****

**REPUBLIC OF KENYA**

**COMPETENCY BASED CURRICULUM**

**FOR**

**DAIRY PROCESSING TECHNOLOGY**

**LEVEL 4**



TVET CDACC

P.O. BOX 15745-00100

NAIROBI

First published 2018

©2018, TVET CDACC

All rights reserved. No part of this curriculum may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods without the prior written permission of the TVET CDACC, except in the case of brief quotations embodied in critical reviews and certain other non-commercial uses permitted by copyright law. For permission requests, write to the Council Secretary/CEO, at the address below:

**Council Secretary/CEO**

**TVET Curriculum Development, Assessment and Certification Council**

**P.O. Box 15745–00100**

**Nairobi, Kenya**

**Email:** **info@tvetcdacc.go.ke**

# FOREWORD

The provision of quality education and training is fundamental to the Government’s overall strategy for social economic development. Quality education and training will contribute to achievement of Kenya’s development blueprint and sustainable development goals.

Reforms in the education sector are necessary for the achievement of Kenya Vision 2030 and meeting the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution and this resulted in the formulation of the Policy Framework for Reforming Education and Training (Sessional Paper No. 4 of 2016). A key feature of this policy is the radical change in the design and delivery of TVET training. This policy document requires that training in TVET be competency based, curriculum development be industry led, certification be based on demonstration of competence and mode of delivery allows for multiple entry and exit in TVET programmes.

These reforms demand that industry takes a leading role in curriculum development to ensure the curriculum addresses its competence needs. It is against this background that this curriculum has been developed.

It is my conviction that this curriculum will play a great role towards development of competent human resource for Food processing sector’s growth and development.

**PRINCIPAL SECRETARY, VOCATIONAL AND TECHNICAL TRAINING**

**MINISTRY OF EDUCATION**

# PREFACE

Kenya Vision 2030 aims to transform the country into a newly industrializing, “middle-income country providing a high-quality life to all its citizens by the year 2030”. Kenya intends to create a globally competitive and adaptive human resource base to meet the requirements of a rapidly industrializing economy through life-long education and training. TVET has a responsibility of facilitating the process of inculcating knowledge, skills and attitudes necessary for catapulting the nation to a globally competitive country, hence the paradigm shift to embrace Competency Based Education and Training (CBET).

The Technical and Vocational Education and Training Act No. 29 of 2013 and Sessional Paper No. 4 of 2016 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification. This called for a shift to CBET to address the mismatch between skills acquired through training and skills needed by industry as well as increase the global competitiveness of Kenyan labour force.

TVET Curriculum Development, Assessment and Certification Council (TVET CDACC) in conjunction with Food Technology Sector Skills Advisory Committee (SSAC) have developed this curriculum.

This curriculum has been developed following the CBET framework policy; the CBETA Standards and guidelines provided by the TVET Authority and the Kenya National Qualification framework designed by the Kenya National Qualification Authority.

This curriculum is designed and organized with an outline of learning outcomes; suggested delivery methods, training/learning resources and methods of assessing the trainee’s achievement. The curriculum is competency-based and allows multiple entry and exit to the course.

I am grateful to the Council Members, Council Secretariat, Food Technology SSAC, expert workers and all those who participated in the development of this curriculum.

**CHAIRPERSON, TVET CDACC**

# ACKNOWLEDGEMENT

This curriculum has been designed for competency-based training and has independent units of learning that allow the trainee flexibility in entry and exit. In developing the curriculum, significant involvement and support was received from various organizations.

I appreciate the funding of the Government of Canada and its implementing partner Colleges and Institutes Canada (CICan) which enabled the development of this curriculum through the Kenya Education for Employment Program (KEFEP).

I also appreciate the Nyeri National Polytechnic and its Canadian technical partners from Cégep Saint-Jean-sur-Richelieu, Collège Communautaire du Nouveau-Brunswick and Champlain Regional College who collaborated to identify industry skills gaps and develop this curriculum.

I recognize with appreciation the role of industry partners including the National Polytechnic’s Industry Advisory Committee and Food Technology Sector Skills Advisory Committee (SSAC) in ensuring that competencies required by the industry are addressed in the curriculum. I also thank all stakeholders in the sector for their valuable input and all those who participated in the process of developing this curriculum.

I am convinced that this curriculum will go a long way in ensuring that workers in food processing sector acquire competencies that will enable them to perform their work more efficiently and effectively.

**COUNCIL SECRETARY/CEO**

**TVET CDACC**

Table of Contents

[FOREWORD IV](#_Toc77580139)

[PREFACE V](#_Toc77580140)

[ACKNOWLEDGEMENT VI](#_Toc77580141)

[ABBREVIATIONS AND ACRONYMS VIII](#_Toc77580142)

[KEY TO UNIT CODE IX](#_Toc77580143)

[COURSE OVERVIEW 1](#_Toc77580144)

[BASIC UNITS OF LEARNING 4](#_Toc77580145)

[COMMUNICATION SKILLS 5](#_Toc77580146)

[NUMERACY SKILLS 8](#_Toc77580147)

[DIGITAL LITERACY 12](#_Toc77580148)

[ENTREPRENEURIAL SKILLS 14](#_Toc77580149)

[EMPLOYABILITY SKILLS 18](#_Toc77580150)

[ENVIRONMENTAL LITERACY 21](#_Toc77580151)

[OCCUPATIONAL SAFETY AND HEALTH PRACTICES 24](#_Toc77580152)

[CORE UNITS OF LEARNING 27](#_Toc77580153)

[COLLECTION OF RAW MILK 28](#_Toc77580154)

[PROCESSING OF PASTEURIZED MILK 31](#_Toc77580155)

[ProDUCTION OF fermented milk products 34](#_Toc77580156)

[QUALITY CONTROL OF MILK AND MILK PRODUCT 38](#_Toc77580157)

[PACKAGING OF MILK PRODUCTS 41](#_Toc77580158)

# ABBREVIATIONS AND ACRONYMS

CBET Competency Based Education and Training

CC Collège Champlain

CCNB Collège Communautaire du Nouveau-Brunswick

CDACC Curriculum Development Assessment and Certification Council

CSTJ Cégep Saint-Jean-sur-Richelieu

EMCA Environmental Management and Coordination Act

GMP Good Manufacturing Practices

HACCP Hazards Analysis and Critical Control Point

HTST High Temperature/Short Time

OS Occupational Standard

PPE Personal Protection Equipment

SOP Standard Operating Procedure

SSAC Sector Skills Advisory Committee

SWOT Strengths Weaknesses Opportunities Threats

TVETA Technical and Vocational Education and Training Authority

# **KEY TO UNIT CODE**

 **DA/CU/PM/BC/01/4/A**

Industry or sector

Occupational Standards

Occupational area

Type of competency

Competency number

Competency level

Control version

# COURSE OVERVIEW

Dairy Processing Technology Level 4 qualification consists of units of learning that an individual must achieve to enable him/her to collect raw milk, process pasteurized milk, produce fermented milk products and control quality of milk and milk products. It also enables an individual to package milk product.

The units of learning leading to Dairy Processing Technology Level 4 qualification include the following.

**Basic Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit Factors**  |
| DA/CU/PM/BC/01/4/A | Communication skills | 20 | 2 |
| DA/CU/PM/BC/02/4/A | Numeracy skills | 25 | 2.5 |
| DA/CU/PM/BC/03/4/A | Digital literacy | 35 | 3.5 |
| DA/CU/PM/BC/04/4/A | Entrepreneurial skills | 60 | 6 |
| DA/CU/PM/BC/05/4/A | Employability skills | 30 | 3 |
| DA/CU/PM/BC/06/4/A | Environmental literacy | 20 | 2 |
| DA/CU/PM/BC/07/4/A | Occupational safety and health practices | 20 | 2 |
| **Total** | **210** | **21** |

**Common Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit Factors** |
| DA/CU/PM/CC/01/4/A | [Clean and sanitize milk processing equipment](#_Toc6590341) | 60 | 6 |
|  | **Total**  | **60** | **6** |

**Core Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit Factors** |
| DA/CU/PM/CR/01/4/A | Collection of raw milk  | 68 | 6.8 |
| DA/CU/PM/CR/02/4/A | Processing of pasteurized milk | 82 | 8.2 |
| DA/CU/PM/CR/03/4/A | Production of fermented milk products  | 80 | 8 |
| DA/CU/PM/CR/04/4/A | Quality control of milk and milk products. | 120 | 12 |
| DA/CU/PM/CR/05/4/A | Packaging of milk products | 68 | 6.8 |
|  | Industrial attachment | 300 | 30 |
| **Total** | **718** | **71.8** |
| **Grand Total** | **988** | **98.8** |

The total duration of the course is 988 hours, which is inclusive of 300 hours of industrial attachment.

**Entry Requirements**

An individual entering this course should have any of the following minimum requirements:

1. Kenya Certificate of Secondary Education (KCSE)

**Or**

1. Certificate Level 3 in Dairy Processing Technology

**Or**

1. Equivalent qualifications as determined by Kenya National Qualifications Authority (KNQA)

**Industrial attachment**

An individual enrolled in this course will undergo an industrial attachment for a period of 300 hours in Dairy Processing firm.

**Trainer qualification**

A trainer for this course should have a higher qualification than the level of this course.

**Assessment**

The course will be assessed at two levels:

1. **Internal assessment**: conducted continuously by the trainer (internal assessor) who is monitored by an accredited internal verifier.
2. **External assessment:** conducted by an accredited external assessor who is monitored by an accredited external verifier.

The assessors and verifiers are accredited by TVET CDACC which also coordinates external assessment.

**Certification**

An individual will be awarded a Certificate of Competency on demonstration of competence in a unit of competency. To be awarded Certificate in Dairy Processing Technology Certificate Level 4, an individual must demonstrate competence in all the units of competency.

These certificates will be awarded by TVET CDACC in conjunction with the training provider.

# BASIC UNITS OF LEARNING

# COMMUNICATION SKILLS

**UNIT CODE:** DA/CU/PM/BC/01/4/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Communication Skills

**Duration of Unit:** 20 Hours

**Unit Description**

This unit covers the competencies required demonstrate communication skills. It involves obtaining and conveying workplace information, completing relevant work-related documents, communicating information about workplace processes, leading workplace discussion and communicating workplace issues.

**Summary of Learning Outcomes**

1. Obtain and convey workplace information
2. Complete relevant work-related documents
3. Communicate information about workplace processes
4. Lead workplace discussions
5. Identify and communicate issues arising in the workplace

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Obtain and convey workplace information
 | * Communication process
* Modes of communication
* Medium of communication
* Effective communication
* Barriers to communication
* Flow of communication
* Sources of information
* Types of questions
* Organizational policies
* Workplace etiquette
* Ethical work practices in handling communication
 | * Interview
* Third party reports
 |
| 1. Complete relevant work-related documents
 | * Types and purposes of workplace documents and forms
* Methods used in filling forms and documents
* Recording workplace data
* Process of distributing workplace forms and documents
* Report writing
* Types of workplace reports
 | * Interview
* Third party reports
 |
| 1. Communicate information about workplace processes
 | * Communication process
* Modes of communication
* Medium of communication
* Effective communication
* Barriers to communication
* Flow of communication
* Sources of information
* Organizational policies
* Organization requirements for written and electronic communication methods
* Report writing
* Effective questioning techniques (clarifying and probing)
* Workplace etiquette
* Ethical work practices in handling communication
 | * Interview
* Portfolio
 |
| 1. Lead workplace discussion
 | * Methods of discussion e.g.
	+ Coordination meetings
	+ Toolbox discussion
	+ Peer-to-peer discussion
* Solicitation of response
 | * Interview
* Third party reports
 |
| 1. Identify and communicate issues arising in the workplace
 | * Identification of problems and issues
* Organizing information on problems and issues
* Relating problems and issues
* Communication barriers affecting workplace discussions
 | * Interview
* Portfolio
 |

**Suggested Methods of Instructions**

* Direct instruction
* Demonstration
* Practice assignment
* Discussion
* Role play
* Brainstorming

**Recommended Resources**

* Desktop computers/laptops
* Internet connection
* Projectors
* Telephone
* Report writing templates

# NUMERACY SKILLS

**UNIT CODE:** DA/CU/PM/BC/02/4/A

**Relationship to Occupational Standards:**

This unit addresses the Unit of Competency: Demonstrate Numeracy Skills

**Duration of Unit:** 25hours

**Unit Description**

This unit covers the competencies required to demonstrate numeracy skills. It involves identifying and using whole numbers and simple fractions, decimals and percentages for work, identifying, measuring and estimating familiar quantities for work, reading and using familiar maps, plans and diagrams for work, identifying and describing common 2D and some 3D shapes for work, constructing simple tables and graphs for work using familiar data and identifying and interpreting information in familiar tables, graphs and charts for work.

**Summary of Learning Outcomes**

1. Identify and use whole numbers and simple fractions, decimals and percentages for work
2. Identify, measure and estimate familiar quantities for work
3. Read and use familiar maps, plans and diagrams for work
4. Identify and describe common 2D and some 3D shapes for work
5. Construct simple tables and graphs for work using familiar data
6. Identify and interpret information in familiar tables, graphs and charts for work

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify and use whole numbers and simple fractions, decimals and percentages for work
 | * Whole numbers
* Simple fractions
* Decimals
* Percentages
* Sizes
* Problem solving methods
* Calculations using the 4 operations
* Recording and communicating numerical information
 | * Written
* Practice assignments

  |
| 2. Identify, measure and estimate familiar quantities for work | * Measurement information
* Units of measurement
* Estimate familiar and simple amounts
* Selection of appropriate measuring equipment
* Calculate using familiar units of measurement
* Check measurements and results against estimates
* Using informal and some formal mathematical and general language
* Record or report results
 | * Written
* Practice assignments
 |
| 3. Read and use familiar maps, plans and diagrams for work | * Maps, plans and diagrams
* Locate items and places in familiar maps, plans and diagrams
* Recognize common symbols and keys in familiar maps, plans and diagrams
* Direction and location of objects, or route or places
* Use of informal and some formal oral mathematical language and symbols
 | * Practical test
* Written
 |
| 4. Identify and describe common 2D and some 3D shapes for work | * Common 2D shapes and 3D shapes
* Classification of common 2D shapes and designs
* Description of Use informal and some formal language to describe common two-dimensional shapes and some common three-dimensional shapes
* Construction of common 2D shapes
* Match common 3D shapes to their 2D sketches or nets
 | * Written
* Practical test
 |
| 5. Construct simple tables and graphs for work using familiar data | * Types of graphs
* Determination of data to be collected
* Selection of data collection method
* Collection of data
* Determination of variables from the data collected
* Order and collate data
* Construct a table and enter data
* Construct a graph using data from table
* Check results
* Report or discuss graph information related to work using informal and some formal mathematical and general language
 | * Written
* Practical test
 |
| 6. Identify and interpret information in familiar tables, graphs and charts for work | * Tables construction and labeling
* i.e. title, headings, rows and columns
* Interpreting information and data in simple tables
* Relaying information of relevant workplace tasks on/in a table
* Identify familiar graphs and charts in familiar texts and contexts
* Locate title, labels, axes, scale and key from familiar graphs and charts
* Identify and interpret information and data in familiar graphs and charts
* Relate information to relevant workplace tasks
 | * Written
* Practical test
 |

**Suggested Methods of Instructions**

* Instructor led facilitation of theory
* Practical demonstration of tasks by trainer
* Practice by trainees/ role play
* Discussion
* Observations and comments and corrections by trainers

**Recommended Resources**

* Computers
* Stationery
* Charts
* Video clips
* Audio tapes
* LCD projectors
* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Projectors
* Writing boards
* Mathematical tables

# DIGITAL LITERACY

**UNIT CODE:** DA/CU/PM/BC/03/4/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Digital Literacy

**Duration of Unit:** 35 hours

**Unit Description**

This unit covers the competencies required to demonstrate digital literacy in a working environment. It entails identifying computer software and hardware, applying security measures to data, hardware, software, applying computer software in solving task sand applying internet and email in communication at workplace.

**Summary of Learning Outcomes**

1. Identify computer software and hardware
2. Apply security measures to data, hardware and software
3. Apply computer software in solving tasks
4. Apply internet and email in communication at workplace

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify computer hardware and software
 | * Meaning of a computer
* Functions of a computer
* Components of a computer
* Classification of computers
 | * Written tests
* Oral
* Observation
 |
| 1. Apply security measures to data, hardware and software
 | * Data security and control
* Security threats and control measures
* Types of computer crimes
* Detection and protection against computer crimes
 | * Written tests
* Oral presentation
* Observation
* Projects
 |
| 1. Apply computer software in solving tasks
 | * Operating system
* Word processing
* Spread sheets
* Data base
 | * Oral questioning
* Observation
* Project
 |
| 1. Apply internet and email in communication at workplace
 | * Computer networks
* Uses of internet
* Electronic mail (e-mail) concept
 | * Oral questioning
* Observation
* Oral presentation
* Written report
 |

**Suggested Methods of Instructions**

* Instructor led facilitation of theory
* Demonstration by trainer
* Practical assignment
* Viewing of related videos
* Project
* Group discussions

**Recommended Resources**

* Desktop computers
* Laptop computers
* Other digital devices
* Printers
* Storage devices
* Internet access
* Computer software

# ENTREPRENEURIAL SKILLS

**UNIT CODE:** DA/CU/PM/BC/04/4/A

**Relationship to occupational standards**

This unit addresses the Unit of Competency: Demonstrate Entrepreneurial Skills

**Duration of unit:** 60 hours

**Unit description**

This unit covers the competencies required for creating and maintaining small scale business, establishing small business customer base, managing and growing a micro/small-scale business.

**Summary of Learning Outcomes**

1. Create and maintain small scale business
2. Establish small scale business customer base
3. Manage small scale business
4. Grow/expand small scale business

 **Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Create and maintain small scale business
 | * Starting a small business
* Legal regulatory requirements in starting a small business
* SWOT/ PESTEL analysis
* Conducting market/industry survey
* Generation and evaluation of business ideas
* Matching competencies with business opportunities
* Forms of business ownership
* Location of a small business
* Legal and regulatory requirement
* Resources required to start a small business
* Common terminologies in entrepreneurship
* Entrepreneurship in national development
* Self-employment
* Formal and informal employment
* Entrepreneurial culture
* Myths associated with entrepreneurship
* Types, characteristics, qualities & role of entrepreneurs
* History, development and importance of entrepreneurship
* Theories of entrepreneurship
* Quality assurance for small businesses
* Policies and procedures on occupational safety and health and environmental concerns
 | * Individual/group assignments
* projects
* Written
* Oral
 |
| 1. Establish small scale business customer base
 | * Good staff/workers and customer relations
* Marketing strategy
* Identifying and maintain new customers and markets
* Product/ service promotions
* Products / services diversification
* SWOT / PESTEL analysis
* Conducting a business survey
* Generating Business ideas
* Business opportunities
 | * Individual/group assignments
* projects
* Written
* Oral
 |
| 1. Manage small scale business
 | * Organization of a small business
* Small business’ business plan
* Marketing for small businesses
* Managing finances for small business
* Production/ operation process for goods/services
* Small business records management
* Book keeping and auditing for small businesses
* Business support services
* Small business resources mobilization and utilization
* Basic business social responsibility
* Management of small business
* Word processing concepts in small business management
* Computer application software
* Monitoring and controlling business operations
 | * Oral
* Individual/group assignments
* projects
* Written
 |
| 1. Grow/expand small scale business
 | * Methods of growing small business
* Resources for growing small business
* Small business growth plan
* Computer software in business development
* ICT and business growth
 | * Individual/group assignments
* projects
* Written
 |

**Suggested Methods of Instructions**

* Instructor led facilitation of theory
* Demonstration by trainer
* Practice by trainee
* Role play
* Case study

**Recommended Resources**

* Case studies for small businesses
* Business plan templates
* Lap top/ desk top computer
* Internet
* Telephone
* Writing materials

# EMPLOYABILITY SKILLS

**UNIT CODE:** DA/CU/PM/BC/05/4/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Employability Skills

**Duration of Unit:** 30 hours

**Unit Description**

This unit covers competencies required to demonstrate employability skills. It involves conducting self-management, demonstrating critical safe work habits, demonstrating workplace learning and workplace ethics.

**Summary of Learning Outcomes**

1. Conduct self-management
2. Demonstrate critical safe work habits
3. Demonstrate workplace learning
4. Demonstrate workplace ethics

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Conduct self-management
 | * Self-awareness
* Formulating personal vision, mission and goals
* Strategies for overcoming life challenges
* Emotional intelligence
* Assertiveness
* Expressing personal thoughts, feelings and beliefs
* Developing and maintaining high self-esteem
* Developing and maintaining positive self-image
* Articulating ideas and aspirations
* Accountability and responsibility
* Good work habits
* Self-awareness
* Self-development
* Financial literacy
* Healthy lifestyle practices
 | * Written tests
* Oral questioning
* Portfolio of evidence
* Third party report
 |
| 1. Demonstrate critical safe work habits
 | * Stress and stress management
* Punctuality and time consciousness
* Interpersonal communication
* Sharing information
* Leisure
* Integratingpersonal objectives into organizational objectives
* Resources utilization
* Setting work priorities
* HIV and AIDS
* Drug and substance abuse
* Handling emerging issues
 | * Written tests
* Oral questioning
* Portfolio of evidence
* Third party report
 |
| 1. Demonstrate workplace learning
 | * Personal training needs identification and assessment
* Managing own learning
* Contributing to the learning community at the workplace
* Cultural aspects of work
* Variety of learning context
* Application of learning
* Safe use of technology
* Identifying opportunities
* Workplace innovation
* Performance improvement
* Handling emerging issues
* Future trends and concerns in learning
 | * Written tests
* Oral questioning
* Portfolio of evidence
* Third party report
 |
| 1. Demonstrate workplace ethics
 | * Meaning of ethics
* Ethical perspectives
* Principles of ethics
* Values and beliefs
* Ethical standards
* Organization code of ethics
* Common ethical dilemmas
* Organization culture
* Corruption, bribery and conflict of interest
* Privacy and data protection
* Diversity, harassment and mutual respect
* Financial responsibility/accountability
* Etiquette
* Personal and professional integrity
* Commitment to jurisdictional laws
* Emerging issues in ethics
 | * Written tests
* Oral questioning
* Portfolio of evidence
* Third party report
 |

**Suggested Methods of Instructions**

* Simulation/Role play
* Group Discussion
* Presentations
* Q&A
* Case studies
* Assignments

**Recommended Resources**

* Computers
* Stationery
* Charts
* Video clips
* Audio tapes
* Radio sets
* TV sets
* LCD projectors

# ENVIRONMENTAL LITERACY

**UNIT CODE:** DA/CU/PM/BC/06/4/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Environmental Literacy

**Duration of Unit:** 20hours

**Unit Description**

This unit specifies the competencies required to demonstrate environmental literacy. It involves controlling environmental hazard, controlling environmental pollution, demonstrating sustainable resource use and evaluating current practices in relation to resource usage.

**Summary of Learning Outcomes**

1. Control environmental hazard
2. Control environmental pollution
3. Demonstrate sustainable use of resources
4. Evaluate current practices in relation to resource usage

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Control environmental hazard
 | * Purposes and content of Environmental Management and Coordination Act 1999
* Purposes and content of Solid Waste Act
* Storage methods for environmentally hazardous materials
* Disposal methods of hazardous wastes
* Types and uses of PPE in line with environmental regulations
* Occupational Safety and Health Standards (OSHS)
 | * Written tests
* Oral questions
* Observation of work procedures
 |
| 1. Control environmental Pollution
 | * Types of pollution
* Environmental pollution control measures
* Types of solid wastes
* Procedures for solid waste management
* Different types of noise pollution
* Methods for minimizing noise pollution
 | * Written tests
* Oral questions
* Observation of work procedures
* Role play
 |
| 1. Demonstrate sustainable resource use
 | * Types of resources
* Techniques in measuring current usage of resources
* Calculating current usage of resources
* Methods for minimizing wastage
* Waste management procedures
* Principles of 3Rs (Reduce, Reuse, Recycle)
* Methods for economizing or reducing resource consumption
 | * Written tests
* Oral questions
* Observation of work procedures
 |
| 1. Evaluate current practices in relation to resource usage
 | * Collection of information on environmental and resource efficiency systems and procedures,
* Measurement and recording of current resource usage
* Analysis and recording of current purchasing strategies.
* Analysis of current work processes to access information and data
* Identification of areas for improvement
 | * Written tests
* Oral questions
* Observation of work procedures
 |
| 1. Identify Environmental legislations/conventions for environmental concerns
 | * Environmental issues/concerns
* Environmental legislations /conventions and local ordinances
* Industrial standard /environmental practices
* International Environmental Protocols (Montreal, Kyoto)
* Features of an environmental strategy
 | * Written tests
* Oral questions
* Observation of work procedures
 |

**Suggested Methods of Instructions**

* Instructor led facilitation of theory
* Practical demonstration of tasks by trainer
* Practice by trainees/ role play
* Discussion
* Observations and comments and corrections by trainers

**Recommended Resources**

* Computers
* Stationery
* Charts
* Video clips
* Audio tapes
* Radio sets
* TV sets
* LCD projectors
* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Machine/equipment manufacturer’s specifications and instructions
* Personal Protective Equipment (PPE)

# OCCUPATIONAL SAFETY AND HEALTH PRACTICES

**UNIT CODE:** DA/CU/PM/BC/07/4/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Demonstrate Occupational Safety and Health Practices

**Duration of Unit:** 20 hours

**Unit Description**

This unit specifies the competencies required to practice safety and health and comply with OSH requirements relevant to work. It involves adhering to workplace procedures for hazards and risk prevention and participating in arrangements for workplace safety and health maintenance.

**Summary of Learning Outcomes**

1. Adhere to workplace procedures for hazards and risk prevention
2. Participate in arrangements for workplace safety and health maintenance

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment****Methods** |
| 1. Adhere to workplace procedures for hazards and risk prevention
 | * Arrangement of work area and items in accordance with Company housekeeping procedures
* Adherence to work standards and procedures
* Application of preventive and control measures, including use of safety gears/PPE
* Study and apply standards and procedures for incidents and emergencies.
 | * Oral questions
* Written tests
* Portfolio of evidence
* Third party report
 |
| 1. Participate in arrangements for workplace safety and health maintenance
 | * Participating in orientations on OSH requirements/regulations of tasks
* Providing feedback on health, safety, and security concerns to appropriate personnel as required in a sufficiently detailed manner
* Practice workplace procedures for reporting hazards, incidents, injuries and sickness
* OSH requirements/ regulations and workplace safety and hazard control procedures are reviewed, and compliance reported to appropriate personnel
* Identification of needed OSH-related trainings are proposed to appropriate personnel
 | * Oral questions
* Written tests
* Portfolio of evidence
* Third party report
 |

**Suggested Methods of Instructions**

* Assigments
* Discussion
* Q&A
* Role play
* Viewing of related videos

**Recommended Resources**

* Computers
* Stationery
* Charts
* Video clips
* Audio tapes
* Radio sets
* TV sets
* LCD projectors
* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Machine/equipment manufacturer’s specifications and instructions
* Personal Protective Equipment (PPE) e.g.
* Mask
* Face mask/shield
* Safety bootsn
* Safety harness
* Arm/Hand guard, gloves
* Eye protection (goggles, shield)
* Hearing protection (ear muffs, ear plugs)
* Hair Net/cap/bonnet
* Hard hat
* Face protection (mask, shield)
* Apron/Gown/coverall/jump suit
* Anti-static suits
* High-visibility reflective vest

# **CORE UNITS OF** LEARNING

# COLLECTION OF RAW MILK

**Unit Code:** DA/CU/PM/CR/01/4/A

**Relationship to Occupational Standards**:

This unit addresses the unit of competency: Collect raw milk

**Duration of Unit:** 68 hours

**UNIT DESCRIPTION**

This unit specifies the competencies required to collect raw milk. It involves collecting, quality and quantity assessment, preserving and storing raw milk. It also includes record keeping.

**Summary of Learning Outcomes**

1. Prepare to collect raw milk
2. Collect and preserve raw milk
3. Complete raw milk collection

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Prepare to collect raw milk
 | * Purchase process
* Negotiation process
* Local raw milk market
* Workplace safety
* Types of PPE
* Uses and maintenance of PPEs
* Safety precautions
* Types of collection tools, equipment and materials
* Factors that determine the type of collection plan
* Suppliers’ geographical location
* Modes of transport
* Raw milk quantity
 | * Oral questioning
* Short Q & A
* Demonstration
* Third party report
 |
| 1. Collect and preserve raw milk
 | * Properties of milk
* Milk quality attributes
* Milk quality management
* Hygienic handling of milk
* Code of hygienic practices and regulations
* Milk storage vessels
* Milk transportation
* Factors contributing to raw milk spoilage
* Milk preservation methods
* Milk collection systems
* Good manufacturing practices (GMP)
* Methods of quantity measurements
* Weighing and recording
* Receiving procedures:
* Sieving/ filtration
* Types of raw milk tests
* Organoleptic test
* Alcohol test
* Clot on boiling test
* Reassuring test
* Methylene blue test
* Lactometer test
* Peroxide test
* Antibiotic test
* Milk sampling procedures
* Random
* Systematic
* Composite
* Types of adulteration in milk
* Types and operations of weighing instruments
* Principle of chilling
* Refrigeration system
* Methods of milk chilling
* Operation of a chilling system
 | * Oral questioning
* Short Q & A
* Demonstration
* Third party report
 |
| 1. Complete raw milk collection
 | * Methods cleaning of collection and chilling equipment
* Data collection/entering techniques
* Reporting techniques
* Information delivery
 | * Oral questioning
* Short Q & A
* Demonstration
* Third party report
 |

**Suggested Methods of Instruction**

* Practical demonstration of tasks by trainer
* Practice by trainees
* Discussions
* Questions & answers
* Observations and comments and corrections by trainers
* Instructor led facilitation of theory

**Recommended Resources**

* Occupational Safety and Health Act of 2007
* Transport standard operating and/or workplace procedures manuals
* Documentation standard operating and/or workplace procedures manuals
* Public Health Act Cap. 242
* Dairy Industry Act Cap. 336
* Kenya Standard: Code of hygienic practice for Milk and Milk products
* Machine/equipment manufacturer’s specifications and instructions
* EMCA
* Tools and equipment:
* Alcohol gun
* Aluminum cans
* Antibiotic kit
* Bulk tankers
* ICT device (computer or tablet)
* Lactometer
* Methylene blue kit
* Peroxide strips
* Reassuring kit
* Thermometer
* Weighing instruments (e.g. spring balance)

# PROCESSING OF PASTEURIZED MILK

**Unit Code:** DA/CU/PM/CR/02/4/A

**Relationship to Occupational Standards**:

This unit addresses the unit of competency: Process pasteurized milk

**Duration of Unit:** 82 hours

**UNIT DESCRIPTION**

This unit describes the competencies required by a trainee in order to competently opirate fluid milk processing equipment, package and store pasteurized milk, clean processing equipment, manage waste and keep pasteurized milk processing records.

**Summary of Learning Outcomes**

1. Prepare to process pasteurized milk
2. Process pasteurized milk
3. Complete processing of pasteurized milk

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Prepare to process pasteurized milk
 | * Workplace safety:
* Types of PPE
* Uses and maintenance of PPE
* Safety precautions
* Milk processing equipment
* Good manufacturing practice
* Refrigeration system
 | * Oral questioning
* Short Q & A
* Demonstration
* Third party report
 |
| 1. Process pasteurized milk
 | * Milk separation
* Milk clarification/ bactofugation
* Material/mass balance
* Legal and labelling requirement
* Milk homogenization
* Milk pasteurization
* Thermal destruction of microorganisms
* Dairy services
* Steam generators
* Compressed air production
* Power supply system
* Refrigeration system
* Types of heat exchangers
* Plate heat exchangers
* Tubular heat exchangers
* Vat heat exchangers (batch)
* Principle of first in first out
* Storage of pasteurized milk
 | * Oral questioning
* Short Q & A
* Demonstration
* Third party report
 |
| 1. Complete processing of pasteurized milk
 | * Cleaning and maintenance of dairy processing equipment.
* Record keeping
* Documentation
* Dairy waste
 | * Observation
* Written tests
* Oral questions
* Third party report
 |

**Suggested Methods of Instruction**

* Practical demonstration of tasks by trainer
* Practice by trainees
* Observations and comments and corrections by trainers
* Instructor led facilitation of theory
* Discussions
* Questions & answers

**Recommended Resources**

* Occupational Safety and Health Act of 2007
* Environmental, Health and Safety manual
* Documentation standard operating and/or workplace procedures manuals.
* Public Health Act Cap. 242
* Dairy Industry Act Cap. 336
* Kenya Standard: Code of hygienic practice for Milk and Milk products
* Operational standard operating and/or workplace procedures manuals
* Machine/equipment manufacturer’s specifications and instructions
* Tools and equipment
* Cold storage room
* Homogenizer
* Other hot water generating systems (energy savers, firewood)
* Pasteurizer’s system (plate heat exchanger, vat pasteurizers, tubular heat, exchangers)
* Separator
* Steam generator/other hot

# ProDUCTION OF fermented milk products

**Unit Code:** DA/CU/PM/CR/03/4/A

**Relationship to Occupational Standards**:

This unit addresses the unit title: Produce fermented milk products

**Duration of Unit:** 80 hours

**UNIT DESCRIPTION**

This unit specifies the competencies required to produce fermented milk products. It involves preparing milk and other ingredients, processing and packaging fermented milk product, cleaning of processing equipment and carrying out waste management. It also includes record keeping.

**Summary of Learning Outcomes**

1. Prepare to produce fermented milk products
2. Produce fermented milk products
3. Complete production of fermented milk products

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Prepare produce fermented milk products
 | * Introduction to fermentation
* Principles of fermentation
* Fermentation tools and equipment:
* Fermentation vat
* Thermometer
* PH meter
* Types of fermented milk products (yoghurt, mala)
* Heat processing:
* Importance of heat processing
* Time temperature combination for processing of fermented products
* Ingredients
* Formulation
* Roles of ingredients
* Statutory composition requirements for fermented milk products.
 | * Interview
* Oral demonstration
* Short Q & A
* Practical
* Demonstration
* Field visit report
 |
| 1. Produce fermented milk products
 | * Types of fermented milk products
* Cultured butter milk (Lala)
* Stirred yoghurt
* Set yoghurt
* Good manufacturing practices
* Methods of producing fermented milk products
* Dairy starter culture
* Types
* The role
* Culture preparation
* Preservation of cultures
* Process for inoculation and incubation
* Temperature control during fermentation process
 | * Interview
* Oral demonstration
* Short Q & A
* Practical
* Demonstration
* Field visit report
 |
| 1. Complete production of fermented milk products
 | * Method of cooling the finished fermented products
* Types of packaging
* Storage of fermented products
* Cleaning and maintenance of dairy processing equipment.
* Record keeping
* Documentation
* Dairy waste
* Hazards affecting fermented milk products
* Physical
* Chemical
* Micro-biological
 | * Interview
* Oral demonstration
* Short Q & A
* Practical
* Demonstration
* Field visits report
* Third party report
 |

**Suggested Methods of Instruction**

* Practical demonstration of tasks by trainer
* Practice by trainees
* Observations, comments and corrections by trainers
* Instructor led facilitation of theory
* Field visits
* Attachment
* Project

**Recommended Resources**

* Occupational Safety and Health Act of 2007
* Public Health Act Cap. 242
* Food, drugs and Chemical Substances Act, Cap. 254
* HACCP Manual
* Fermented products manuals (industry references)
* Kenya bureau of standards - Products’ Quality standards
* Equipment manufacturer’s specifications and instructions
* Equipment and tools:
* Complete small-scale dairy processing system:
* Chiller
* Packaging system
* Pasteurizer
* Thermometer
* Cold storage room
* Fermentation vat
* ICT equipment
* Utensils (cans, stirrers, milk dippers.)
* Consumables:
* Milk and cultures
* Starch, fruits, sugar, flavors

#  QUALITY CONTROL OF MILK AND MILK PRODUCT

**UNIT CODE:** DA/CU/PM/CR/04/4/A

**Relationship to Occupational Standards**:

This unit addresses the unit title: Control quality of milk and milk product

**Duration of Unit:** 120 hours

**UNIT DESCRIPTION**

This unit specifies the competencies required to control the quality of milk and milk products. It involves preparing tests materials and equipment, sampling; testing and analysing tests results. It also entails cleaning quality control equipment, apparatus and facilities, managing laboratory waste, documenting and reporting quality control.

**Summary of Learning Outcomes**

1. Prepare to control quality of milk and milk products.
2. Control quality of milk and milk products
3. Complete quality control of milk and milk products

**Learning Outcomes, Content and Suggested Assessment Methods**

| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Prepare to control quality of milk and milk products
 | * Introduction to quality control:
* Quality
* Quality assurance
* Quality control
* Quality management
* Quality management systems
* Food Analysis
* Common laboratory equipment and materials
* Milk analyses
* Milk composition
* Basic principles of food quality control
* Good manufacturing practices
* Quality management
* HACCP
* Codex Alimentarius
* Kenya Bureau of Standards
* Kenya Dairy Board
* ISO 9001; ISO 22000
* Sampling:
* Sampling techniques
* Sampling plan
* Sampling procedures
* Sample preparation and storage
* Work-place safety
* Documentation
 | * Oral demonstration
* Short Q & A
* Practical
* Demonstration
* Field visits report
 |
| 1. Control quality of milk and milk products
 | * Quality control tests
* Organoleptic test
* Lactometer test
* Titratible acidity
* Geber Fat test
* Phosphates test
* Alcohol test
* Automatic milk analysis test
* Standard plating & colony enumeration
* Resazurin test
* Common types of adulteration
* Common types of contamination
* Basic microbiology:
* Classification of microorganisms
* Sources of microbial contamination
* Types of microbial contamination
* Culturing methods
 | * Interview
* Oral demonstration
* Short Q & A
* Practical
* Demonstration
* Field visits report
 |
| 1. Complete quality control of milk and milk products
 | * Record keeping
* Documentation
* Laboratory waste management
* Quality control reporting
 | * Interview
* Oral demonstration
* Short Q & A
* Practical
* Demonstration
* Field visits report
* Third party report
 |

**Suggested Methods of Instruction**

* Practical demonstration of tasks by trainer
* Practice by trainees
* Observations, comments and corrections by trainers
* Instructor led facilitation of theory
* Field visits
* Attachment
* Projects

**Recommended Resources**

* Occupational Safety and Health Act of 2007
* ISO 9001; ISO 22000
* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Organizational or external personnel
* Machine/equipment manufacturer’s operational specifications and instructions
* Quality standards
* Tools and Equipment

# PACKAGING OF MILK PRODUCTS

**Unit Code:** DA/CU/PM/CR/05/4/A

**Relationship to Occupational Standards**:

This unit addresses the unit title: Package milk products

**Duration of Unit:** 68 hours

**UNIT DESCRIPTION**

This unit specifies the competencies required to package milk products. It involves preparing packaging lines, operating packaging equipment, sampling and assessing packaged product and documenting packaging process.

**Summary of Learning Outcomes**

1. Prepare the packaging line
2. Operate the packaging line
3. Complete packaging of milk products

**Learning Outcomes, Content and Suggested Assessment Methods**

| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Prepare the packaging line
 | * Packaging food products
* Reasons
* Types of packaging materials
* Types of packaging equipment
* Preparation for packaging
* Procedure for packaging
 | * Interview
* Oral demonstration
* Short Q & A
* Practical
* Demonstration
* Field visits reports
 |
| 1. Operate the packaging line
 | * Aseptic packaging condition
* Equipment start–up, shut-down and emergency procedures
* Equipment operating parameters:
* Line space
* Sealing temperature
* Filling volume
* Position of product information
* Product specifications:
* Filled volume
* Net weight
* Quality of sealing
* Position and content of the production information:
* Lot number
* Date of manufacture
* Use by date
* Sampling
* Quality test on packaged products
* Packaging environmental impact and waste disposal
 | * Interview
* Oral demonstration
* Short Q & A
* Practical
* Demonstration
* Field visits report
 |
| 1. Complete packaging of milk products
 | * Cleaning and maintenance of packaging line
* Packaging wastes
* Segregation and disposal methods
* Packaging documentation
 | * Interview
* Oral demonstration
* Short Q & A
* Practical
* Demonstration
* Field visits report
 |

**Suggested Methods of Instruction**

* Practical demonstration of tasks by trainer
* Practice by trainees
* Observations, comments and corrections by trainers
* Instructor led facilitation of theory
* Field visits
* Attachment
* Projects

**Recommended Resources**

* Occupational safety and Health Act of 2007
* ISO 14001
* Public Health Act Cap. 242
* Code of hygienic standards KS EAS 39: 2000
* Kenya Standard: Code of hygienic practice for Milk and Milk products
* Standard specifications for labelling of pre-packaged food-KS EAS 38: 2014
* Packaging procedures manuals
* Machine/equipment manufacturer’s specifications and instructions
* Clean fill hood and automatic fill control machine
* Hand operated packaging system
* Packaging materials