

## **FERMENTED MILK PRODUCTS PROCESSING**

**ISCED UNIT CODE: 0721 351 03A**

**TVET CDACC UNIT CODE: DA/CU/PM/CR/03/4/MA**

### **Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Process Fermented Milk Products

**Duration:** 180 Hours

### **Unit Description**

This unit specifies the competencies required to process fermented milk products. It involves producing yoghurt, cultured and kefir milk products.

### **Summary of Learning Outcomes**

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

<b>S/No</b>	<b>Learning Outcomes</b>	<b>Duration (Hours)</b>
1.	Produce yoghurt	80
2.	Produce cultured milk	50
3.	Produce kefir milk	50
<b>Total</b>		<b>180</b>

<b>Learning Outcomes</b>	<b>Content</b>	<b>Suggested Assessment Methods</b>
1. Produce Yoghurt.	1.1 Yoghurt Production concepts 1.1.1 Definition of terms 1.1.1.1 Inoculation 1.1.1.2 Fermentation	<ul style="list-style-type: none"><li>Written tests</li><li>Interviews/ Oral questions</li><li>Practical</li><li>Individual/group assignments</li></ul>

	<p>1.1.1.3 Incubation</p> <p>1.2 Dairy Culture</p> <ul style="list-style-type: none"> <li>1.2.1 Qualities/characteristics</li> <li>1.2.2 Storage conditions</li> <li>1.2.3 Factors that affect starter culture viability</li> </ul> <p>1.3 Types of fermentation</p> <ul style="list-style-type: none"> <li>1.3.1 Aerobic, anaerobic, Uncontrolled, Controlled, Homo fermentation, Hetero fermentation, Lactic acid fermentation, Propionic acid fermentation, Alcohol fermentation, Citric acid fermentation, Coliform gassy fermentation, Butyric acid fermentation</li> </ul> <p>1.4 Types of yoghurt</p> <ul style="list-style-type: none"> <li>1.4.1 Set yoghurt</li> <li>1.4.2 Stirred Yoghurt</li> </ul> <p>1.5 Raw milk Sampling</p> <ul style="list-style-type: none"> <li>1.5.1 Definition of terms</li> <li>1.5.2 Sampling methods</li> <li>1.5.3 Sampling procedures</li> </ul> <p>1.6 Raw milk quality Analysis</p> <ul style="list-style-type: none"> <li>1.6.1 Raw milk quality tests</li> <li>1.6.2 Organoleptic</li> <li>1.6.3 Clot On Boiling</li> <li>1.6.4 Compositional test</li> <li>1.6.5 Resazurin test</li> <li>1.6.6 Alcohol test</li> </ul>	<ul style="list-style-type: none"> <li>• Case Studies</li> <li>• Third party report</li> </ul>
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	<p>1.6.7 Lactometer test</p> <p>1.6.8 Antibiotic test</p> <p>1.6.9 pH test</p> <p>1.7 Milk additives</p> <p>1.7.1 Types (Sugar or sweetener; Stabilisers; Milk powder, Flavour, Colour)</p> <p>1.7.2 Role of milk additives</p> <p>1.8 Yoghurt making tools, equipment and materials</p> <p>1.8.1 Pasteurization Materials</p> <p>1.8.1.1 Raw milk</p> <p>1.8.1.2 Milk powder</p> <p>1.8.1.3 Sugar</p> <p>1.8.1.4 Thermophilic live culture</p> <p>1.8.1.5 Packaging material</p> <p>1.8.1.6 Flavour</p> <p>1.8.1.7 Food colour</p> <p>1.8.2 Yoghurt making equipment</p> <p>1.8.2.1 Clarifier</p> <p>1.8.2.2 Homogenizer</p> <p>1.8.2.3 Pasteurizer</p> <p>1.8.2.4 Incubator/fermentation tank</p> <p>1.8.2.5 Packaging machine</p> <p>1.8.2.6 A.I</p> <p>1.9 Yoghurt making process</p> <p>1.9.1 Pre-warming</p> <p>1.9.2 Milk standardization</p>	
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	<p>1.9.3 Homogenization</p> <p>1.9.4 Pasteurization</p> <p>1.9.5 Cooling</p> <p>1.9.6 Inoculation</p> <p>1.9.7 Incubation</p> <p>1.9.8 Breaking the coagulum</p> <p>1.9.9 Addition of flavour and colour</p> <p>1.9.10 Heat treatment of yoghurt</p> <p>1.10 Quality evaluation of yoghurt</p> <p>1.10.1 Sensory evaluation</p> <p>1.10.1.1 Principles of sensory evaluation</p> <p>1.10.1.2 Judging and grading</p> <p>1.10.2 Shelf life</p> <p>1.10.3 Yield</p> <p>1.11 Packaging of Finished yoghurt product</p> <p>1.11.1 Packaging machines</p> <p>1.11.2 Packaging materials</p> <p>1.11.3 Packaging methods</p> <p>1.11.3.1 Aseptic packaging</p> <p>1.11.3.2 Hermetic packaging</p> <p>1.11.4 Importance of Packaging</p> <p>1.12 Storage of yoghurt</p> <p>1.12.1 Definition of terms</p> <p>1.12.2 Storage conditions</p> <p>1.12.3 Storage principles; FIFO</p> <p>1.12.4 Storage equipment</p>	
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	<p>1.13 Hygiene and sanitation of yoghurt processing equipment</p> <p>    1.13.1 Cleaning procedures</p> <p>    1.13.2 Sanitization methods</p> <p>1.14 Waste disposal</p> <p>    1.14.1 Methods of waste disposal</p> <p>    1.14.2 Importance of waste disposal</p> <p>1.15 Record-keeping</p> <p>    1.15.1 Types of records</p> <p>    1.15.2 Importance</p> <p>1.16 Smart and Sustainable Systems</p> <p>    1.16.1 AI application</p> <p>    1.16.2 Sustainable packaging options</p> <p>    1.16.3 Sustainable waste disposal</p>	
2. Produce cultured milk	<p>2.1 Production of Cultured Milk</p> <p>    2.1.1 Definition of terms</p> <p>        2.1.1.1 Mesophilic Culture</p> <p>        2.1.1.2 Cultured Milk</p> <p>2.2 Cultured milk processing equipment and materials</p> <p>    2.2.1 Cultured milk Materials</p> <p>        2.2.1.1 Raw milk</p> <p>        2.2.1.2 Milk powder</p> <p>        2.2.1.3 Mesophilic live culture</p> <p>        2.2.1.4 Packaging material</p> <p>    2.2.2 Cultured Milk equipment</p> <p>        2.2.2.1 Blender</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> <li>• Third party report</li> </ul>

	<p>2.2.2.2 Cream separator</p> <p>2.2.2.3 Homogenizer</p> <p>2.2.2.4 Pasteurizer</p> <p>2.2.2.5 Milk silo tank</p> <p>2.2.2.6 Packaging machine</p> <p>2.3 Cultured milk processing</p> <p>2.3.1 Raw milk standardization</p> <p>2.3.2 Pasteurization</p> <p>2.3.3 Cooling</p> <p>2.3.4 Inoculation</p> <p>2.3.5 Incubation</p> <p>2.3.6 Breaking coagulum</p> <p>2.4 Milk homogenization</p> <p>2.4.1 Definition of terms</p> <p>2.4.2 Homogenization equipment</p> <p>2.4.3 Homogenization principles</p> <p>2.4.4 Factors influencing homogenization</p> <p>2.5 Quality evaluation of cultured milk product</p> <p>2.5.1 Sensory Evaluation</p> <p>2.5.1.1 Principles of sensory evaluation</p> <p>2.5.1.2 Judging and grading</p> <p>2.5.2 Yield</p> <p>2.5.3 Shelf life</p> <p>2.6 Packaging of cultured milk products</p> <p>2.6.1 Packaging machines</p> <p>2.6.2 Packaging materials</p>	
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	<p>2.6.3 Packaging methods</p> <p>    2.6.3.1 Aseptic packaging</p> <p>    2.6.3.2 Hermetic packaging</p> <p>2.6.4 Importance of Packaging</p> <p>2.6.5 Sustainable packaging options</p> <p>2.7 Storage of Cultured milk product</p> <p>    2.7.1 Storage conditions</p> <p>    2.7.2 Storage principles; FIFO</p> <p>    2.7.3 Storage equipment</p> <p>2.8 Hygiene and sanitation of cultured milk processing equipment</p> <p>    2.8.1 Cleaning procedures</p> <p>    2.8.2 Sanitization methods</p> <p>2.9 Waste disposal</p> <p>    2.9.1 Methods of waste disposal</p> <p>    2.9.2 Importance of waste disposal</p> <p>2.10 Record keeping</p> <p>    2.10.1 Types of records</p> <p>    2.10.2 Importance</p> <p>2.11 Smart and Sustainable Systems</p> <p>    2.11.1 AI application</p> <p>    2.11.2 Sustainable packaging options</p> <p>    2.11.3 Sustainable waste disposal</p>	
3. Produce kefir	<p>3.1 Kefir Production</p> <p>    3.1.1 Definition of Kefir</p> <p>    3.1.2 Characteristics of kefir</p> <p>3.2 Kefir processing equipment and materials</p>	<ul style="list-style-type: none"> <li>•Written tests</li> <li>•Interviews/ Oral questions</li> <li>•Practical reports</li> <li>•Individual/group assignments</li> </ul>

	<p>3.2.1 Kefir Processing Materials</p> <ul style="list-style-type: none"> <li>3.2.1.1 Raw milk</li> <li>3.2.1.2 Kefir grains</li> <li>3.2.1.3 Packaging material</li> </ul> <p>3.2.2 Kefir Processing equipment</p> <ul style="list-style-type: none"> <li>3.2.2.1 Homogenizer</li> <li>3.2.2.2 Clarifier</li> <li>3.2.2.3 Pasteurizer</li> <li>3.2.2.4 Milk silo tank</li> <li>3.2.2.5 Packaging machine</li> </ul> <p>3.3 Kefir processing</p> <ul style="list-style-type: none"> <li>3.3.1 Standardization</li> <li>3.3.2 Pasteurization</li> <li>3.3.3 Cooling</li> <li>3.3.4 Inoculation</li> <li>3.3.5 Incubation</li> <li>3.3.6 Separation</li> </ul> <p>3.4 Packaging of kefir milk product</p> <ul style="list-style-type: none"> <li>3.4.1 Packaging machines</li> <li>3.4.2 Packaging materials</li> <li>3.4.3 Packaging methods <ul style="list-style-type: none"> <li>3.4.3.1 Aseptic packaging</li> <li>3.4.3.2 Hermetic packaging</li> </ul> </li> </ul> <p>3.5 Importance of Packaging Storage of kefir milk product</p> <ul style="list-style-type: none"> <li>3.5.1 Storage conditions</li> <li>3.5.2 Storage principles; FIFO</li> <li>3.5.3 Storage equipment</li> </ul>	<p>Third party report</p> <ul style="list-style-type: none"> <li>•Case Studies</li> </ul>
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	<p>3.6 Hygiene and sanitation of kefir processing equipment</p> <p>    3.6.1 Cleaning procedures</p> <p>    3.6.2 Sanitization methods</p> <p>3.7 Waste disposal</p> <p>    3.7.1 Methods of waste disposal</p> <p>    3.7.2 Importance of waste disposal</p> <p>3.8 Record keeping</p> <p>    3.8.1 Types of records</p> <p>    3.8.2 Importance Record -keeping</p> <p>3.9 1.1 Smart and Sustainable Systems</p> <p>    3.9.1 AI application</p> <p>    3.9.2 Sustainable packaging options</p> <p>    3.9.3 Sustainable waste disposal</p> <p>3.10 Apply smart and sustainable systems</p> <p>    3.10.1 AI application</p> <p>    3.10.2 Sustainable packaging options</p> <p>    3.10.3 Sustainable waste disposal</p>	
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### Suggested Methods of Instruction

- Demonstrations
- Group discussion
- Direct instruction
- Role play

### 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 color 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/industry		1	1:25
<b>C</b>	<b>Consumable materials</b>			
1.	Raw milk		1ltr	1:5
2.	Pasteurized Milk		1ltr	1:5
3.	Mesophilic culture			
4.	Thermophilic culture			
5.	Kefir			
6.	Ethanol		10 ml	10:5
7.	Resazurin solution		-	-
8.	Antibiotic test kit		-	-
<b>D</b>	<b>Tools and Equipment</b>			
1.	Alcohol gun		5 pcs	1:5
2.	Lactometer		5pcs	1;5
3.	Thermometer		5 pcs	1:5
4.	Centrifuge		1 pcs	1:25
5.	Clarifier		1pcs	1:25
6.	Pasteurizer		1 pcs	1:25
7.	Homogenizer		1 pcs	1:25
8.	Lovi bond Comparator		1pcs	1:25