

**REPUBLIC OF KENYA**

**OCCUPATIONAL STANDARD**

**FOR**

**DAIRY PLANT TECHNICIAN**

**KNQF LEVEL 5**

**OCCUPATIONAL STANDARD ISCED CODE: 0721 454A**

First published 2024

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**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 the achievement of Kenya’s development blueprint, Vision 2030 and sustainable development goals.

This policy document requires that training in TVET be competency based, certification be based on demonstration of competence and mode of delivery allows for multiple entry and exit in TVET programmes.

The reforms also 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 occupational standard was developed for developing a Competency-Based Education and Training (CBET) curriculum for Dairy Plant Technician Level 5. This occupational standard will also be the basis for the assessment of an individual for competency certification.

It is my conviction that this occupational standard will play a great role in the development of a competent human resource for sustainable development.

**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 TVET Act CAP 210A and Sessional Paper No. 14 of 2012 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 the industry as well as increase the global competitiveness of the Kenyan labour force.

The National Polytechnics, in conjunction with the industry experts through the Industry Advisory Board (IAB), sector regulator boards, TVETA authority, and qualification awarding institution has developed this occupational standard for Dairy Plant Technician Level 5. The occupational standards will be the basis for the development of a competency-based education and training curriculum for Animal Dairy Plant Technician Level 5.

I am grateful to the Governing Council Members, TVETA, sector regulators, the industry experts, and subject experts who participated in the development of these standards.

**ACKNOWLEDGMENT**

This occupational standard was developed through the combined effort of various stakeholders from private and public organizations. I am thankful to the management of these organizations for allowing their staff to participate in this course. I wish to acknowledge the invaluable contribution of industry players who provided input towards the development of this occupational standard.

I also thank all the individuals and organizations who participated in the validation of this occupational standard.

**ACRONYMS**

|  |  |
| --- | --- |
| APT | Advanced persistent threats |
| CMT | California Mastitis Test |
| CPU | Central Processing Unit |
| CV | Curriculum Vitae |
| DVI | Digital Visual Interface |
| EAS | East Africa Standard |
| HACCP | Hazard analysis critical control point |
| HDMI | High-Definition Multimedia Interface |
| HSE | Health, safety and environment |
| IAC | Industry Advisory Committee |
| ICT | Information and Communication Technology |
| IMS | Integrated Management System |
| ISDN | Integrated Services Digital Network |
| ISO | Organization of International Standards |
| IUPAC | International Union of Pure and Applied Chemistry |
| KNP | Kitale National Polytechnic |
| KS | Kenya Standard |
| LPM | Livestock production manual |
| RAM | Random Access Memory |
| TC/SC | Technical Committee/Subcommittee |
| ***UHT*** | Ultra-High Temperature |
| USB | Universal Serial Bus |
| VGA | Video Graphics Array |
| VSEPR | Valence Shell Electron Pair Repulsion |

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# OCCUPATIONAL STARDARD OVERVIEW

Dairy plant technician Level 5 occupational standard consists of competencies that an individual must achieve to carry out activities in processing milk and milk products. It entails handling raw milk, processing fluid, fermented, and fat-based milk products; processing cheese products and conducting dairy product quality control.

This occupational standard consists of the following basic, common and core competencies:

**SUMMARY OF UNITS OF COMPETENCY**

|  |  |
| --- | --- |
| **BASIC UNITS OF COMPETENCY** | |
| **UNIT CODE** | **UNIT TITLE** |
| **0031 441 01A** | APPLY COMMUNICATION SKILLS |
| **0417 441 02A** | APPLY WORK ETHICS AND PRACTICES |
| **COMMON UNITS OF COMPETENCY** | |

|  |  |
| --- | --- |
| **UNIT CODE** | **UNIT TITLE** |

|  |  |
| --- | --- |
| **0721 441 03A** | APPLY FUNDAMENTALS OF DAIRY TECHNOLOGY |
| **0721 441 04A** | APPLY DAIRY CHEMISTRY PRINCIPLES |
| **0721 451 05A** | APPLY DAIRY PRODUCTION PRINCIPLES |
| **0721 451 06A** | APPLY DAIRY MICROBIOLOGY PRINCIPLES |
| **CORE UNITS OF COMPETENCY** | |

|  |  |
| --- | --- |
| **UNIT CODE** | **UNIT TITLE** |

|  |  |
| --- | --- |
| **0721 451 07A** | HANDLE RAW MILK |
| **0721 451 08A** | PROCESS FLUID MILK PRODUCTS |
| **0721 451 09A** | PROCESS FERMENTED MILK PRODUCTS. |
| **0721 451 10A** | PROCESS CHEESE PRODUCTS |
| **0721 451 11A** | PROCESS FAT BASED MILK PRODUCTS |
| 0721 451 12A | CONDUCT DAIRY PRODUCT QUALITY CONTROL |

# BASIC UNITS OF COMPETENCY

# APPLY COMMUNICATION SKILLS

**UNIT CODE: 0031 441 01A**

**UNIT DESCRIPTION**

This unit specifies the competencies required by a Dairy Plant Technician level 5 to apply communication skills. It involves applying communication channels, written, non-verbal, oral and group communication skills.

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT**  These describe the key outcomes that make up workplace function | **PERFORMANCE CRITERIA**  These are assessable statements that specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in the Range*** |
| --- | --- |
| 1. Apply communication channels | 1. Specific communication channels are identified and applied based on workplace requirements. 2. Challenges are identified and addressed as per the operational standards of the organization. 3. Communication channels are evaluated to meet workplace needs. |
| 1. Apply written communication skills | * 1. Types of written communication are identified and applied according to the workplace requirements.   2. Written communication needs are identified and implemented according to workplace procedures.   3. Written communication guidelines are analyzed, evaluated, and revised based on workplace needs. |
| 1. Apply non-verbal communication skills | 3.1 Existing non-verbal communication techniques are identified and applied based on organization policy.  3.2 Non-verbal communication techniques are articulated and modeled to enhance inclusivity according to workplace requirements. |
| 1. Apply oral communication skills | 4.1 Types of oral communication are identified and established as per organization policy.  4.2 Pathways of oral communication are identified and established as per organization policy.  4.3 Pathways of oral communication are reviewed according to organization procedures.  4.4 Pathways of oral communication are maintained according to the organization standards. |
| 1. Apply group communication skills | 1. Group communication strategies are appliedbased on the workplace needs. 2. Groups are organized in accordance with workplace procedures. 3. Effective questioning, listening and non-verbal communication techniques are used as per needs.   5.4 Group communication challenges are identified and addressed according to the workplace needs. |

**RANGE**

This section provides the work environment and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

| **Variable** | **Range** |
| --- | --- |
| 1. Communication strategies may include but are not limited to: | * Language switch * Comprehension check * Repetition * Asking confirmation * Paraphrasing * Clarification request * Translation * Restructuring * Generalization |
| 1. Effective group interaction may include but not limited to: | * Identifying and evaluating what is occurring within an interaction in a non-judgmental way. * Using active listening. * Making decision about appropriate words, behavior. * Putting together response which is culturally appropriate. * Expressing an individual perspective. * Expressing own philosophy, ideology and background and exploring impact with relevance to communication |
| 1. Situations may include but are not limited to: | * Establishing rapport * Eliciting facts and information * Facilitating resolution of issues * Developing action plans |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required Skills**

The individual needs to demonstrate the following skills:

* Active listening
* Interpretation
* Negotiation
* Writing
* Oral skills
* Creative thinking
* Critical thinking
* Decision making
* Analytical
* Innovation
* Conflict skills
* Leadership
* Problem solving skills
* Management
* Organizational
* Teamwork

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Communication process
* Dynamics of groups
* Styles of group leadership
* Key elements of communications strategy
* Principles of effective communication
* Turn-taking techniques
* Conflict resolution techniques
* Work planning
* Work organization
* Company policies
* Company operations and procedure standards
* Fundamental rights at the workplace
* Personal hygiene
* Accountability
* Workplace problems and how to deal with them

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills, knowledge, and range.

|  |  |
| --- | --- |
| 1. Critical aspects of Competency. | Assessment requires evidence that the candidate:   * 1. Identified and applied specific communication channels based on workplace requirements.   2. Identified and applied specific written communication correspondence according to the workplace requirements.   3. Applied and developed non-verbal strategies to communicate in all areas of the workplace requirements.   4. Established pathways of oral communication as per workplace policy.   5. Applied group communication strategies based on workplace needs. |
| 1. Resource Implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place. 2. Appropriately simulated environment where assessment can take place. 3. Resources relevant to the proposed activity or tasks. |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   * 1. Observation   2. Oral assessment   3. Portfolio of evidence   4. Interviews   5. Third party report   6. Written assessment   7. Practical assessment   8. Projects |
| 1. Context of Assessment | Competency may be assessed:   1. On-the-job 2. In a simulated work environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

# APPLY WORK ETHICS AND PRACTICES

**UNIT CODE: 0417 441 02A**

**UNIT DESCRIPTION**

This unit specifies the competencies required by a Dairy Plant Technician level 5 to apply work ethics and practices. It involves applying self-management skills, promoting ethical work practices and values, promoting team work, maintaining professional and personal development, applying problem solving skills and promoting customer care.

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT**  These describe the key outcomes which make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in Range*** |
| --- | --- |
| 1. Apply self-management skills | 1. Personal vision, mission and goals are formulated based on potential and concerning organization objectives and strategic plan 2. Self-esteem and a positive self-image are developed and maintained based on value 3. Emotional intelligence and stress management are demonstrated as per workplace requirements. 4. Assertiveness is developed and maintained based on the requirements of the job. 5. Accountability and responsibility for one's actions are demonstrated based on workplace instructions. 6. Time management, attendance and punctuality are observed as per the organization’s policy. 7. Personal goals are managed as per the organization’s objective 8. Self-strengths and weaknesses are identified based on personal objectives 9. Motivation, initiative and proactivity are utilized as per the organization policy 10. Individual performance is evaluated and monitored according to the agreed targets. |
| 1. Promote ethical work practices and values | 1. Integrity is demonstrated as per acceptable norms 2. Codes of conduct is applied as per the workplace requirements 3. Policies and guidelines are observed as per the workplace requirements 4. Professionalism is exercised in line with organizational policies |
| 1. Promote Team work | 3.1 ***Teams*** are formed to enhance productivity based on organization’s objectives  3.2 Duties are assigned to teams under the organization policy.  3.3 Team activities are managed and coordinated as per set objectives.  3.4 Team performance is evaluated based on set targets as per workplace policy.  3.5 ***Conflicts*** are resolved between team members in line with organization policy.  3.6 Gender and diversity-related issues are identified and mainstreamed in accordance with workplace policy.  3.7 Healthy ***relationships*** are developed and maintained in line with the workplace.  3.8 Adaptability and flexibility are applied in dealing with team members as per workplace policies |
| 1. Maintain professional and personal development | 4.1 ***Personal growth and development*** needs are identified and assessed in line with the requirements of the job.  ***4.2 Training and career opportunities*** are identified and utilized based on job requirements.  4.3 ***Resources*** for training are mobilized and allocated based on organizations and individual skills needs.  4.4 Licenses and certifications relevant to the job and career are obtained and renewed as per policy.  4.5 Recognitions are sought as proof of career advancement in line with professional requirements.  4.6 Work priorities and personal commitments are balanced and managed based on the requirements of the job and personal objectives.  4.7 Dynamism and on-the-job learning are embraced in line with the organization’s goals and objectives. |
| 1. Apply Problem solving skills | 5.1 ***Creative, innovative*** and practical solutions are developed based on the problem  5.2 Independence and initiative in identifying and solving problems are demonstrated based on the requirements of the job.  5.3 Team problems are solved as per the workplace guidelines  5.4 Problem-solving strategies are applied as per the workplace guidelines  5.5 Problems are analyzed and assumptions tested as per the context of data and circumstances |
| 1. Promote Customer Care | 6.1 Customers' needs are identified based on their characteristics  6.2 Customer ***feedback*** is allowed and facilitated in line with organization policies.  6.3 Customer concerns and complaints are analyzed and resolved in line with the set organizational culture.  6.4 Proactive customer outreach programs are implemented as per organizational policies  6.5 Customer retention strategies are developed and implemented in line with the organizational policy |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

| **Variable** | **Range** |
| --- | --- |
| 1. Feedback may include but are not limited to: | * Verbal * Written * Informal * Formal |
| 1. Conflicts include but are not limited to: | * Interpersonal Conflict. * Intrapersonal Conflict. * Intergroup Conflict. * Intragroup Conflict. |
| 1. Relationships may include but are not limited to: | * Man/Woman * Trainer/trainee * Employee/employer * Client/service provider * Husband/wife * Boy/girl * Parent/child * Sibling relationships |
| 1. Team may include but are not limited to: | * Small work group * Staff in a section/department * Inter-agency group * Virtual teams |
| 1. Personal growth may include but are not limited to: | * Growth in the job * Career mobility * Gains and exposure the job gives * Net workings * Benefits that accrue to the individual as a result of noteworthy performance |
| 1. Personal objectives may include but are not limited to: | * Long term * Short term * Broad * Specific |
| 1. Trainings and career opportunities may include but are not limited to | * Participation in training programs * Serving as Resource Persons in conferences and workshops * Capacity building |
| 1. Resource may include may but are not limited to: | * Human * Financial * Technology |
| 1. Creative and innovative may include but are not limited to: | * New ideas * Original ideas * Different ideas * Methods/procedures * Processes * New tools |
| 1. Emerging issues may include but are not limited to: | * Artificial Intelligence * Data confidentiality * National cohesion * Open offices |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required Skills**

The individual needs to demonstrate the following skills:

* Active listening
* Critical thinking
* Organizational
* Negotiation
* Monitoring
* Evaluation
* Problem solving
* Decision Making
* Leadership
* Creative/innovative thinking
* Adaptability
* Conflict management
* Emotional intelligence
* Teamwork

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Work values and ethics
* Company policies and procedures
* Company operations, procedures and standards
* Flexibility and adaptability
* Concept of time and leisure time
* Decision making
* Work planning
* Organizing work
* Monitoring and evaluation
* Record keeping
* Gender and diversity mainstreaming
* Drug and substance abuse
* Professional growth and development
* creativity
* Innovation
* problem solving
* customer care
* Mentoring and coaching.
* Emerging issues

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

|  |  |
| --- | --- |
| 1. Critical aspects of Competency | Assessment require evidence that the candidate:   * 1. Applied self-management skills as per organizational procedures.   2. Promoted ethical practices and values as per organizational procedures.   3. Promoted Teamwork as per workplace assignments.   4. Maintained professional and personal development as per organizational procedures.   5. Applied Problem-solving skills based on work requirements.   6. Identified customer needs based on their characteristics.   7. Gave back Customer feedback in line with organization policies. |
| 1. Resource Implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place 2. Appropriately simulated environment where assessment can take place. 3. Resources relevant to the proposed activity or tasks. |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   1. Observation 2. Oral questioning 3. Written test 4. Portfolio of Evidence 5. Interview 6. Third party report |
| 1. Context of Assessment | Competency may be assessed:   1. On-the-job 2. In a simulated work environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

# COMMON UNITS OF COMPETENCY

# **APPLY DAIRY PRODUCTION PRINCIPLES**

**UNIT CODE: 0721 441 03A**

**UNIT DESCRIPTION**

This unit specifies the competencies required by a Dairy Plant Technician level 5 to apply dairy production principles. It involves breeding dairy cattle, applying principles of animal nutrition, applying hygienic milk production practices and performing dairy practices

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Breed dairy cattle | 1. ***Dairy animal breeds*** are identified based on Livestock production manual (LPM) 2. Breeding management tools, equipment and materials are used in accordance with LPM 3. Dairy animal breeding is carried out based on LPM 4. Breeding records are prepared as per work procedures |
| 1. Apply principles of animal nutrition | 1. ***Dairy animal feeds*** are identified as per the nutritional requirements 2. Feed formulation tools, equipment and materials are used based on feed formulation manual 3. ***Components of animal feed rations*** are identified as per animal feeding standard 4. Dairy animal feed rations are formulated as per animal feeding standard 5. Dairy animal is fed as per animal feed requirement 6. Dairy animal feeds are conserved as per LPM 7. Dairy animal feed waste is managed according to environmental protection regulations |
| 1. Apply hygienic milk production practices | 1. ***Milking materials and equipment*** are assembled based on the milking technique selected 2. Milking dairy animal are assembled in accordance with the LPM 3. Udder is cleaned and pre-dipped according to LPM 4. ***Mastitis test*** is carried out based LPM 5. Milk let down is stimulated based on selected ***milking technique*** 6. Milking is carried out based on Essentials of Clean Milk Production Standard. 7. Udder quarters are disinfected as per the LPM 8. Milked dairy animal is released as per workplace procedures 9. Milk is sieved and weighed according to the workplace procedures 10. Milk is stored and cooled in accordance with LPM 11. Milk production record is maintained based on the workplace procedures 12. Milking equipment are cleaned as per workplace procedures 13. Milking parlour is cleaned as per workplace procedures 14. Re-usable materials are stored as per manufactures instruction and workplace policy 15. Waste is managed and disposed with due regard to environment protection regulations |
| 1. Perform dairy practices | 1. Dairy ***animal identification method*** is selected based on Good agricultural Practices (GAPs) 2. Dairy animal is dehorned or disbudded based on GAPs 3. Overgrown hooves are trimmed based on GAPs 4. Culling is performed based on workplace policy 5. Internal and external parasites are controlled based on LPM and GAPs 6. Vaccination is performed as per workplace policy, manufacturer’s instructions and LPM 7. Dairy animal isolation and quarantine is carried out to control notifiable diseases based on GAPs 8. Dairy animal is provided with clean water ad-libitum as per LPM |

**RANGE**

| **RANGE** | **VARIABLE** |
| --- | --- |
| 1. Dairy animal feeds may include but not limited to: | * Carbohydrates * Proteins * Vitamins * Minerals * Fats/ lipids * Water |
| 1. Components of animal feed rations may include but not limited to: | * Energy Sources * Protein Sources * Fiber Sources * Vitamins and Minerals * Additives and Supplements |
| 1. Dairy animal breeds method may include but not limited to: | * + Cow   + Goat   + Camel |
| 1. Milking materials and equipment may include but not limited to: | * Animal Restraint * Cleaning * Cups * Herd Test Buckets * Thermometer * Separator |
| 1. Mastitis test may include but not limited to: | * + CMT   + Strip cup |
| 1. Milking technique may include but not limited to: | * + Hand milking   + Milking machine |
| 1. Dairy animal identification method may include but not limited to: | * + Ear tagging   + Ear notching   + Branding   + Neck chains   + Straps with numbers   + Ear tattooing |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Principles of animal production
* Animal selection and breeding
* Dairy animal nutrition
* Parasite and disease management in cattle
* Dairy animal routine management practices
* Dairy animal production records

**Required Skills**

The individual needs to demonstrate the following skills:

* Communication
* Analytical
* Evaluation
* Management
* Problem solving
* Time management
* Data collection
* Numeracy
* Observation
* Negotiation
* Digital literacy
* Equipment calibration

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate   1. Carried out dairy animal breeding is based on LPM 2. Fed dairy animal as per animal feed requirement 3. Conserved dairy animal feeds as per Livestock production manual (LPM) 4. Carried out dairy animal milking based on Essentials of Clean Milk Production Standard 5. Cleaned milking equipment as per workplace procedures 6. Cleaned milking parlour as per workplace procedures 7. Dehorned or disbudded dairy animal based on GAPs. 8. Trimmed overgrown hooves based on GAPs 9. Performed culling based on workplace policy 10. Controlled internal and external parasites based on LPM and GAPs 11. Performed vaccination as per workplace policy, manufacturer’s instructions and LPM |
| 1. Resource   implication | The following resources should be provided:   * 1. Access to relevant workplace where assessment can take place   2. Appropriately simulated environment where assessment can take place   3. Materials relevant to the proposed assessment activity or tasks |
| 1. Method of   assessment | Competency in this unit may be assessed through:   * 1. Written tests   2. Questionnaires   3. Oral questioning   4. Projects   5. Observation |
| 1. Context of   assessment | 4.1 Competency elements must be assessed in a safe working environment  4.2 Assessment may be conducted in a workplace or simulated environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

# **APPLY FUNDAMENTALS OF DAIRY TECHNOLOGY**

**UNIT CODE: 0721 441 04A  
UNIT DESCRIPTION:**This unit specifies the competencies required by Dairy Processing Attendant level 4 to apply  
fundamentals of dairy technology. It involves application milk composition and dairy  
microbiology knowledge and dairy equipment operations principles.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT** These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Apply milk composition knowledge | 1.1 ***Milk constituents*** are tested as per dairy processing manual 1.2 ***Milk physical properties*** are applied as per work instructional manual 1.3 ***Milk chemical properties*** are applied as per work instruction manual |
| 2. Apply dairy microbiology knowledge | 2.1 Microbiological principles are applied in dairy processing as per Kenya Standard (KS) 1552: 2016 Code of hygienic practice for milk and milk products. 2.2 ***Microbiology test apparatus*** are used as per good laboratory practices. 2.3 Dairy microbial specimens are collected as per good laboratory practices. 2.4 Microbial findings are documented as per work instruction manual. 2.5 Microbial wastes are managed as per KS 1552: 2016 Code of hygienic practice for milk and milk products. 2.6 Microbiology apparatus is cleaned and maintained as per good laboratory practices. |
| 1. Apply dairy equipment operational principles | 31 ***Dairy equipment and machinery*** are assembled as per work.  requirement 3.2 Dairy equipment and machinery are operated as per equipment and machinery operation manual 3.16 ***Dairy utilities*** are utilized as per work requirement. |

**RANGE**

|  |  |
| --- | --- |
| **RANGE** | **VARIABLE** |
| ***Milk constituents*** may include but not limited to: | • Carbohydrates • Proteins • Vitamins • Minerals • Butterfat • Water |
| ***Milk physical properties*** may include but not limited to: | • Colour • Taste • Density • Viscosity • Freezing point • Ph • Enzymes • Emulsions • Heat sensitivity. |
| ***Milk chemical properties*** may include but not limited to: |  |
| ***Microbiology test apparatus*** may include but not limited to: | • Microscope • Incubators • Autoclaves • Heat exchanger • Vats • Tanks • Cans • pumps • Steam system • water |
| ***Dairy equipment and machinery*** may include but not limited to: |  |
| ***Dairy utilities*** may include but not limited to: | • Waste water system • Refrigeration. • Pneumatic system. |

**REQUIRED SKILLS AND KNOWLEDGE**This section describes the skills and knowledge required for this unit of competency.

**Required knowledge**The individual needs to demonstrate knowledge of:

* Milk composition.
* Microorganisms
* Microscopy procedures
* Processing Techniques
* Quality Control measures
* Packaging and Storage
* Hygiene

**Required Skills**The individual needs to demonstrate the following skills:

* Communication.
* Testing skills.
* Time management.
* Data collection.
* Numeracy.
* Observation.
* Digital literacy

**EVIDENCE GUIDE**This provides advice on assessment and must be read in conjunction with the performance  
criteria, required skills and knowledge and range.

|  |  |
| --- | --- |
| * + - 1. Critical aspects of competency | Assessment requires evidence that the candidate 1.1 Tested Milk constituents as per dairy processing manual   * 1. Applied Microbiological principles in dairy processing as per Kenya Standard (KS) 1552: 2016 Code of hygienic practice for milk and milk products.   2. Operated dairy equipment and machinery as per equipment and machinery operation manual   3. Utilized dairy utilities as per work requirement. |
| * + - 1. Resource implication | The following resources should be provided  2.1 Access to relevant workplace where assessment can take place 2.2 Appropriately simulated environment where assessment can take place 2.3 Materials relevant to the proposed assessment activity or tasks |
| * + - 1. Method of assessment | Competency in this unit may be assessed through:   * Practical * Oral questioning * Portfolio of evidence * Third party report * Written tests |
| * + - 1. Context of assessment | 4.1 Competency elements must be assessed in a safe working environment 4.2 Assessment may be conducted in a workplace or simulated environment |
| * + - 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended |

# APPLY DAIRY CHEMISTRY PRINCIPLES

**ISCED UNIT CODE: 0721 451 04A**

**TVET CDACC UNIT CODE: DA/CU/PM/CM/14/6/C**

**Unit Description**

This unit specifies the competencies required by a Dairy Plant Technician level 6 to Apply Dairy Chemistry Principles. It involves applying physical properties, applying chemical properties and applying functional properties

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Apply physical properties | 1. Physical properties of milk are applied in milk composition in accordance work requirements 2. Physical properties of milk are applied in milk quality control in accordance work requirements 3. Physical properties of milk are applied in ***processing operations*** in accordance work requirements |
| 1. Apply chemical properties | 1. Chemical properties of milk are applied in milk composition in accordance work requirements 2. Chemical properties of milk are applied in milk quality control in accordance work requirements 3. Chemical properties of milk are applied in processing operations in accordance work requirements 4. Chemical properties of milk are applied in product development in accordance work requirements |
| 1. Apply functional properties | 1. Functional properties of milk are applied sensory attributes enhancement in accordance to work requirements 2. Functional properties of milk are applied in nutritional quality improvement in accordance to work requirements. 3. Functional properties of milk are applied in product formulation in accordance to work requirements 4. Functional properties of milk are applied in product shelf stability in accordance to work requirements |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

Required knowledge

The individual needs to demonstrate knowledge of:

1. Physical properties of milk
2. Milk composition
3. Process induced changes

**Required skills**

The individual needs to demonstrate the following skills:

* Communication skills
* Problem solving
* Analytical skills
* Observation of laboratory safety

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Applied physical properties of milk in milk quality control in accordance work requirements   2. Applied chemical properties of milk in milk quality control in accordance work requirements   3. Applied functional properties of milk in nutritional quality improvement in accordance to work requirements. |
| 1. Resource implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place   2. Access to relevant work environment   3. Resources relevant to the proposed activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   1. Practical assessment 2. Oral questioning 3. Portfolio of evidence 4. Interviews 5. Third party report 6. Written tests |
| 1. Context of assessment | Competency may be assessed:   * 1. Workplace   2. Simulated work environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

# APPLY DAIRY MICROBIOLOGY PRINCIPLES

**UNIT CODE: 0721 451 05A**

**TVET CDACC UNIT CODE: DA/CU/PM/CM/17/6/C**

**UNIT DESCRIPTION**

This unit specifies the competencies required by a Dairy Plant Technologist level 6 to Apply Dairy Microbiology Principles. It involves utilizing dairy microorganism, applying dairy hygiene practices, and controlling dairy microorganisms.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Utilize dairy microorganism | * 1. ***Beneficial dairy microorganisms*** are identified as per work requirements   2. Beneficial dairy microorganisms are used as per work requirements   3. Fermentation process is monitored as per work instruction manual.   4. Enzymatic activity is monitored as per work instruction manual   5. Fermentation process records are maintained as per work instruction manual. |
| 1. Apply dairy hygiene practices | * 1. ***Inspection*** of dairy plant is carried out as per code of hygiene practice.   2. ***Microbial tests*** are carried out as per work instruction manual.   3. Dairy plant is cleaned as per work instruction manual   4. ***Dairy plant environment*** hygiene is maintained as per work instruction manual.   5. Employee hygiene is maintained as per code of hygiene practice.   6. Dairy hygiene records are maintained as per work instruction manual |
| 1. Control dairy microorganisms | * 1. ***Harmful dairy micro-organisms*** *are identified* aswork instruction manual   2. Harmful dairy micro-organismsare *controlle*d as per work instruction manual*.*   3. Harmful dairy micro-organisms control record is maintained as per work instruction manual. |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Beneficial dairy microorganisms may include but are not limited to: | * Bacteria * Fungi * Protozoa |
| 1. Inspection may include but are not limited to: | * Hygiene and sanitation * Facility layout and design * Equipment and machinery * Raw material handling |
| 1. Microbial test may include but are not limited to: | * Standards plate count * Total plate count * Coliforms plate count * Yeast and mold count |
| 1. Dairy plant environment may include but are not limited to: | * Processing area * Packaging area * Dairy laboratory * Waste disposal area |
| 1. Harmful dairy micro-organisms may include but are not limited to: | * Salmonella * Escherichia coli * Listeria monocytogenes * Staphylococcus aureus |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

Required knowledge

The individual needs to demonstrate knowledge of:

* Dairy microorganism
* Dairy hygiene practice
* Microbial test
* Enzymatic activities

**Required skills**

The individual needs to demonstrate the following skills:

* Use of dairy microorganism
* Dairy hygiene practices applications
* Control dairy microorganisms
* Communication skills
* Problem solving
* Analytical skills
* Observation of laboratory safety

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Used Beneficial dairy microorganisms as per work requirements   2. Carried out inspection of dairy plant as per code of hygiene practice.   3. Carried out microbial tests as per work instruction manual.   4. Cleaned dairy plant as per work instruction manual   5. Maintained employee hygiene as per code of hygiene practice. |
| 1. Resource implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place   2. Access to relevant work environment   3. Resources relevant to the proposed activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   1. Practical assessment 2. Oral questioning 3. Portfolio of evidence 4. Interviews 5. Third party report 6. Written tests |
| 1. Context of assessment | Competency may be assessed:   * 1. Workplace   2. Simulated work environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

# CORE UNITS OF COMPETENCY

# **HANDLE RAW MILK**

**UNIT CODE: 0721 451 06A**

**UNIT DESCRIPTION**

This unit specifies the competencies required by a Dairy Plant Technician level 5 to handle raw milk. It involves procuring, grading and preserving raw milk.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Procure raw milk | * 1. Raw milk ***sources*** are identified as per work requirement.   2. Cost of raw milk is determined based on prevailing market price.   3. ***Raw milk*** ***supply agreement*** is prepared based on procurement laws   4. Raw milk is delivered in accordance to KS 1552 Code of hygienic practice for milk and milk products |
| 1. Grade raw milk | * 1. ***Grading tools, equipment and materials*** for testing raw milk are assembled according to job requirement.   2. Raw milk sample is collected as per KS ISO 707:2008 sampling of milk and milk products   3. ***Raw milk quality analysis is carried out*** in accordance KS ISO/TC 34/SC 5 milk and milk products   4. Raw milk is received based on Kenya Bureau of standards and dairy industry standards.   5. Raw milk quality records are updated based on work procedure.   6. Raw milk testing equipment are cleaned in accordance with KS1552-2016 Code of hygienic practice for milk and milk products |
| 1. Preserve raw milk | * 1. Raw milk is weighed in accordance with work procedures   2. Raw milk is ***bulked*** as per KS1552- 2016 Code of Hygienic practice for milk and milk products   3. Raw milk ***cooling parameters*** are set as per the KS1552- 2016 Code of hygienic practice for milk and milk products.   4. Raw milk cooling process is carried out as per equipment operational manual.   5. Raw milk bulking ***records*** are documented based on work instruction manual   6. Raw milk handling equipment are cleaned in accordance with KS1552- 2016 Code of hygienic practice for milk and milk products |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Raw milk sources may include but are not limited to: | * Dairy cow * Dairy camel * Dairy goat |
| 1. Raw milk supply agreement may include but are not limited to: | * Quantity * Terms of payment * Delivery methods * Quality * Delivery time * Penalties * Review period |
| 1. Grading tools, equipment and materials may include but are not limited to: | **Tools and equipment**   * Alcohol gun * Plunger * Lactometer * Thermometer * Measuring cylinder * Test tubes * Centrifuge * Lovi bond Comparator   **Materials**   * Ethanol * Resazurin tablets * Antibiotic test kit * Aflatoxin test kit * Indicator * Sodium hydroxide |
| 1. Raw milk quality analysis may include but are not limited to: | * Organoleptic test * Compositional test * Resazurin test * Alcohol test * Lactometer test * Antibiotic test * pH test |
| 1. Bulked may include but are not limited to: | * Vats * Cans * Silo tanks |
| 1. Cooling parameters may include but are not limited to: | * Temperatures < 6 0C * Time * Temperature controls * Agitation |
| 1. Cooling process is monitoredmay include but are not limited to: | * Cooling time * Agitation * Temperatures |
| 1. Records may include but are not limited to: | * Quantity of raw milk received * Quality parameters * Farmer records |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Microbial growth
* Milk composition
* Milk sampling techniques
* Milk quality testing techniques
* Milk preservation techniques
* Good manufacturing practices
* Code of hygiene
* Legal requirements
* Record keeping

**Required skills**

The individual needs to demonstrate the following skills:

* Communication skills
* Problem solving
* Analytical skills
* Weighing skills
* Milk handling skills
* Food safety risk assessment
* Milk equipment handling
* Training skills

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | * 1. Received raw milk based on Kenya Bureau of standards and dairy industry standards.   2. Raw milk quality analysis is carried out in accordance KS ISO/TC 34/SC 5 milk and milk products   3. Prepared raw milk supplyagreement based on procurement laws   4. Carried out raw milk cooling process as per equipment operational manual.   5. Cleaned raw milk handling equipment in accordance with KS1552- 2016 Code of hygienic practice for milk and milk products   6. Documented raw milk bulking based on work instruction manual |
| 1. Resource implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place   2. Access to relevant work environment   3. Resources relevant to the proposed activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Practical   2. Project   3. Portfolio of evidence   4. Third party report   5. Written tests   6. Oral questioning |
| 1. Context of assessment | Competency may be assessed:   * 1. Workplace   2. Simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

# **PROCESS FLUID MILK PRODUCTS**

**UNIT CODE: 0721 451 08A**

**UNIT DESCRIPTION**

This unit specifies the competencies required by a Dairy Plant Technician level 5 to process fluid milk products. It involves processing pasteurized milk, ultra heat-treated milk and extended shelf-life milk.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Process pasteurized milk | * 1. Raw milk sample is collected as per KS ISO 707:2008 Sampling of milk and milk products   2. ***Raw milk quality analysis*** is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   3. ***Pasteurized milk processing materials and equipment*** are assembled based on work requirement.   4. Milk is standardized in line with Kenya Standards East Africa Standards (KS EAS) 69-2019   5. Standardized milk is homogenized in line with KS EAS 69-2019   6. Standardized milk is ***pasteurized*** in accordance with KS EAS 69-2019   7. **Pasteurization efficiency** is **assessed** as per pasteurized milk standards   8. Pasteurized milk is packaged as per KS EAS 69-2019   9. Pasteurized milk is stored in accordance KS EAS 69-2019   10. Pasteurized milk processing equipment is cleaned as per code of hygienic practice for milk and milk products   11. Dairy waste is disposed as per (KS)1552- 2016 code of Hygienic practice for milk and milk products   12. Pasteurized milk processing records are updated as per work instruction manual. |
| 1. **2.** Process ultra-high temperature milk | * 1. Raw milk sample is collected as per ISO 707:2008 Guidance on sampling of milk and milk products   2. ***Raw milk quality analysis*** is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   3. ***UHT milk processing materials and equipment*** are assembled based on work requirement.   4. Milk is standardized in line with Kenya Standards East Africa Standards (KS EAS) 69-2019   5. Standardized milk is homogenized in line with KS EAS 69-2019   6. Standardized milk is pasteurized in accordance with KS EAS 27:2023 UHT milk- specification.   7. Pasteurized milk is stored in accordance with KS EAS 27:2023 UHT milk- specification.   8. Milk is sterilized in accordance with KS EAS 27:2023 UHT milk- specification.   9. UHT milk Sterility is assessed as per KS EAS 27:2023 UHT milk- specification.   10. Sterilized milk is packaged as per KS EAS 27:2023 UHT milk- specification.   11. Sterilized milk milk is stored in accordance KS EAS 63-2019   12. UHT milk processing equipment is cleaned as per code of hygienic practice for milk and milk products   13. Dairy waste is disposed as per Kenya Standards (KS)1552- 2016 code of Hygienic practice for milk and milk products   14. Sterilized milk processing records are updated as per work instruction manual. |
| 1. Process lactose free milk | * 1. Raw milk sample is collected as per KS ISO 707:2008 Sampling of milk and milk products   2. ***Raw milk quality analysis*** is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   3. ***Lactose free processing materials*** and equipment are assembled based on work requirement.   4. Milk is standardized in accordance with KS EAS 39   5. Standardized milk is homogenized in line with KS EAS 39   6. Milk is pasteurized in accordance with KS EAS 39.   7. Pasteurized milk undergoes lactase enzyme treatment in accordance to KS EAS 39.   8. Lactose free milk is pasteurized accordance to KS EAS 39.   9. Lactose free milk is packaged as per KS EAS 39.   10. Lactose free milk is stored in accordance KS EAS 39.   11. Processing equipment is cleaned as per code of hygienic practice for milk and milk products.   12. Dairy waste is disposed as per Kenya Standards (KS)1552- 2016 code of Hygienic practice for milk and milk products   13. Lactose free milk processing records are updated as per work instruction manual |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Pasteurized milk processing materials and equipment may include but are not limited to: | **Materials**   * Raw milk * Milk powder * Anhydrous fat * Packaging material   **Equipment**   * Blender * Cream separator * Homogenizer * Pasteurizer * Milk silo tank * Packaging machine |
| 1. Pasteurization efficiency is assessed may include but are not limited to: | * Alkaline phosphatase test |
| 1. UHT processing materials and equipment may include but are not limited to: | * Homogenizer * Steriliser * Sterile tank * Aseptic packaging machines |
| 1. ***Lactose free processing materials*** may include but are not limited to: | * Lactase enzyme |
| 1. Pasteurized may include but are not limited to: | * Batch pasteurisation at <68OC for 30 minutes * Continuous pasteurisation <72OC for 15 seconds |
| 1. Sterilized may include but are not limited to: | * Heat treatment at ≤133OC for 5 seconds |
| 1. Sterility may include but are not limited to: | * Packet integrity * Sterilisation temperatures * Sterile packaging material |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Dairy microbiology
* Dairy chemistry
* Milk sampling techniques
* Milk quality testing techniques
* Milk preservation techniques
* Good manufacturing practices
* Code of hygiene practices
* Legal requirements
* Record keeping
* Dairy waste and management

**Required skills**

The individual needs to demonstrate the following skills:

* Communication
* Problem solving
* Milk testing
* Analytical
* Milk handling
* Food safety risk assessment
* Milk equipment handling

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| 1.Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Sterilized milk in accordance with KS EAS 27:2023 UHT milk- specification.   2. Assessed pasteurization efficiency as per pasteurized milk standards   3. Assessed UHT milk sterility as per KS EAS 27:2023 UHT milk- specification.   4. Cleaned UHT milk processing equipment as per code of hygienic practice for milk and milk products   5. Pasteurized milk in accordance with KS EAS 69-2019   6. Cleaned pasteurized milk processing equipment as per code of hygienic practice for milk and milk products |
| 2.Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proposed activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Practical   2. Project   3. Portfolio of evidence   4. Third party report   5. Written tests   6. Oral questioning   7. Observation |
| 1. Context of assessment | Competency may be assessed:   * 1. Workplace   2. Simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

# **PROCESS CHEESE PRODUCTS**

**UNIT CODE: 0721 451 09A**

**UNIT DESCRIPTION**

This unit specifies the competencies required by a Dairy Plant Technician level 5 to process Cheese products. It involves producing Cheddar, Gouda Paneer, Mozzarella cheese, Processed and Cream cheese.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Produce cheddar cheese | * 1. Raw milk sample is collected as per Kenya Standard (KS) ISO 707:2008 Sampling of milk and milk products   2. ***Raw milk quality analysis*** is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   3. ***Cheddar cheese processing materials and equipment*** are assembled as per work requirement.   4. Cheddar cheese making is carried out in accordance with Kenya Standard (KS) 28-1, General standard for cheese.   5. Cheddar cheese is ripened in accordance with KS 28-1, General standard for cheese.   6. Cheddar cheese sample is drawn as per KS ISO 707:2008 Sampling of milk and milk products   7. Cheddar cheese quality is analysed in accordance with KS ISO/TC 34/SC 5 milk and milk products   8. Cheddar cheese is packaged in accordance with KS 28-1, General standard for cheese.   9. Cheddar cheese is stored in accordance with KS 28-1, General standard for cheese.   10. Cheddar cheese processing equipment is cleaned as per code of hygienic practices for milk and milk products   11. Dairy waste is disposed as per Kenya Standards (KS)1552- 2016 code of Hygienic practice for milk and milk products   12. Cheddar cheese production records are updated as per work instruction manual |
| 1. Produce gouda cheese | * 1. Raw milk sample is collected as per KS ISO 707:2008 Sampling of milk and milk products   2. ***Raw milk quality analysis*** is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   3. ***Gouda cheese processing materials and equipment*** are assembled based on work requirement.   4. Gouda cheese making is carried out in accordance with Kenya Standard (KS) 28-1, General standard for cheese.   5. Gouda cheese is ripened in accordance with KS 28-1, General standard for cheese.   6. Gouda cheese sample is drawn as per KS ISO 707:2008 Sampling of milk and milk products   7. Gouda cheese quality is analysed in accordance with KS ISO/TC 34/SC 5 milk and milk products   8. Gouda cheese is packaged in accordance with KS 28-1, General standard for cheese.   9. Gouda cheese is stored in accordance with KS 28-1, General standard for cheese.   10. Gouda cheese processing equipment is cleaned as per Kenya Standards (KS)1552- 2016 code of hygienic practice for milk and milk products   11. Dairy waste is disposed as per KS1552- 2016 code of Hygienic practice for milk and milk products   12. Gouda cheese production records are updated as per work instruction manual. |
| 1. Produce paneer cheese | * 1. Raw milk sample is collected as per KS ISO 707:2008 Sampling of milk and milk products   2. ***Raw milk quality analysis*** is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   3. ***Paneer cheese processing materials and equipment*** are assembled based on work requirement.   4. Paneer cheese making is carried out in accordance with Kenya Standard (KS) 28-1, General standard for cheese.   5. Paneer cheese sample is drawn as per KS ISO 707:2008 Sampling of milk and milk products   6. Paneer cheese quality is analysed in accordance with KS ISO/TC 34/SC 5 milk and milk products   7. Paneer cheese is packaged in accordance with (KS) 28-1, General standard for cheese.   8. Paneer cheese is stored in accordance with (KS) 28-1, General standard for cheese.   9. Processing equipment is cleaned as per code of hygienic practice for milk and milk products   10. Dairy waste is disposed as per Kenya Standards (KS)1552- 2016 code of Hygienic practice for milk and milk products   11. Paneer cheese production records are updated as work instruction manual. |
| 1. Produce mozzarella cheese | * 1. Raw milk sample is collected as per KS ISO 707:2008 Sampling of milk and milk products   2. ***Raw milk quality analysis*** is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   3. ***Mozzarella cheese processing materials and equipment*** are assembled based on work requirement.   4. Mozzarella cheese making is carried out in accordance with Kenya Standard (KS) 28-1, General standard for cheese.   5. Mozzarella cheese sample is drawn as per KS ISO 707:2008 Sampling of milk and milk products   6. Mozzarella cheese quality is analysed in accordance with KS ISO/TC 34/SC 5 milk and milk products   7. Mozzarella cheese is packaged in accordance with (KS) 28-1, General standard for cheese.   8. Mozzarella cheese is stored in accordance with (KS) 28-1, General standard for cheese.   9. Mozzarella cheese processing equipment is cleaned as per code of hygienic practice for milk and milk products   10. Dairy waste is disposed as per Kenya Standards (KS)1552- 2016 code of Hygienic practice for milk and milk products   11. Mozzarella cheese production records are updated as per work instruction manual. |
| 1. Produce processed cheese | * 1. ***Processed cheese processing materials and equipment*** are assembled based on work requirement.   2. Processed cheese making is carried out in accordance with Kenya Standard (KS) 28-1, General standard for cheese.   3. Processed cheese sample is drawn as per KS ISO 707:2008 Sampling of milk and milk products   4. Processed cheese quality is analysed in accordance with KS ISO/TC 34/SC 5 milk and milk products   5. Processed cheese is packaged in accordance with (KS) 28-1, General standard for cheese.   6. Processed cheese is stored in accordance with (KS) 28-1, General standard for cheese.   7. Processing equipment is cleaned as per code of hygienic practice for milk and milk products   8. Dairy waste is disposed as per Kenya Standards (KS)1552- 2016 code of Hygienic practice for milk and milk products   9. Processed cheese production records are updated as per work instruction manual. |
| 1. Produce cream cheese | * 1. ***Processing materials and equipment*** are assembled based on work requirement.   2. Cream cheese making is carried out in accordance with Kenya Standard (KS) 28-1, General standard for cheese.   3. Cream cheese sample is drawn as per KS ISO 707:2008 Sampling of milk and milk products   4. Cream cheese quality is analysed in accordance with KS ISO/TC 34/SC 5 milk and milk products   5. Cream cheese is packaged in accordance with (KS) 28-1, General standard for cheese.   6. Cream cheese is stored in accordance with (KS) 28-1, General standard for cheese.   7. Processing equipment is cleaned as per code of hygienic practice for milk and milk products   8. Dairy waste is disposed as per Kenya Standards (KS)1552- 2016 code of Hygienic practice for milk and milk products   9. Cream cheese production records are updated as per work instruction manual. |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Cheddar cheese processing materials and equipment may include but are not limited to: | **Material**   * Starter culture * Rennet * Food Colour * Salt   **Equipment**   * Cheese vat * Cheese press * Cheese mould * Knives * Cheese cloth * Miller * pH meter * Thermometer |
| 1. Gouda cheese processing materials and equipment may include but are not limited to: | **Material**   * Starter culture * Rennet * Food Colour * Salt   **Equipment**   * Cheese vat * Cheese press * Cheese mould * Knives * Cheese cloth * Thermometer * pH meter |
| 1. Paneer cheese processing materials and equipment may include but are not limited to: | **Material**   * Citric acid * Food Colour * Salt   **Equipment**   * Cheese vat * Cheese mould * Knives * Cheese cloth * Thermometer * pH meter |
| 1. Mozzarella cheese processing materials and equipment may include but are not limited to: | **Material**   * Starter culture * Rennet * Food Colour * Salt   **Equipment**   * Cheese vat * Knives * Stretcher |
| 1. Processed cheese processing materials and equipment may include but are not limited to: | **Material**   * Cheese * Food Colour * Food flavours * Emulsifier * Stabilizer * Salt * Permitted preservative * Skim milk power * Portable water   **Equipment**   * Batch pasteurizer * Cheese mould * Knives * Cheese vat |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

The individual needs to demonstrate knowledge of:

* Dairy microbiology
* Dairy chemistry
* Milk sampling techniques
* Milk quality testing techniques
* Good manufacturing practices
* Code of hygiene practices
* Dairy standards
* Record keeping
* Dairy waste and management
* Cheese technology

**Required skills**

The individual needs to demonstrate the following skills:

* Communication
* Problem solving
* Analytical
* Milk handling
* Cheese equipment handling
* Cheese making
* Milk testing

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| 1.Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Carried out Cheddar cheese making in accordance with Kenya Standard (KS) 28-1, General standard for cheese.   2. Carried out Gouda cheese making in accordance with Kenya Standard (KS) 28-1, General standard for cheese   3. Ripened Cheddar cheese in accordance with KS 28-1, General standard for cheese.   4. Ripened Gouda cheese in accordance with KS 28-1, General standard for cheese.   5. Carried out Paneer cheese making in accordance with Kenya Standard (KS) 28-1, General standard for cheese.   6. Carried out Mozzarella cheese making in accordance with Kenya Standard (KS) 28-1, General standard for cheese.   7. Carried out Processed cheese making in accordance with Kenya Standard (KS) 28-1, General standard for cheese.   8. Carried out Cream cheese making in accordance with Kenya Standard (KS) 28-1, General standard for cheese.   9. Cheese quality is analysed in accordance with KS ISO/TC 34/SC 5 milk and milk products   10. Cleaned cheese processing equipment as per code of hygienic practices for milk and milk products |
| 2.Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proposed activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Practical   2. Project   3. Portfolio of evidence   4. Third party report   5. Written tests   6. Oral questioning   7. Observation |
| 1. Context of assessment | Competency may be assessed:   * 1. Workplace   2. Simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

# **PROCESS FERMENTED MILK PRODUCTS.**

**UNIT CODE: 0721 451 10A**

**UNIT DESCRIPTION**

This unit specifies the competencies required by a Dairy Plant Technician level 5 to process Fermented Milk Products. It involves producing Yoghurt, Cultured and Kefir milk products.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Produce yoghurt product | * 1. Raw milk sample is collected as per KS ISO 707:2008 Sampling of milk and milk products   2. ***Raw milk quality analysis*** is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   3. ***Yoghurt processing materials and equipment*** are assembled based on work requirement.   4. Yoghurt product making is carried out in accordance with Kenya Standard East Africa Standard (KS EAS) 33-2006, Yoghurt — Specification   5. Yoghurt product sample is drawn as per KS ISO 707:2008 Sampling of milk and milk products   6. Yoghurt product quality is analysed in accordance with KS ISO/TC 34/SC 5 milk and milk products   7. Yoghurt product is packaged in accordance with Kenya East Africa Standard (K EAS) 33-2006, Yoghurt — Specification.   8. Yoghurt product is stored in accordance with Kenya East Africa Standard (K EAS) 33-2006, Yoghurt — Specification   9. Yoghurt product processing equipment is cleaned as per code of hygienic practice for milk and milk products   10. Dairy waste is disposed as per Kenya Standards (KS)1552- 2016 code of Hygienic practice for milk and milk products   11. Yoghurt product production records are updated as per work instruction manual |
| 1. Produce cultured milk product | * 1. Raw milk sample is collected as per Kenya Standard KS ISO 707:2008 Sampling of milk and milk products   2. ***Raw milk quality analysis*** is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   3. ***Cultured milk product processing materials and equipment*** are assembled based on work requirement.   4. Cultured milk product making is carried out in accordance with Kenya East Africa Standard (K EAS) 1008:2021 Fermented (cultured) milk — Specification.   5. Cultured milk sample is drawn as per KS ISO 707:2008 Sampling of milk and milk products   6. Cultured milk quality is analysed in accordance with KS ISO/TC 34/SC 5 milk and milk products   7. Cultured milk product is packaged in accordance with Kenya East Africa Standard (K EAS) 1008:2021 Fermented (cultured) milk — Specification   8. Cultured milk product is stored in accordance with Kenya Standard East Africa Standard (KS EAS) 1008:2021 Fermented (cultured) milk — Specification   9. Cultured milk product processing equipment is cleaned as per code of hygienic practice for milk and milk products   10. Dairy waste is disposed as per Kenya Standards (KS)1552- 2016 code of Hygienic practice for milk and milk products   11. Cultured milk product production records are updated as per work place manual. |
| 1. Produce kefir product | * 1. Raw milk sample is collected as per KS ISO 707:2008 Sampling of milk and milk products   2. ***Raw milk quality analysis*** is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   3. ***Kefir product processing materials and equipment*** are assembled based on work requirement.   4. Kefir milk product making is carried out in accordance with East Africa Standard (EAS) 1008:2021 Fermented (cultured) milk — Specification.   5. Kefir product sample is drawn as per KS ISO 707:2008 Sampling of milk and milk products   6. Kefir product quality and safety is analysed in accordance with KS ISO/TC 34/SC 5 milk and milk products   7. Kefir milk product is packaged in accordance with East Africa Standard (EAS) 1008:2021 Fermented (cultured) milk — Specification   8. Kefir milk product is stored in accordance with East Africa Standard (EAS) 1008:2021 Fermented (cultured) milk — Specification   9. Kefir milk product processing equipment is cleaned as per code of hygienic practice for milk and milk products   10. Dairy waste is disposed as per Kenya Standards (KS)1552- 2016 code of Hygienic practice for milk and milk products   11. Kefir milk product production records are updated as per work instruction manual |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

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| **Variable** | **Range** |
| 1. Yoghurt processing materials and equipment may include but are not limited to: | Material   * Starter culture * Milk * Thickeners * Sweetener * Emulsifier * Stabilizers * Food colour * Flavours   **Equipment**   * Milk pasteurizer * Homogenizer * Fermentation tanks * Thermometers * Cooler |
| 1. Cultured milk product processing materials and equipment may include but are not limited to: | **Material**   * Starter culture * Milk * Thickeners * Sweetener * Emulsifier * Stabilizers * Food colour * Flavours   **Equipment**   * Milk pasteurizer * Homogenizer * Fermentation tanks * Thermometers * Cooler |
| 1. Kefir product processing materials and equipment may include but are not limited to: | **Material**   * Kefir grains * Milk * Thickeners * Sweetener * Emulsifier * Stabilizers * Food colour * Flavours   **Equipment**   * Milk pasteurizer * Homogenizer * Fermentation tanks * Thermometers * Cooler |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

The individual needs to demonstrate knowledge of:

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Dairy microbiology
* Dairy chemistry
* Milk sampling techniques
* Milk quality testing techniques
* Milk preservation techniques
* Good manufacturing practices
* Code of hygiene
* Legal requirements
* Record keeping
* Dairy waste and management
* Fermented milk technology

**Required skills**

The individual needs to demonstrate the following skills:

* Communication skills
* Problem solving
* Analytical skills
* Milk handling skills
* Food safety risk assessment
* Fermented equipment handling
* Fermented milk culture handling
* Fermented milk testing skill

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

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| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Carried out yoghurt product making in accordance with Kenya Standard East Africa Standard (KS EAS) 33-2006, Yoghurt — Specification   2. Carried out Cultured milk product making in accordance with Kenya East Africa Standard (K EAS) 1008:2021 Fermented (cultured) milk — Specification   3. Carried out Kefir milk product making in accordance with East Africa Standard (EAS) 1008:2021 Fermented (cultured) milk — Specification.   4. Analysed Yoghurt product quality in accordance with KS ISO/TC 34/SC 5 milk and milk products   5. Analyzed Cultured milk quality in accordance with KS ISO/TC 34/SC 5 milk and milk products   6. Processing equipment is cleaned as per code of hygienic practice for milk and milk products |
| 1. Resource implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place   2. Access to relevant work environment   3. Resources relevant to the proposed activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Practical   2. Project   3. Portfolio of evidence   4. Third party report   5. Written tests   6. Oral questioning   7. Observation |
| 1. Context of assessment | Competency may be assessed:   * 1. Workplace   2. Simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

# **PROCESS FAT BASED MILK PRODUCTS**

**UNIT CODE: 0721 451 11A**

**UNIT DESCRIPTION**

This unit specifies the competencies required by a Dairy Plant Technician level 5 to process Fat Based Milk products. It involves producing dairy cream, dairy butter, dairy ghee and dairy ice cream.

**ELEMENTS AND PERFORMANCE CRITERIA**

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| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Produce dairy cream | * 1. Raw milk sample is collected as per KS ISO 707:2008 Sampling of milk and milk products   2. ***Raw milk and ingredients samples analysis*** is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   3. ***Cream*** ***processing materials and equipment*** are assembled based on work requirement.   4. Dairy cream product is produced in accordance with KS 35:2018 Dairy cream and prepared creams – Specification   5. Dairy cream product sample is drawn as per KS ISO 707:2008 Sampling of milk and milk products   6. Dairy ***cream product quality is analysed*** in accordance with KS ISO/TC 34/SC 5 milk and milk products   7. Dairy cream product is packaged in accordance with KS 35:2018 Dairy cream and prepared creams – Specification   8. Dairy cream product is stored in accordance with KS 35:2018 Dairy cream and prepared creams - Specification.   9. Dairy cream processing equipment is cleaned as per Kenya Standards (KS)1552- 2016 code of Hygienic practice for milk and milk products   10. Dairy waste is disposed as per KS 1552- 2016 code of Hygienic practice for milk and milk products   11. Dairy cream product production records are updated as per work instruction manual |
| 1. Produce dairy butter | * 1. Raw milk sample is collected as per KS ISO 707:2008 Sampling of milk and milk products   2. Raw milk sample is analysed in accordance with KS ISO/TC 34/SC 5 milk and milk products   3. ***Butter processing materials and equipment*** are assembled based on work requirement.   4. Dairy butter making is carried out in accordance with KS EAS 22:2019 Butter - Specification   5. Dairy butter product sample is drawn as per KS ISO 707:2008 Sampling of milk and milk products   6. Dairy ***butter product quality is analysed*** in accordance with KS ISO/TC 34/SC 5 milk and milk products   7. Dairy butter is packaged in accordance with KS EAS 22:2019 Butter - Specification   8. Dairy butter product is stored in accordance with KS EAS 22:2019 Butter - Specification   9. Dairy butter processing equipment is cleaned as per Kenya Standards (KS)1552- 2016 code of Hygienic practice for milk and milk products   10. Dairy waste is disposed as per KS1552- 2016 code of Hygienic practice for milk and milk products   11. Dairy butter product production records are updated as per work instruction manual. |
| 1. Produce dairy ghee | * 1. ***Ghee*** ***processing materials and equipment*** are assembled based on work requirement.   2. Dairy ghee making is carried out in accordance with KS 326 Specification for edible fats and oils   3. Dairy Ghee product sample is drawn as per KS ISO 707:2008 Sampling of milk and milk products   4. Dairy ***Ghee product quality is analysed*** in accordance with KS ISO/TC 34/SC 5 milk and milk products   5. Dairy ghee is packaged in accordance with KS 326 Specification for edible fats and oils   6. Dairy ghee product is stored in accordance with KS 326 Specification for edible fats and oils   7. Dairy ghee product pprocessing equipment is cleaned as per Kenya Standards (KS)1552- 2016 Code of Hygienic practice for milk and milk products   8. Dairy waste is disposed as per KS 1552- 2016 Code of Hygienic practice for milk and milk products   9. Dairy ghee product production records are updated as per work instruction manual. |
| 1. Produce dairy ice cream | * 1. ***Dairy Ice cream processing materials and equipment*** are assembled based on work requirement.   2. Dairy Ice cream making is carried out in accordance with Kenya Standard East Africa Standard (KS EAS 70) Dairy ice cream — Specification   3. Dairy Ice Cream product sample is drawn as per KS ISO 707:2008 Sampling of milk and milk products   4. Dairy ***Ice Cream quality is analysed*** in accordance with KS ISO/TC 34/SC 5 milk and milk products   5. Dairy Ice cream product is packaged in accordance with (K EAS 70) Dairy ice cream — Specification   6. Dairy Ice cream product is stored in accordance with (K EAS 70) Dairy ice cream — Specification   7. Dairy Ice cream product processing equipment is cleaned as Kenya Standards (KS)1552- 2016 Code of Hygienic practice for milk and milk products   8. Dairy waste is disposed as per KS1552- 2016 Code of Hygienic practice for milk and milk products.   9. Dairy Ice cream product production records are updated as per work instruction manual. |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

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| **Variable** | **Range** |
| 1. Butter processing materials and equipment may include but are not limited to: | **Materials**   * Raw milk * Cream * Salt * Food colours   **Equipment**   * Cream separator * Butter churn |
| 1. Ghee Processing materials and equipment may include but are not limited to: | **Materials**   * Butter * Cream   Equipment   * Heat exchangers |
| 1. Dairy Ice cream processing materials and equipment may include but are not limited to: | **Materials**   * Milk powder * Sweeteners * Flavours * Food colour * Stabilizers * Emulsifiers   **Equipment**   * Ice cream freezer |
| 1. Cream product quality analysis may include but are not limited to: | * Acidity * Fat content * Yeast and mould * Coliforms plate count * Total plate count * Sensory evaluation |
| 1. Butter product quality is analysis may include but are not limited to: | * Fat content * Acidity * Yeast and mould * Coliforms plate count * Total plate count * Moisture content * Sensory evaluation |
| 1. Ice Cream quality is analysis may include but are not limited to: | * Acidity * Fat content * Yeast and mould * Coliforms plate count * Total plate count * Sensory evaluation |
| 1. Ghee product quality may include but are not limited to: | * Fat content * Yeast and mould * Coliforms plate count * Total plate count * Sensory evaluation |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Milk sampling techniques
* Milk tests
* Cream production
* Butter making technology
* Ghee making technology
* Ice cream technology
* Principles of sensory evaluation
* Codes of hygienic practice (s)
* Dairy products standards
* Good manufacturing practices
* Good laboratory practices
* Cleaning of processing equipment
* Dairy waste and management
* Records keeping

**Required skills**

The individual needs to demonstrate the following skills:

* Operation of cream separator
* Operation of butter churn
* Operation of ghee pot
* Operation of ice cream freezer.
* Measuring
* Milk sampling
* Milk testing
* Reagent preparation
* Food safety risk assessment and communication
* Food handling
* Computation
* Communication
* Documentation and record keeping
* Active listening
* Basic ICT
* Critical thinking
* Writing
* Problem solving
* Analytical

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
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| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Produced dairy cream product in accordance with KS 35:2018 Dairy cream and prepared creams - Specification   2. Carried out Dairy butter making is in accordance with KS EAS 22:2019 Butter - Specification   3. Carried out Dairy ghee making in accordance with KS 326 Specification for edible fats and oils   4. Carried out Dairy Ice cream making in accordance with Kenya Standard East Africa Standard (KS EAS 70) Dairy ice cream — Specification   5. Analysed Dairy cream product quality in accordance with KS ISO/TC 34/SC 5 milk and milk products   6. Analysed Dairy butter product quality in accordance with KS ISO/TC 34/SC 5 milk and milk products   7. Dairy Ghee product quality is analysed in accordance with KS ISO/TC 34/SC 5 milk and milk products   8. Analysed Dairy Ice Cream quality in accordance with KS ISO/TC 34/SC 5 milk and milk products |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proposed activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * + Practical   + Project   + Portfolio of evidence   + Third party report   + Written tests   + Oral questioning |
| 1. Context of assessment | Competency may be assessed:   1. Workplace 2. Simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

# **CONDUCT DAIRY PRODUCT QUALITY CONTROL**

**UNIT CODE: 0721 451 12A**

**UNIT DESCRIPTION**

This unit specifies the competencies required by a Dairy Plant Technician level 5 to Conduct Dairy Product quality control. It involves analyzing raw materials and ingredients, monitoring production process, analyzing end product quality and implementing quality control measures.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| * + - 1. Analyse raw materials and ingredients | * 1. ***Laboratory reagents*** are prepared as per manufacturer’s instructions.   2. ***Laboratory tools and equipment*** are assembled as per instructional manuals.   3. ***Raw milk and ingredients*** sample***s*** are collected as per ISO 707:2008 Sampling of milk and milk products.   4. ***Raw milk and ingredients samples analysis*** is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   5. Raw milk and ingredients test records are updated as per work instruction manual.   6. Laboratory tools and equipment are cleaned according to good laboratory practices.   Laboratory waste is disposed as per Kenya Standard (KS) 1552: 2016 Code of hygienic practice for milk and milk products. |
| * + - 1. Monitor production process | * 1. Laboratory reagentsare prepared as per KS ISO/TC 34/SC 5 milk and milk products   2. Laboratory tools and equipment are assembled as per instructional manuals.   3. ***Semi-finished milk product*** sample***s*** are collected as per ISO 707:2008 Sampling of milk and milk products.   4. ***Semi-finished milk product samples analysis*** is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   5. Semi-finished milk productsample***s*** test records are updated as per work instruction manual.   6. Laboratory tools and equipment are cleaned according to good laboratory practices.   7. Laboratory waste is disposed per (KS) 1552: 2016 Code of hygienic practice for milk and milk products. |
| 1. Analyse end product quality | * 1. Laboratory reagentsare prepared as per KS ISO/TC 34/SC 5 milk and milk products   2. Laboratory tools and equipment are assembled as per instructional manuals   3. ***End milk product*** sample***s*** are collected as per ISO 707:2008 Sampling of milk and milk products.   4. ***End milk product samples analysis*** in accordance with KS ISO/TC 34/SC 5 milk and milk products   5. End milk productsample***s*** test records are updated as per work instruction manual   6. ***End product storage conditions*** are monitoredas per Kenya Standard (KS) 1552: 2016 Code of hygienic practice for milk and milk products.   7. Laboratory tools and equipment are cleaned according to good laboratory practices.   8. Laboratory waste is disposed per Kenya Standard (KS) 1552: 2016 Code of hygienic practice for milk and milk products. |
| 1. Analyse product handling condition quality | * 1. Laboratory reagentsare prepared as per KS ISO/TC 34/SC 5 milk and milk products   2. Laboratory test tools and equipment are assembled as per instructional manuals.   3. Laboratory tools and equipment are ***calibrated*** as per KEBS standards***.***   4. ***Specimen samples*** are collected as per ISO 707:2008 sampling of milk and milk products.   5. Specimen samples analysis is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   6. Laboratory tools and equipment are cleaned according to good laboratory practices.   7. Laboratory waste is disposed per Good laboratory practices   Laboratory equipment and reagents inventory is updated as per KS 1552: 2016 Code of hygienic practice for milk and milk products. |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Laboratory reagents may include but are not limited to: | * Media * Diluents * Indicators * Solvent * Buffers * Dyes * Stains |
| 1. Laboratory tools and equipment may include but are not limited to: | * Microscopes * Beakers * Flasks * Test Tube * Pipettes * Burettes * Balances * Scales * Heating * Equipment * Centrifuges * Autoclaves * Sterilizers * Incubators * Gloves * Safety Goggles * Lab Coats * pH Meters * Water Baths |
| 1. Raw milk and ingredients analysis may include but are not limited to: | * Organoleptic * Alcohol * Acidity * Antibiotic * Lactometer * Resazurin * Butter fat * Peroxide |
| 1. Semi-finished milk product analysis may include but are not limited to: | * Phosphatase * Peroxidase * Acidity * Salt content * Moisture content * Butter fat content * pH |
| 1. End milk product analysis may include but are not limited to: | * Phosphatase * Sterility * Peroxidase * Acidity * Salt content * Butter fat content * pH * Total plate count * Coliforms plate count * Yeast and mould count |
| 1. Specimen samples may include but are not limited to: | * Churn rinse * Equipment swab * Trapped air * Personnel swab |
| 1. End product storage conditions may include but are not limited to; | * Room temperature * Refrigeration temperature * Humidity * Frozen condition |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

The individual needs to demonstrate knowledge of:

* Standards for Dairy products
* Quality control and assurance.
* Dairy microbiology
* Dairy chemistry
* HACCP process
* Codes of hygienic practice (s)
* Relevant regulations
* Sampling techniques
* Principles of sensory evaluation
* Good manufacturing practices
* Good laboratory practices
* Cleaning of quality control facilities
* Laboratory waste and management
* Record keeping

**Required skills**

The individual needs to demonstrate the following skills:

* Active listening
* Reflecting
* Paraphrasing
* Clarifying
* Questioning
* Basic ICT
* Critical thinking
* Writing
* Problem solving
* Operation of quality control equipment
* Measuring
* Sampling
* Trouble-shooting
* Equipment maintenance
* Milk testing
* Reagent and Media preparation
* Computation

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. End milk product samples analysis is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   2. Collected End milk product samples as per ISO 707:2008 Sampling of milk and milk products.   3. Specimen samples analysis is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   4. Collected specimen samples as per ISO 707:2008 Sampling of milk and milk products.   5. Verified production processes are as per instructional manuals.   6. Collectedraw milk and ingredientssample***s*** as per ISO 707:2008 sampling of milk and milk products.   7. Raw milk and ingredients samples analysis is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products   8. Collected Semi-finished milk product samples as per ISO 707:2008 sampling of milk and milk products.   9. Semi-finished milk product samples analysis is carried out in accordance with KS ISO/TC 34/SC 5 milk and milk products |
| 1. Resource implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place   2. Access to relevant work environment   3. Resources relevant to the proposed activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * + Practical   + Project   + Portfolio of evidence   + Third party report   + Written tests   + Oral questioning |
| 1. Context of assessment | Competency may be assessed:   * Workplace * Simulated workplace * Workplace together with simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |