

PRINCIPLES OF DAIRY EQUIPMENT OPERATION

ISCED UNIT CODE: 0721 541 05A

TVET CDACC UNIT CODE: DA/CU/PM/CC/01/6/MA

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Apply Dairy Equipment Operational Principles

Duration: 120 hours

Unit Description

This unit specifies the competencies required to apply dairy equipment operational principles. It involves applying unit operations principles, applying operations and maintenance principles and applying instrumentation and automation principles in dairy processing.

Summary of Learning Outcomes

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

S/No	Learning Outcomes	Duration (Hours)
1.	Apply unit operations principles	20
2.	Apply dairy plant layout principles	20
3.	Apply dairy plant design principles	30
4.	Apply Dairy Machinery and Equipment operation principle	30
5.	Apply Dairy Equipment Operational Principles	20
Total		120

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcomes	Content	Suggested Assessment Methods
1. Apply unit operations principles	1.1 Dimensions and units 1.1.1 Dimensions 1.1.1.1 Length 1.1.1.2 Time 1.1.1.3 Temperature 1.1.1.4 Mass 1.2 Units	<ul style="list-style-type: none">Practical assessmentPortfolio of evidenceThird party reportWritten testsOral questions

	<p>1.2.1 meter (m)</p> <p>1.2.2 standard kilogram (kg)</p> <p>1.2.3 second (s)</p> <p>1.2.4 degree Celsius (°C)</p> <p>1.2.5 unit of force, the newton (N),</p> <p>1.2.6 energy unit/joule (J),</p> <p>1.3 Unit operations</p> <p>1.3.1 Mass/material and energy balance</p> <p>1.3.2 Thermodynamics</p> <p>1.3.3 Electrical transmission</p> <p>1.3.4 Fluid flow</p> <p>1.3.5 Heat transfer</p> <p>1.3.6 Sedimentation</p> <p>1.3.7 Filtration and membrane separation</p> <p>1.3.8 Centrifugation</p> <p>1.3.9 Cyclone separation</p> <p>1.3.10 Evaporation</p> <p>1.3.11 Drying</p> <p>1.3.12 Freezing</p> <p>1.4 Application of unit operations</p>	
2. Apply dairy plant layout principles	<p>2.1 Site selection</p> <p>2.2 Equipment layout</p> <p>2.3 Dairy plant layout</p> <p>2.4 Dairy equipment</p> <p>2.5 Milk dump tank</p> <p>2.6 Storage tanks</p> <p>2.7 Homogeniser</p> <p>2.8 Pasteuriser</p> <p>2.9 Cream separator</p> <p>2.10 Yoghurt making machine</p> <p>2.11 Butter churn</p> <p>2.12 Ice cream making machine</p> <p>2.13 Cheese vats</p> <p>2.14 Milk boiler</p> <p>2.15 Pumps</p>	<ul style="list-style-type: none"> • Practical assessment • Portfolio of evidence • Third party report • Written tests • Oral questioning
3. Apply dairy plant design principles	<p>3.1 Choice of construction materials</p> <p>3.2 Food contact surfaces</p> <p>3.3 Non-food contact surfaces</p> <p>3.4 Plant construction</p>	<ul style="list-style-type: none"> • Practical assessment • Portfolio of evidence • Third party report • Written tests • Oral questioning

	3.5 Raw milk reception dock 3.6 Processing hall 3.7 Storage area 3.8 Product manufacturing area 3.9 Packing area 3.10 Storage 3.11 Quality control lab 3.12 Utilities area 3.13 Waste water treatment area 3.14 Vehicle packing area 3.15 Dairy plant evaluation 3.5.1 Sustainability assessment 3.5.2 Environmental monitoring 3.5.3 Occupational standards	
4. Apply dairy machinery and equipment operation	4.1 Selection of processing equipment and machinery 4.2 Equipment installation 4.3 Equipment and machinery operation 4.4 Equipment and machinery records	<ul style="list-style-type: none"> • Practical assessment • Portfolio of evidence • Third party report • Written tests • Oral questioning
5. Apply Dairy Machinery and Equipment Maintenance principles	5.1 Maintenance tools 5.2 Maintenance methods 5.3 Unscheduled 5.4 Scheduled maintenance 5.5 Preventive 5.6 Factors affecting maintenance schedule 5.7 Criticality of equipment 5.8 Operating environment 5.9 Cost benefit analysis 5.10 maintain ace records	<ul style="list-style-type: none"> • Practical assessment • Portfolio of evidence • Third party report • Written tests • Oral questioning

Suggested Methods of Instruction

- Practical
- Demonstrations
- Project
- Group discussion
- Direct instruction

Recommended Resources for 25 trainees

S/No.	Category/Item	Description/Specifications	Quantity	Recommended Ratio (Item: Trainee)
A	Learning Materials			
	Textbooks		5 pcs	1:5
	Production Manuals		5	1:5
	Flash Cards	Assorted	5	1:5
	Whiteboard		1	1:25
	Rolls flip charts		1	1:25
	Assorted color of whiteboard markers	For trainers Use		
B	Learning Facilities & infrastructure			
5	Lecture/theory room		1	1:25
6	Workshop		1	1:25
7	Laboratory		1	1:25
8	Site		1	1:25
C	Consumable materials			
	Crystal violet		25 pcs	1:1
	Sodium hydroxide pallets		100g	100g:25
	Hydrochloric acid		500mls	500mls:5
	Sulfuric acid		500mls	500mls:5
	Absolute Ethanol/acetone		500mls	500mls:5
	Milk /product samples		500mls	500mls:5
D	Tools and Equipment			
	Refractometer		5 pcs	1:5
	Centrifuge		1 pc	1:25
	projector		1 pc	1:25

	Heat exchangers		1 pc	1:25
	Weighing balance		5	1:5XXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX
	Analytical balance		5	1:5
	Vats		5 pcs	1:5
	Bulking equipment		5 pcs	1:5
	Evaporator		1	1:25
	Boiler		1	1:5
	Refrigeration Equipment's		1 pcs	1:25