50
<b>Total</b>		<b>120</b>

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcomes	Content	Suggested Assessment Methods
1. Apply Milk Composition Knowledge	5.1 Milk Composition 5.1.1 Definition of terms 5.1.2 Milk Composition	<ul style="list-style-type: none"><li>• Written tests</li><li>• Practical</li><li>• Interviews/ Oral questions</li></ul>

	<p>5.1.3 Factors affecting milk composition</p> <p>1.1.1.1 Management Factors</p> <p>1.1.1.1 Biological Factors</p> <p>1.1.1.1 Milk Adulteration</p> <p>5.2 Physical Properties of milk</p> <p>5.2.1 Colour</p> <p>5.2.2 Taste</p> <p>5.2.3 Density</p> <p>5.2.4 Viscosity</p> <p>5.2.5 Freezing point</p> <p>5.3 Chemical Properties</p> <p>5.3.1 pH</p> <p>5.3.2 Enzymes</p> <p>5.3.3 Emulsions</p> <p>5.3.4 Heat sensitivity</p> <p>5.4 Smart and Sustainable Systems</p> <p>5.4.1 AI application</p> <p>5.4.2 Sustainable waste disposal</p>	<ul style="list-style-type: none"> <li>• Individual/group assignments</li> </ul>
2. Apply dairy microbiology knowledge	<p>2.1 Introduction to Microbiology</p> <p>2.1.1 Definition of terms</p> <p>2.1.2 Role of microbiology in dairy processing</p> <p>2.1.2.1 Milk Preservation</p> <p>2.1.2.2 Milk safety</p> <p>2.1.2.3 Fermentation</p> <p>2.1.2.4 Waste management</p> <p>2.1.3 Classification of Micro organism</p> <p>2.1.3.1 Bacteria</p>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Interviews/ Oral questions</li> <li>• Practical</li> <li>• Individual/group assignments</li> <li>• Case Studies</li> </ul>

	<p>2.1.3.2 Moulds</p> <p>2.1.3.3 Yeast</p> <p>2.2 Microbiological apparatus</p> <p>2.2.1 Microscope</p> <p>2.2.2 Incubators</p> <p>2.2.3 Autoclave</p> <p>2.3 Microscopy Procedures</p> <p>2.3.1 Sampling</p> <p>2.3.2 Slide Preparation</p> <p>2.3.3 Staining</p> <p>2.3.4 Culturing</p> <p>2.3.5 enumeration</p> <p>2.3.6 Observation</p> <p>2.3.7 Documentation</p> <p>2.4 Hygiene and sanitation</p> <p>2.4.1 Sanitation procedures</p> <p>2.5 Waste Management</p> <p>2.5.1 Definition of terms</p> <p>2.5.2 Waste segregation</p> <p>2.5.3 Handling of bio hazards</p> <p>2.5.4 Methods of waste management</p> <p>2.5.5 Importance of waste management</p> <p>2.6 Smart and Sustainable Systems</p> <p>2.6.1 AI application</p> <p>2.6.2 Sustainable waste disposal</p>	
3. Apply Dairy equipment operational Principles	<p>3.1 Dairy Equipment and Machinery</p> <p>3.1.1 Definition of terms</p> <p>3.1.2 Operational parameters</p>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Practical</li> </ul>

	<p>3.1.3 Operational Processes</p> <p>3.1.4 Maintenance</p> <p>3.1.5 Operations principles and maintenance of dairy processing equipment and machinery</p> <p>3.1.6 Types of Dairy Equipment's and Machinery</p> <p>3.1.6.1 Milk separator</p> <p>3.1.6.2 Milk homogenizer</p> <p>3.1.6.3 Heat exchanger</p> <p>3.1.6.4 Vats</p> <p>3.1.6.5 Milk coolers</p> <p>3.1.6.6 Milk Pumps</p> <p>3.1.6.7 Milk filters</p> <p>3.1.6.8 Butter churn</p> <p>3.1.6.9 Ice cream freezer</p> <p>3.2 Packaging equipment Operations and maintenance of Dairy Utilities and services</p> <p>3.2.1 Steam boiler</p> <p>3.2.2 Electricity</p> <p>3.2.3 Water</p> <p>3.2.4 Waste water system</p> <p>3.2.5 Refrigeration equipment</p> <p>3.3 Smart and Sustainable Systems</p> <p>3.3.1 AI application</p> <p>3.3.2 Sustainable waste disposal</p> <p>3.3.3 Eco friendly dairy plant utilities</p>	<ul style="list-style-type: none"> <li>• Interviews/ Oral questions</li> <li>• Individual/group assignments</li> <li>• Case Studies</li> </ul>
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### **Suggested Methods of Instruction**

- Demonstrations

- Role playing
- Group discussion
- Direct instruction
- Question and Answer
- Snow balling

#### Recommended Resources for 25 trainees

S/No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio (Item: Trainee)
<b>A</b>	<b>Learning Materials</b>			
1.	Textbooks		5 pcs	1:5
2.	Production Manuals		5	1;5
3.	PowerPoint presentations	For trainer's use		
4.	Projector		1	1;25
5.	Assorted Flash Cards		5	1;5
6.	Whiteboard		1	1;25
7.	Rolls flip charts		1	1;25
8.	Assorted colour of whiteboard markers	For trainers Use		
<b>B</b>	<b>Learning Facilities &amp; infrastructure</b>			
1.	Lecture/theory room		1	1:25
2.	Workshop		1	1:25
3.	Laboratory		1	1:25
4.	Site		1	1:25
<b>C</b>	<b>Consumable materials</b>			
1.	Iodine			1:5
2.	Crystal violet		25 pcs	1:1
3.	Safranin			
4.	Ethanol/acetone			
5.	Iodine			
6.	Milk /product samples		500ml	500mls:5
<b>D</b>	<b>Tools and Equipment</b>			
1.	Microscope		5 pcs	1:5
2.	Microscope slides		50 pcs	2:1
3.	Heat exchanger		1 pcs	1:25
4.	Vats		5 pcs	1:5

5.	Refrigeration Equipment's		1 pcs	1:25
6.	Milk separator		1 pcs	1:25
7.	Milk homogenizer		1 pcs	1:25
8.	Heat exchanger		1 pcs	1:25
9.	Vats		1 pcs	1:25
10.	Milk coolers		1 pcs	1:25
11.	Milk Pumps		1 pcs	1:25
12.	Milk filters		1 pcs	1:25
13.	Butter churn		1 pcs	1:25
14.	Ice cream freezer		1 pcs	1:25
15.	Packaging equipment		1 pcs	1:25

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