CHEESE PRODUCTS PROCESSING

ISCED UNIT CODE: 0721 451 09A

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

Relationship to Occupational Standards

This unit addresses the Unit of Competency: **Process Cheese Products**

Duration: 200 Hours

Unit Description

This unit specifies the competencies required to process Cheese products. It involves producing cheddar, gouda paneer, mozzarella cheese, processed and cream cheese.

Summary of Learning Outcomes

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

S/No	Learning Outcomes	Duration (Hours)
1.	Produce cheddar cheese	40
2.	Produce gouda cheese	30
3.	Produce paneer cheese	30
4.	Produce mozzarella cheese	30
5.	Produce processed cheese	20
6.	Produce cream cheese	20
7.	Produce Feta Cheese	30
Total		**200**

Learning Outcomes	Content	Suggested Assessment Methods
1. Produce cheddar cheese	1.1 Cheddar cheese processing concepts 1.1.1 Definition of terms 1.1.1.1 Cheddar cheese 1.1.1.2 Ripening 1.1.1.3 Acidification	• Written tests • Interviews/ Oral questions • Practical

	1.1.1.4 Ageing 1.1.1.5 Syneresis 1.1.1.6 Coagulation 1.1.2 Cheese Classification 1.1.3 Cheese milk quality requirements 1.1.4 Cheese milk pre-treatments 1.1.5 Cheese additives and ingredients 1.1.6 General cheese making operations principles 1.1.7 Characteristics of cheddar cheese 1.2 Raw milk Sampling 1.2.1 Definition of terms 1.2.2 Sampling methods 1.2.3 Sampling procedures 1.3 Raw milk quality Analysis 1.3.1 Raw milk quality tests 1.3.2 Organoleptic 1.3.3 Clot On Boiling 1.3.4 Compositional test 1.3.5 Resazurin test 1.3.6 Alcohol test 1.3.7 Lactometer test 1.3.8 Antibiotic test 1.3.9 pH test 1.4 Cheddar cheese making equipment and materials 1.4.1 Materials	• Individual/group assignments • Case Studies • Third party reports

	1.4.1.1 Raw milk 1.4.1.2 Milk powder 1.4.1.3 Renin 1.4.1.4 lactic live culture 1.4.1.5 Packaging material 1.4.1.6 salt 1.4.2 Equipment 1.4.2.1 Pre-warming Cheese vat 1.4.2.2 Cheese press 1.4.2.3 Cheese mould 1.4.2.4 Knives 1.4.2.5 Cheese cloth 1.4.2.6 Miller 1.4.2.7 pH meter 1.4.2.8 Thermometer 1.4.2.9 Packaging machine 1.5 Cheddar Cheese making process 1.5.1 Milk standardization 1.5.2 Pasteurization 1.5.3 Innoculation of cheese milk 1.5.4 Acidification 1.5.4.1 Objectives of acidification 1.5.4.2 Use of rennet enzyme 1.5.4.3 Factors affecting rennet activity 1.5.4.4 Use of dilute acids 1.5.5 Coagulation 1.5.6 Cooking/scalding the Curd	

	1.5.7 Cutting the Curd 1.5.8 Draining Whey 1.5.9 Texturizing 1.5.10 Salting 1.5.11 Pressing and moulding of Curds 1.6 Ripening 1.6.1 Ripening conditions 1.6.2 Physical and chemical changes 1.6.3 Effect of Ripening on quality 1.7 Quality evaluation of Cheddar cheese 1.7.1 Sensory evaluation 1.7.2 Yield 1.7.3 Shelf-life 1.8 Packaging of Finished Cheddar Cheese product 1.8.1 Packaging machines 1.8.2 Packaging materials 1.8.3 Packaging methods 1.8.3.1 Aseptic packaging 1.8.3.2 Hermetic packaging 1.8.4 Importance of Packaging 1.9 Storage of cheddar cheese 1.9.1 Definition of terms 1.9.2 Storage conditions 1.9.3 Storage principles; FIFO 1.9.4 Storage equipment	

	1.10 Hygiene and sanitation of cheddar cheese processing equipment 1.10.1 Cleaning procedures 1.10.2 Sanitization methods 1.11 Waste disposal 1.11.1 Methods of waste disposal 1.11.2 Importance of waste disposal 1.12 Record-keeping 1.12.1 Types of records 1.12.2 Importance 1.13 Smart and Sustainable Systems 1.13.1 AI application 1.13.2 Sustainable packaging options 1.13.3 Sustainable waste disposal	
2. Produce Gouda cheese	2.1 Gouda Cheese processing 2.1.1 Definition of terms 2.1.2 Characteristics of gouda cheese 2.2 Gouda cheese making equipment and materials 2.2.1 Materials 2.2.1.1 Raw milk 2.2.1.2 Milk powder 2.2.1.3 Renin 2.2.1.4 lactic live culture 2.2.1.5 Packaging material 2.2.1.6 Flavour 2.2.1.7 Salt 2.2.2 Equipment	• Written tests • Interviews/ Oral questions • Practical reports • Individual/group assignments • Case Studies • Third party reports

	2.2.2.1 Pre-warming Cheese vat 2.2.2.2 Cheese press 2.2.2.3 Cheese mould 2.2.2.4 Knives 2.2.2.5 Cheese cloth 2.2.2.6 Miller 2.2.2.7 pH meter 2.2.2.8 Thermometer 2.2.2.9 Packaging machine 2.3 Gouda Cheese making 2.3.1 Definition of Terms 2.3.1.1 gouda Cheese 2.3.1.2 Ripening 2.3.1.3 Syneresis 2.3.1.4 Coagulation 2.3.2 Characteristics of Gouda cheese 2.3.3 Gouda cheese making process 2.3.3.1 Milk standardization 2.3.3.2 Pasteurization 2.3.3.3 Inoculation of cheese milk 2.3.3.4 Renneting and coagulation 2.3.3.5 Cooking the Curd 2.3.3.6 Cutting the Curd 2.3.3.7 Draining Whey and Moulding 2.3.3.8 Salting 2.3.3.9 Pressing of Curds 2.4 Ripening 2.4.1 Definition of terms	

	2.4.2 Ripening conditions 2.4.3 Physical and chemical changes 2.4.4 Effect of Ripening on quality 2.5 Quality evaluation of Gouda cheese 2.5.1 Sensory evaluation 2.5.2 Shelf-life assessment 2.5.3 Cheese yield 2.6 Packaging of Gouda cheese product 2.6.1 Packaging machines 2.6.2 Packaging materials 2.6.3 Packaging methods 2.6.3.1 Aseptic packaging 2.6.3.2 Hermetic packaging 2.6.3.3 Importance of Packaging 2.7 Storage of gouda cheese 2.7.1 Definition of terms 2.7.2 Storage conditions 2.7.3 Storage principles; FIFO 2.7.4 Storage equipment 2.8 Hygiene and sanitation of Gouda cheese processing equipment 2.8.1 Cleaning procedures 2.8.2 Sanitization methods 2.9 Waste disposal 2.9.1 Methods of waste disposal 2.9.2 Importance of waste disposal 2.10 Record-keeping 2.10.1 Types of records	

	2.10.2 Importance 2.11 Smart and Sustainable Systems 2.11.1 AI application 2.11.2 Sustainable packaging options 2.11.3 Sustainable waste disposal	
3. Produce Paneer cheese	3.1 Paneer Cheese Production 3.1.1 Definition of terms 3.1.2 Characteristics of paneer cheese 3.1 Raw milk Sampling 3.1 Raw milk quality Analysis 3.1 Paneer cheese processing equipment and materials 3.4.1 Paneer cheese Processing Materials 3.4.1.1 Raw milk 3.4.1.2 Salt 3.4.1.3 Acetic /citric acid 3.4.1.4 Packaging material 3.4.2 Paneer cheese Processing equipment 3.4.2.1 Cheese vat 3.4.2.2 Cheese mould 3.4.2.3 Knives 3.4.2.4 Cheese cloth 3.4.2.5 Thermometer 3.4.2.6 pH meter 3.4.2.7 Homogenizer 3.4.2.8 Clarifier	• Written tests • Practical • Interviews/ Oral questions • Practical reports • Individual/group assignments • Case Studies

	3.4.2.9 Pasteurizer 3.1 Paneer cheese processing 3.5.1 Pasteurization 3.5.2 Acidification 3.5.3 Homogenization 3.5.4 Curding 3.5.5 Wheying off 3.5.6 Salting 3.5.7 cooling 3.1 Quality Evaluation of paneer cheese 3.6.1 sensory evaluation 3.6.2 shelf-life evaluation 3.6.3 cheese yield 3.1 Packaging of paneer cheese 3.7.1 Packaging machines 3.7.2 Packaging materials 3.7.3 Packaging methods 3.1 Importance of Packaging 3.1 Storage of Paneer Cheese 3.9.1 Storage conditions 3.9.2 Storage principles; FIFO 3.9.3 Storage equipment 3.1 Hygiene and sanitation of paneer cheese processing equipment 3.10.1 Cleaning procedures 3.10.2 Sanitization methods 3.10.3 Waste disposal 3.1 Smart and Sustainable Systems	

	3.11.1 AI application 3.11.2 Sustainable packaging options 3.11.3 Sustainable waste disposal	
4. Produce Mozzarella Cheese	4.1 Mozzarella cheese production 4.1.1 Definition of mozzarella cheese 4.1.2 Characteristics of mozzarella cheese 4.2 Raw milk Sampling 4.3 Raw milk quality Analysis 4.4 Mozzarella cheese processing equipment and materials 4.4.1 Mozzarella cheese Processing Materials 4.4.1.1 Raw milk 4.4.1.2 Salt 4.4.1.3 Live culture 4.4.1.4 Rennet enzyme 4.4.1.5 Packaging material 4.4.2 Mozzarella cheese Processing equipment 4.4.2.1 Cheese vat 4.4.2.2 Cheese mould 4.4.2.3 Knives 4.4.2.4 Cheese cloth 4.4.2.5 Thermometer 4.4.2.6 Pasteurizer 4.4.2.7 Cold room/refrigerator 4.5 Mozzarella cheese processing 4.5.1 Pre-treatment 4.5.2 Pasteurization	• Written tests • Practical • Interviews/ Oral questions • Practical reports • Individual/group assignments • Case Studies

	4.5.3 Inoculation 4.5.4 Ripening 4.5.5 Renneting and coagulation 4.5.6 Scalding 4.5.7 Moulding 4.5.8 Cooling 4.5.9 Salting 4.6 Quality evaluation of Mozzarella cheese 4.6.1 sensory evaluation 4.6.2 shelf-life evaluation 4.7 Packaging of Mozzarella cheese 4.7.1 Packaging machines 4.7.2 Packaging materials 4.7.3 Importance of Packaging 4.8 Storage of Mozzarella Cheese 4.8.1 Storage conditions 4.8.2 Storage principles; FIFO 4.8.3 Storage equipment 4.9 Hygiene and sanitation of Mozzarella cheese processing equipment 4.9.1 Cleaning procedures 4.9.2 Sanitization methods 4.10 Waste disposal 4.10.1 Methods of waste disposal 4.10.2 Importance of waste disposal 4.11 Record keeping 4.12 Smart and Sustainable Systems 4.12.1 AI application	

	4.12.2 Sustainable packaging options 4.12.3 Sustainable waste disposal	
5. Processed Cheese	1.1 Processed Cheese Production 1.1.1 Definition of processed cheese 1.1.2 Characteristics of processed cheese 1.1.3 Processed cheese processing equipment and material 1.1.4 Processed cheese Processing Materials 1.1.5 Base Cheese 1.1.6 Salt 1.1.7 Live culture 1.1.8 Emulsifiers 1.1.9 Cream 1.1.10 Pasteurised Milk 1.1.11 Flavour 1.1.12 Packaging material Cheese 1.1.13 Food Colour 1.1.14 Emulsifier 1.1.15 Stabilizer 1.1.16 Permitted preservative 1.1.17 Skim milk power 1.1.18 Portable water 1.1.19 Processed cheese Processing equipment 1.1.20 Cheese vat 1.1.21 Cheese mould 1.1.22 Knives 1.1.23 Cheese cloth 1.1.24 Thermometer 1.1.25 Pasteurizer 1.1.26 Blender 1.1.27 Cold room/refrigerator 1.1.28 Processed cheese processing 1.1.29 Selection of Base cheese 1.1.30 Blending 1.1.31 Melting and cooking 1.1.32 Cooling 1.1.33 Quality evaluation of processed cheese 1.1.34 sensory evaluation 1.1.35 shelf-life evaluation	• Written tests • Practical • Interviews/ Oral questions • Practical reports • Individual/group assignments • Case Studies • Third party reports

	1.1.36 Packaging of processed cheese 1.1.37 Packaging machines 1.1.38 Packaging materials 1.1.39 Importance of Packaging 1.1.40 Storage of Processed Cheese 1.1.41 Storage conditions 1.1.42 Storage principles; FIFO 1.1.43 Storage equipment 1.1.44 Smart and Sustainable Systems 1.1.45 AI application 1.1.46 Sustainable packaging options 1.1.47 Sustainable waste disposal	
6. Cream Cheese	6.1 Cream Cheese Production 6.5.1 Definition of Cream Cheese 6.5.2 Characteristics of Cream cheese 6.2 Cream cheese processing equipment and materials 6.5.1 Cream cheese Processing Materials 6.1.1.1 Cream 6.1.1.2 Salt 6.1.1.3 Mesophilic culture 6.1.1.4 Emulsifiers 6.1.1.5 Pasteurised Milk 6.1.1.6 Flavour 6.1.1.7 Packaging material 6.5.2 Cream cheese Processing equipment 7.2.2.1 Cheese vat 7.2.2.2 Cheese mould 7.2.2.3 Knives 7.2.2.4 Cheese cloth 7.2.2.5 Thermometer 7.2.2.6 Pasteurizer	• Written tests • Practical • Interviews/ Oral questions • Practical reports • Individual/group assignments • Case Studies • Third party reports

	7.2.2.7 Blender 7.2.2.8 Cold room/refrigerator 6.3 Cream cheese processing 6.5.1 Standardization 6.5.2 Homogenization 6.5.3 Pasteurization 6.5.4 Cooling 6.5.5 Inoculation 6.5.6 Incubation 6.5.7 Coagulation 6.5.8 Draining 6.5.9 Salting 6.4 Quality evaluation of cream cheese 6.12.1 Sensory evaluation 6.12.2 Shelf-life evaluation 6.5 Packaging of cream cheese 6.5.1 Packaging machines 6.5.2 Packaging materials 6.5.3 Importance of Packaging 6.6 Storage of cream Cheese 6.12.1 Storage conditions 6.5.2 Storage principles; FIFO 6.5.3 Storage equipment 6.7 Smart and Sustainable Systems 6.12.1 AI application 6.12.2 Sustainable packaging options 6.12.3 Sustainable waste disposal	
7. Produce Feta Cheese	1.1 Feta Cheese Production 7.1.1 Definition of Feta Cheese	• Written tests • Practical

	7.1.2 Characteristics of Feta cheese 7.1.3 Feta cheese processing equipment and materials 7.7.1 Feta cheese Processing Materials 7.2..1 Milk 7.2..2 Salt 7.2..3 Mesophilic culture 7.2..4 Packaging material 7.7.1 Feta cheese Processing equipment 7.2.2.1 Cheese vat 7.2.2.2 Cheese mould 7.2.2.3 Knives 7.2.2.4 Cheese cloth 7.2.2.5 Thermometer 7.2.2.6 Pasteurizer 7.2.2.7 Blender 7.2.2.8 Cold room/refrigerator 7.3 Feta cheese processing 7.3.1 Cheese milk Standardization 7.3.2 Cheese milk pasteurization 7.3.3 Cheese milk inoculation 7.3.4 Cheese milk renneting 7.3.5 Cut coagulum treatment 7.3.6 Cheese curd handling 7.3.7 Cheese ripening 7.3.8 Cheese packaging and distribution 7.4 Quality evaluation of Feta cheese 7.4.1 Sensory evaluation	• Interviews/ Oral questions • Practical reports • Individual/group assignments • Case Studies • Third party reports

	7.4.2 Shelf-life evaluation 7.5 Packaging of Feta cheese 7.5.1 Packaging machines 7.5.2 Packaging materials 7.5.3 Importance of Packaging 7.6 Storage of Feta Cheese 7.6.1 Storage conditions 7.6.2 Storage principles; FIFO 7.6.3 Storage equipment 7.7 Smart and Sustainable Systems 7.7.1 AI application 7.7.2 Sustainable packaging options 7.7.3 Sustainable waste disposal	

Suggested Methods of Instruction

- Demonstrations
- Role playing
- Group discussion
- Direct instruction

Recommended Resources for 25 Trainees

S/No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio (Item: Trainee)
A	**Learning Materials**			
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	**Learning Facilities & infrastructure**			
5.	Lecture/theory room		1	1:25
6.	Workshop		1	1:25
7.	Laboratory		1	1:25
8.	Site/industry		1	1:25
C	**Consumable materials**			
1.	Ethanol		1ltr	1:5
2.	Resazurin solution		10mls	10:5
3.	Antibiotic test kit		1	1;5
4.	Phenolphthalein Indicator		10ml	10:5
5.	Sodium hydroxide		-	-
6.	Raw milk		1ltr	1:5
7.	Rennet enzyme		-	-
8.	Salt		-	-
9.	Live culture		-	-
D	**Tools and Equipment**			
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	5:25
6.	Pasteurizer		1 pcs	1:25
7.	Homogenizer		1 pcs	1:25
8.	Lovi bond Comparator		1pcs	1:25