

**MINISTRY OF AGRICULTURE,
LIVESTOCK & FISHERIES**



SMALLHOLDER DAIRY COMMERCIALIZATION PROGRAMME

MODULE IV



**QUALITY ASSURANCE
GUIDE FOR MILK BARS**



This guide is intended to milk bars to procure, handle and market quality and safe milk and milk products that comply with regulatory and market requirements through the application of Quality Assurance Systems in milk marketing.

Like any other business, a milk bar operator should aim at meeting or surpassing their customers' expectations by providing high quality and safe milk and milk products.

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The programme covers nine counties namely Nakuru, Trans Nzoia, Uasin Gishu, Bomet, Nandi, Bungoma, Kakamega, Nyamira and Kisii. The goal of the programme is to increase the incomes of poor rural households that depend substantially on production and trade of dairy products for their livelihoods by

- Improving the financial returns of market oriented production and trade activities by small-scale operators, through improved information on market opportunities, increased productivity, cost reduction, value adding and more reliable trade relations
- Enabling more rural households to create employment through, and benefit from, expanded opportunities for market-oriented dairy activities, as a result of strengthened farmer organizations.

Through the facilitation of SDCP, Kenya Dairy Board (KDB), a statutory organization established by an Act of Parliament, the Dairy Industry Act Cap 336, and in partnership with the Kenya Industrial Research and Development Institute (KIRDI) and Dairy Training Institute (DTI) developed this guide to assist milk bar operators to establish and benefit from a Quality Assurance System.

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PREFACE

Kenya has a well-developed dairy industry with an estimated production of 5.2 billion litres of milk per year. This is derived from a dairy herd population of approximately 4.2 million improved dairy animals, 9 million zebus, 12 million goats, and 900,000 camels (Ministry of Agriculture, Livestock & Fisheries, 2016). Cattle account for approximately 88% of the production.

The dairy industry in Kenya contributes approximately 14% and 4.5% of the country's agricultural and National Gross Domestic Products (GDP) respectively. It also provides livelihoods for approximately 1.8 million smallholder dairy farmers. The dairy value chain creates approximately 750,000 direct jobs at milk production, transport, bulking, cooling, processing and marketing. The support service industry generates an additional 500,000 jobs.

A milk bar can be regarded as a retail outlet that sells milk and other dairy products to consumers. Small-scale processing including pasteurization of milk and value addition mainly of fermented milk is also undertaken. However, due to limitations of space, technology and skills, milk bar operators are best serviced by established milk processors who can supply bulk pasteurized milk and other processed dairy products.

The Kenya Dairy Board has an active licensee base of over 1,400 milk bars located mainly in the urban and peri urban areas. The requirements for licensing by the Board include hygienically constructed and designed premises, use of food grade milk handling equipment and utensils, hygienic milk handling personnel, adequate supply of potable water and other utilities, environmental hygiene and maintenance of quality records among others.

Adoption of Good Manufacturing Practices (GMP) and Quality Assurance Systems (QAS) in sourcing, handling and marketing of milk and milk products provides milk bar operators with the opportunity to enhance compliance to quality and safety requirements and also derive better income from the sale of milk.

The Government of Kenya has continued to support the development of the Kenyan dairy industry by creating a conducive policy and regulatory environment, investing in infrastructural development and capacity building of stakeholders among others. Standards for milk and milk products have also been developed to guide the industry towards compliance and enhanced market access.

IFAD has continued to be a key partner in the development of the Kenyan dairy industry. Their support and goodwill have contributed to increased productivity of milk, better organization and efficiency of stakeholders and increased value addition by the Kenyan dairy industry.

We hope that this guide will be of value to dairy farmers and other stakeholders in adopting best practices and QAS that will lead to improvement in the quality and safety of milk and milk products.

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ABBREVIATIONS

DTI	Dairy Training Institute
GDP	Gross Domestic Product
GOK	Government of Kenya
GMP	Good Manufacturing Practices
HACCP	Hazard Analysis Critical Control Points
IFAD	International Fund for Agricultural Development
KDB	Kenya Dairy Board
KIRDI	Kenya Industrial Research and Development Institute
MODE	Market Oriented Dairy Development
QA	Quality Assurance
QAM	Quality Assurance Manual
QAP	Quality Assurance Practices
QAS	Quality Assurance System
SDCP	Smallholder Dairy Commercialization Programme
SOP	Standard Operating Procedures

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CHAPTER 1: INTRODUCTION

1.1 Purpose

The purpose of this guide is to assist milk bar operators to procure, handle and retail pasteurized milk and other value added dairy products that comply with quality and safety regulatory and market requirements. These requirements include the physical, chemical and microbiological limits as provided by the relevant Kenyan standards including those for raw and pasteurized milk. Milk bars that undertake value addition of milk (e.g. yoghurt and cultured milk) are required to conform to the respective Kenyan standards.

The Kenya Dairy Board requires that milk bars sell pasteurized milk which can be sourced externally from licensed milk processors or pasteurized in-house. Where value addition is undertaken, necessary controls should be implemented to ensure production of high quality dairy products.

The Quality Assurance Framework provided in this guide will assist milk bar operators to establish hygienic milk handling practices, preventive and control mechanisms, self-assessment mechanisms and maintain proper quality records in their milk businesses.

1.2 Objectives

The guide will assist milk bar operators to handle and market quality and safe pasteurized milk and other value added products. It seeks to build the capacity of milk bar operators to;

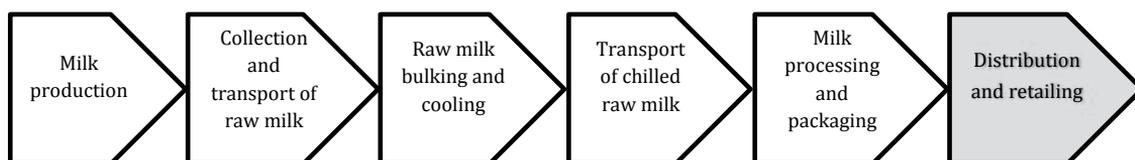
- (a) Identify the causes of poor quality milk
- (b) Identify the milk quality and safety requirements in milk handling and marketing

- (c) Identify for adoption best practices in milk handling and marketing
- (d) Determine and implement preventive and corrective actions for quality management
- (e) Establish and administer quality assurance self-assessment mechanisms
- (f) Undertake proper documentation of operations

1.3 Scope

This guide covers milk bar operations from procuring of pasteurized milk to handling, value addition and retail to consumers. Aspects related to good milk handling practices, personnel, equipment, containers, vessels, vehicles and records requirements are addressed where relevant to the quality and safety of milk.

Figure 1: The Dairy value chain



1.4 Structure

This guide is presented in four chapters covering the following in milk bar operations:

- (a) Introduction to Quality Assurance Systems
- (b) Quality and safety requirements in milk bar operations
- (c) Application of Quality Assurance in milk bar operations
- (d) Self-assessment guidelines to evaluate Quality Assurance practices

CHAPTER TWO: INTRODUCTION TO QUALITY ASSURANCE SYSTEMS IN MILK BAR OPERATIONS

2.1 What is quality?

Quality is the totality of features and characteristics of a product or service to satisfy the stipulated needs and requirements of the users.

Milk bars are an important outlet for milk and milk products for consumers. As such, they should comply with milk quality and safety requirements from procurement, handling and retail. Good practices to minimize contamination of the milk are required and should be implemented.

2.2 What is Quality Assurance?

Quality assurance (QA) is a management method that is defined as “all those planned and systematic actions needed to provide adequate confidence that a product, service or result will satisfy given requirements for quality and be fit for use” (ISO 1994).

In milk bar operations, quality assurance entails identification, implementation and documentation of relevant activities that will lead to procurement, handling and retail of quality and safe milk and milk products that comply with statutory and market requirements.

2.3 What is Quality Assurance System?

Quality Assurance System is a tool to help enterprises to operate more effectively and efficiently and comply with product or service specifications and requirements. They help to ensure that at every step of operation a minimum standard of defined quality is met for a product or service.

In milk bar operations, such a system will help in establishing methods, procedures and practices essential for assuring the quality of milk and milk products handled by the enterprise.

In practice, there are several types of QAS that are applicable in milk bar operations such as:

- ISO 9001 Quality Management System
- ISO 22000 Food Safety Management System
- Hazard Analysis Critical Control Points (HACCP)
- Good Agricultural Practises (GAP)
- Total Quality Management (TQM)

These systems have basic principles of Quality Assurance which include:

- Design and scope of the system
- Management commitment and responsibility
- Systematic analysis and systematic action
- Process approach
- Customer focus
- Record keeping and documentation
- Continious improvement

This guide has adopted these principles to present a simple QAS that can be adopted and implemented in operation of milk bars.

2.4 Components of a Quality Assurance System

The components of a QA system in milk bar operations can be grouped into three levels, namely;

- (a) The top level commitment by milk bar operator to meet statutory and market requirements in handling and marketing of milk and milk products.
- (b) The operational level which involves establishing, implementing and documenting methods and practices for assuring quality and safety of milk and milk products.

- (c) The assessment stage where the effectiveness of the QA system in meeting the desired goals is evaluated and remedial actions to improve the system instituted.

2.5 Steps in implementation of quality assurance systems

Generally, the implementation of a QA system in the food industry entails the following steps

- (a) Identification of the quality and safety goals of the product
- (b) Identification of the activities required to produce and meet the stated quality and safety goals of the product
- (c) Identification of the most likely problems that may occur and which may affect the quality and safety of the product
- (d) Establishment of preventive and control mechanisms to reduce the likelihood of the problem occurring
- (e) Identification and implementation of remedial actions to manage the problems if they occur
- (f) Establishment of documentation and records requirements
- (g) Identification and implementation of the assessment mechanism

2.6 Documentation requirements in a Quality Assurance System

Documentation is any written text document used to explain some attributes of an object, procedure or process. Documentation is an essential part of the QAS system. It provides the control measures and actions that need to be implemented and also documents the various activities undertaken in the production of a good or service, their inter-relationship, characteristics and operating parameters.

The documents required in a QAS are summarized in figure 2 below

Figure 2: Documents required in a QAS



(a) The Quality Assurance Manual (QAM):

Is the first level of documentation in a Quality Assurance System. The QAM clearly identifies the product being provided under the QAS and provides an understanding of the processes affecting quality of the product.

The manual also describes:

- The business
- The scope of the QAS
- The quality policies of the business which shows its commitment to provide quality products
- The product and its specifications
- The processes involved in the production of the product

The QAM for a milk bar will among other things provide a brief profile of the business, the commodity addressed (pasteurized milk and other value added dairy products), the product quality objectives (which is to procure, handle and retail quality and safe

milk and milk products that comply with regulatory and market requirements).

(b) Quality Assurance Procedures:

Quality Assurance Procedures (QAP) are vital in quality management system. They establish processes that identify the activity, establish what to look for in that activity based on a certain reference, acceptance criteria and the records to keep. They are simplified step-by-step sequence of activities or course of action that must be followed in the same order to correctly perform a task

In a milk bar, QAP are required for the following actions among others;

- Sourcing and handling of milk
- Cleaning and sanitization programs
- Control of non-conforming products
- Control of records

(c) Standard operating procedure (SOP):

Are step-by-step instructions compiled to help workers carry out routine operations. SOPs aim to achieve efficiency, quality output and uniformity of performance. SOP's in a milk bar ensure personnel follow the correct procedures in handling of milk and milk products and cover the following activities among others

- Milk sampling and testing
- Cleaning of cans, containers and equipments
- Value addition procedures

(d) Quality Records:

Are the documented evidences that processes are executed according to the QA plan and requirements. Such records in a milk bar include:

- Milk test results
- Cleaning and sanitization records
- Customer complaints
- Approved supplier records
- Staff training records
- Equipment maintenance and calibration records

Figure 3: Benefits of record keeping



Records in a milk bar are important for the following reasons

- Accountability of operations
- Compliance with legislative requirements
- Quality improvement
- Management planning and decision making
- Communication to stakeholders

2.7 Importance of QA systems in milk bar operations

A well designed and implemented QA system in a milk bar will have the following benefits:

- (a) Increase confidence of customers on the quality and safety of the product
- (b) Establish reliable and premium markets that facilitate value addition of high quality milk and milk products
- (c) Protect consumers from possible hazards or risks associated with poor milk handling practices including adulteration with water and other prohibited substances
- (d) Demonstrates management commitment to handle and market quality and safe milk and milk products that meets consumer requirements
- (h) Reduces post-harvest losses of milk and milk products resulting from spoilage and rejections by consumers

- (i) Establish traceability mechanism for the product where necessary
- (j) Overall contributes to increased operational efficiency and profitability of the enterprise

CHAPTER THREE: QUALITY AND SAFETY REQUIREMENTS IN MILK BAR OPERATIONS

3.1 Quality and safety objectives in milk bar operations

The objective of a milk bar is to procure, handle and retail quality and safe milk and milk products to the market. This refers to milk and milk products processed from milk that has been produced from healthy animals and handled under hygienic conditions.

Quality and safe milk is:

- (a) Wholesome, has no added water, preservatives, or other added substances, and no proportion of a natural constituent has been removed
- (b) Free of extraneous matters like dust, dirt, flies and manure.
- (c) Has a normal composition, possesses a natural milk sensory attributes such as flavor and color and is low in bacteria counts
- (d) Is free from hazardous residues such as toxins and veterinary drugs and chemical contaminants
- (e) Has a high keeping quality
- (f) Has a high commercial value

The safe handling of milk and milk products is based universally on the following two principles:

- (a) Avoiding or minimizing contamination at the various stages of milk handling
- (b) Reducing the growth and activity of the micro-organisms in the milk.

3.2 Regulatory requirements for milk bars

The requirements for operating a milk bar are stipulated in various Kenyan food legislations which include:

I. Laws and regulations

- (a) Public Health Act Cap 242
- (b) Dairy industry Act Cap 336
- (c) Food, Drugs and Chemical Substances Act Cap 254
- (d) Standards Act Cap 496

II. Standards and codes of practice

Of relevance to milk bars are the following Kenyan standards and code:

- (a) Raw cow milk specifications - KS EAS 67:2007
- (b) Pasteurized milk specifications – KS EAS 69:2007
- (c) Specification for yoghurt – KS EAS 33:2007
- (d) Specifications for cultured milk – KS 941:1993
- (e) Standard specifications for drinking (potable water) - KS EAS 12
- (f) Code of hygienic practice for milk and milk products - KS 1552: 2015
- (g) Relevant international standards such as CODEX standards

In general, the above laws, regulations and standards require milk bars to observe or comply with the following requirements:

(a) Hygienic milk handling

Milk should be handled and retailed under conditions that minimize contamination from the environment, personnel, vehicle, equipment, containers and related facilities among others.

(b) Certification of milk handlers

Milk handling personnel should observe good personal hygiene that minimizes the likelihood of contaminating the milk. They should be free from communicable diseases and medically certified. The milk handlers should undergo some basic training on milk testing and hygienic milk handling. They should be provided with appropriate protective attire and sanitary facilities.

Figure 4: Diseases that can be transmitted from milk handlers through milk



Milk handlers can contaminate milk with pathogenic micro-organisms which cause the following diseases in humans

- Typhoid fever
- Hepatitis
- Diarrhea

(c) Compliance to product specifications

Milk bars generally handle four types of products, namely raw milk, pasteurized milk, yoghurt and cultured milk. The Kenyan standards provide the specifications for these products as summarized below;

- i. **Raw milk:** Raw milk is the normal, clean and fresh secretion extracted from the udder of a healthy cow, properly fed and kept, but excluding that got during the first seven days after calving. It should not contain added water, preservatives, or other added substances, nor should any proportion of a natural constituent be removed.

Raw milk should comply with the following among others (it should be noted that standards are dynamic and may change from time to time. Milk dealers are advised to keep abreast with revisions of the relevant standards).

- Minimum of 3.25 % milk fat and 8.50 % milk solids not fat.
- Density at 20 °C shall be within the range of 1.028 g/ml – 1.036 g/ml
- Low bacterial counts not exceeding 2,000,000 CFU/ml
- Low coliform counts not exceeding 50,000 cfu/ml
- Low somatic cell count not exceeding 300 000 per ml
- Be free from pesticides and veterinary drugs residues
- Be free from toxins e.g. aflatoxin M1

In addition, the raw milk should:

- Have a characteristic creamy – white color, free from off flavors and taints
 - Be free of objectionable matter
 - Not coagulate in the clot on boiling test
 - Test negative to the alcohol test
 - Test negative for presence of hydrogen peroxide
- ii. **Pasteurized milk:** Pasteurization is a heat treatment process applied to milk with the objective of eliminating possible health hazards arising from pathogenic micro-organisms which is consistent with minimal chemical, physical and organoleptic changes in the milk. Pasteurization is a temperature-time combination process. The heat treatment can either be batch at 65 °C for 30 minutes or High Temperature Short Term (HTST) at 73 °C for 16 seconds.

Pasteurized milk should comply with the following specifications among others

- Density at 20 °C should be within the range of 1.028 g/ml – 1.036 g/ml
- Low bacterial counts not exceeding 30,000 CFU/ml
- Low coliform counts not exceeding 10 cfu/ml
- Be free from pesticides and veterinary drugs residues
- Be free from toxins e.g. aflatoxin M1
- Shall test negative for alkaline phosphatase enzyme

iii. **Yoghurt and cultured milk:** Yoghurt and cultured milk (mala) are fermented milk products obtained by lactic acid fermentation using selected strains of lactic acid bacteria. Yoghurt is attained through the action of *Lactobacillus bulgaricus* and *Streptococcus thermophilus* while cultured milk is derived from the action of mesophilic starter cultures.

Yoghurt should comply with the following specifications among others

- Free of pathogenic micro-organisms such as *Escherichia coli*, *Salmonella species* and *Staphylococcus aureus*
- Low counts of molds and yeasts not exceeding 10 per ml
- Be free from pesticides and veterinary drugs residues
- Be free from toxins e.g. aflatoxin M1
- Use of approved food grade additives at the recommended levels. These include colors, flavors, emulsifiers and stabilizers

(d) Licensing of milk bars

Milk bars are required to obtain licenses and permits from the relevant authorities before commencement of business such as a Milk Bar license and Food Hygiene license issued by Kenya Dairy Board and Public Health Department respectively.

Figure 5: Importance of licensing of milk bars



Why registration and licensing?

- For compliance
- Facilitates periodic inspection of production facility
- For traceability of products
- For certification of products
- Builds consumer confidence in product

CHAPTER FOUR: IMPLEMENTATION OF QUALITY ASSURANCE IN MILK BAR OPERATIONS

4.1 Background

The quality and safety of milk and milk products handled by milk bars is influenced by many factors including the environment, storage temperatures, personnel, equipment, containers, utensils, cleaning and sanitization procedures and time taken to retail the milk among others.

Milk and milk products should be handled under conditions that minimize microbial growth and other forms of contamination. This includes minimizing exposure to dust, dirt, flies, rodents and insects.

The design and layout of the milk bar should minimize potential contamination of the products. The design and layout should provide for;

- (a) Adequate lighting and ventilation
- (b) Separation of working areas to prevent cross-contamination
- (c) Adequate working space for hygienic operations
- (d) Drainage and disposal of waste and effluent
- (e) Impervious and easy to clean floors and walls
- (f) Utilities including potable water and power
- (g) Hand washing and other sanitary facilities
- (h) Storage and value addition equipment
- (i) Hand washing and sanitizing facilities

Training of personnel handling milk and milk products in a milk bar is key in developing the necessary skills to support the implementation of a Quality Assurance System.

Adoption of a robust Quality Assurance System will therefore focus on the entire milk bar operations which can be categorized into three broad stages:

- (a) Preparatory stage
- (b) Procurement and value addition of milk
- (c) Retailing

In each of the three stages, the following Quality Assurance Practises are recommended.

4.2 Preparatory stage

Milk bars should adequately prepare the required equipments, containers, personnel, testing equipments and reagents and records among others before procurement of milk. It is important that the milk testing equipment is calibrated as required and the reagents standardized for accuracy of test results.

The personnel involved in milk grading and handling should be trained and equipped with the appropriate work attire to minimize chances of contaminating the milk.

The water used to clean equipments, containers and facilities should be adequate and meet the requirements for potable water. The choice of the cleaning and sanitizing agent and the cleaning program should be well considered to eliminate possibility of residues which may contaminate the product and render it unwholesome.

Table 1: Recommended QA practices in preparatory stage of milk bar operations

Factors to consider	Risk element	Requirements	Monitoring mechanism	Remedial action if requirement are not met	Records
1 Premise	Contamination of milk	Premise should be located away from sources of contamination	Physical inspection	Take appropriate action to manage the source of contamination Relocate the premise	
		The floors, walls and ceilings should be impervious, easy to clean and sanitize	Physical inspection	Renovate as required	Renovation records
		The premise has adequate and protected lighting and ventilation	Physical inspection	Provide adequate lighting Renovate as required	Renovation records
		Premise has adequate hand washing and sanitization facilities	Physical inspection	Installation of required amenities Provide consumables such as soap and sanitizers	
		Adequate and clean toilet and sanitary facilities should be provided	Physical inspection	Provide adequate facilities as required	Cleaning schedule
		Premise should be designed to prevent cross contamination of milk	Physical inspection of premises	Control of human movement Separation of high risk areas	
2 Equipment and containers	Contamination of the milk	Surfaces of milk containers intended to come into contact with milk should be easy to clean and disinfect, corrosion resistant and not capable of transferring harmful substances to the milk	Physical inspection of equipment and containers Rinse and swab tests of product contact surfaces	Repair or replace affected equipment and containers	Maintenance records Rinse and swab test results

Factors to consider	Risk element	Requirements	Monitoring mechanism	Remedial action if requirement are not met	Records
		The layout of the equipment should allow for adequate cleaning and prevent cross contamination	Physical inspection	Re-design the layout	
3 Cleaning and sanitization programs	Contamination of the milk	The cleaning and disinfecting agents should be effective, safe and easily rinsed.	Physical inspection Rinse and swab tests of product contact surfaces	Replace reagents Review cleaning and sanitization program	Cleaning schedule Rinse and swab test results
		Immediate cleaning and disinfection of the equipment and containers after use	Physical inspection	Develop Standard Operating Procedures for cleaning of equipment and containers Provide cleaning and disinfection facilities	Standard Operating Procedures for cleaning of equipments and containers
4 Personnel	Contagious diseases	Milk handlers should be free of contagious or infectious diseases which may be transferred through the milk or affect the quality and safety of the milk	Physical inspection of milking personnel Medical examination by a certified medical examiner	Relieve infected personnel from milk handling duties	Valid medical certificates
	Contamination of the milk	Milk handling personnel should observe personal hygiene, wear suitable protective attire and avoid undesirable behavior during milk handling	Physical inspection of milk handling personnel	Develop and implement personal hygiene rules for milk handlers Relieve affected milk handlers from milk handling duties Train and sensitize personnel on hygiene Provide adequate and appropriate attire and sanitary facilities	Personal hygiene rules for milk handlers
5 Water	Contamination	Provide adequate	Physical	Procure water from	Water

Factors to consider	Risk element	Requirements	Monitoring mechanism	Remedial action if requirement are not met	Records
	of the milk	and clean potable water for cleaning of equipments, facilities, utensils and containers	inspection of water sources Routine testing water for quality	certified sources Water treatment Protect water sources from possible contamination	procurement records Water treatment records Results of water quality tests
6 Waste management	Contamination of milk and milk products and spread of contagious and infectious diseases	Liquid and solid waste should be disposed in accordance with the relevant regulations	Physical inspection	Comply with the relevant regulations	Waste treatment and disposal records
		Ensure solid and liquid waste does not harbor flies, insects and other rodents	Physical inspection	Provide solid waste disposal facilities	

Figure 6: Personal hygiene tips for milk handlers



Milk handling personnel should maintain high degree of personal hygiene and be equipped with appropriate work attire. They should:

- Wear neat and clean protective attire
- Wear clean safety boots
- Avoid wearing wrist watches, rings, earring, necklace or chain
- Hair should be trimmed and tucked inside the cap
- Cover all open wounds

4.3 Procurement and value addition of milk

Milk bars are generally small-scale milk businesses handling between 50 to 200 litres of milk per day. They are required to retail quality and safe processed milk and milk products to consumers. The technology applied at this level is simple and small-scale in nature and therefore require a lot of controls to assure delivery of quality and safe products. Sourcing of processed milk and milk products from established and licensed milk processing plants with effective QAS offers a reliable and stable supply of quality milk.

Every milk bar should be adequately equipped to test or confirm the quality of incoming milk at point of delivery to quickly determine the suitability of the milk for value addition and retailing. The tests include the assessment of the extent of abnormalities and adulteration in the milk including water, preservatives or inhibitory substances. Building strong relationships with established processors of milk and milk products is recommended and a good

Quality Assurance Practice. Delivery of milk from such processors should be accompanied by quality analysis results especially where the milk bar has limited capacity to conduct internal tests.

Where value addition is done, milk bars should have the right equipment, personnel and systems to produce quality and safe milk and milk products. Hazard Analysis Critical Control Points (HACCP) based approaches and Good Manufacturing Practices in production should be adopted. Such premises should have capacity to conduct compliance tests either internally or externally during production and on the finished products.

Figure 7: Recommended tests on milk and milk products by milk bars



Milk bars should be equipped to test for the quality of milk and milk products. It is very important that the sampling of milk is done correctly and hygienically to ensure that sample is representative of the bulk milk. Common platform tests to be conducted by milk bars are:

- Organoleptic test
- Density (lactometer) tests
- Alcohol test
- Testing for the efficiency of pasteurization using rapid test methods
- Testing for preservatives, contaminants and residues in milk. Rapid testing kits can be used for this purpose.

Table 2: Procurement and value addition of milk

Factors to consider	Risk element	Requirements	Monitoring mechanism	Remedial action if requirements are not met	Records
1 Procurement of milk	Poor quality milk	Milk should be wholesome and should not contain added water, preservatives, or other added substances as provided by the relevant standards	Testing of the milk including <ul style="list-style-type: none"> - Organoleptic test - Density test - Alcohol test - Peroxidase test - Titratable acidity - Tests for preservatives and antibiotics - Phosphatase test 	Rejection of poor quality milk Follow-up with supplier of milk Identify reliable suppliers	Milk test records Milk supply and rejection records
2 Value addition	Contamination of the milk	Raw materials should comply to specifications as provided by the relevant standards	Testing of raw materials	Develop specifications for raw materials Reject poor quality raw materials Source raw materials from certified suppliers	Specifications for raw materials Raw material test records Raw material procurement records
		Process controls should be in place to assure quality and safety of products	Temperature and time combinations of milk value addition processes Milk quality tests during value addition	Calibration of temperature and time recording devices Monitoring of temperature and time combinations Repair or replace faulty equipment Reprocessing of the milk where applicable Rejection of poor quality milk products	Calibration records Temperature control records Maintenance records Product quality test results

Factors to consider	Risk element	Requirements	Monitoring mechanism	Remedial action if requirements are not met	Records
		Products should conform to product specifications	Testing during and at the end of production	Dispose poor quality products Process audit to identify preventive and corrective actions	Products disposal records

Table 3: Tests commonly conducted in a milk bar

Type of test	Procedure	Judgement
(a) Organoleptic test Permits rapid segregation of poor quality milk. No equipment is required, but a good sense of sight, smell and taste.	<ul style="list-style-type: none"> - Open a can of milk - Immediately smell the milk - Observe the appearance of the milk - Inspect the can and lid for cleanliness 	Discard milk that has abnormal smell and has visible dirt
(b) The Lactometer test Milk has a specific gravity. When its adulterated with water or solids density of milk changes from its normal value to abnormal.	<ul style="list-style-type: none"> - Mix the milk sample gently and pour it gently into a measuring cylinder - Let the Lactometer sink slowly into the milk. - Read and record the last lactometer degree (°L) just above the surface of the milk. - If the temperature of the milk is different from the calibration temperature of the lactometer (usually 20 degrees centigrade), calculate the temperature correction - For each degree centigrade above the calibration temperature add 0.2°L; for each degree centigrade below calibration temperature subtract 0.2 °L from the recorded lactometer reading 	Discard milk that has a density below 1.028g/ml and that above 1.036g/ml
(c) The Alcohol Test The test is quick and simple. It is based on instability of the milk proteins	<ul style="list-style-type: none"> - Mix equal amounts of milk and 68% of ethanol solution in a small bottle or test tube. - Observe the milk for coagulation 	If milk is of good quality, there will be no coagulation, clotting or precipitation,
(d) Titratable acidity	<ul style="list-style-type: none"> - Pipette 9 ml of sample into 	Divide the reading by

Type of test	Procedure	Judgement
The titratable acidity test is used for quantifying the acidity in milk. This test should be used for samples from milks, which are suspected to be sour according to results of alcohol and/or clot-on boiling tests.	<p>the porcelain dish.</p> <ul style="list-style-type: none"> - Add 3 drops of phenolphthalein indicator the milk in the dish - Add carefully drop by drop NaOH solution from the burette to the milk in the dish and agitate carefully until a pink colour appears. - Read off from the column of the burette the volume of 0.1 N NaOH solution consumed. 	10 to get the % of lactic acid in the milk. Reject milk with an acidity of more than 0.16%.

4.4 Retailing of milk and milk products

Upon procurement and value addition, the milk and milk products are ready for retail to consumers. The products should be kept under conditions that do not compromise their integrity. These include storage under recommended temperatures and time combinations.

A lot of care and good hygienic practices are required as the products are mostly in bulk and can easily be contaminated during transfer to retail containers. The milk bar should provide or require customers to have appropriate and clean containers.

Personnel handling milk should observe high degree of personnel hygiene and undergo routine medical examination.

Table 4: Recommended QA practices at milk reception, bulking and cooling stage

Factors to consider	Risk element	Requirements	Monitoring mechanism	Remedial action if requirements are not met	Records
1. Storage of product before retailing	Contamination of milk	The product should be stored under recommended conditions of hygiene and temperature	<p>Physical inspection of storage conditions</p> <p>Monitoring of temperature</p>	<p>Adjust temperatures settings accordingly</p> <p>Routine cleaning and disinfection of storage facilities including refrigerators and</p>	<p>Temperature monitoring records</p> <p>Cleaning schedule</p>

Factors to consider	Risk element	Requirements	Monitoring mechanism	Remedial action if requirements are not met	Records
				<p>deep freezers</p> <p>Control of flies, insects and rodents</p>	
2. Transfer of milk to retail containers	Contamination of the milk	The vessel used to measure and transfer milk should be clean and made of food grade material	Physical inspection	<p>Clean and disinfect the milk transfer vessel</p> <p>Store the milk transfer vessel under hygienic conditions when not in use</p> <p>Replace with a food grade vessel</p>	
		Retail container should be clean and made of food grade material	Physical inspection	<p>Clean and disinfect the retail container</p> <p>Replace with a food grade vessel</p>	

CHAPTER FIVE: SELF-ASSESSMENT GUIDELINES FOR MILK BARS

In order to evaluate whether the quality assurance system in milk bars is effectively in place and working as desired, it is critical to routinely conduct a self-assessment.

Self-assessment is a rapid tool for internal appraisal that can give reliable results on the level of achievement of the Quality Assurance System in place. This evaluation will also provide a framework and input to regulatory surveillance and support. It also provides a mechanism for continuous improvement of the Quality Assurance System.

The tool promotes confidence build up for market access and elevates the profile of the milk bar as a reliable source of quality and safe milk and milk products.

This can be done using a simple checklist as recommended below.

Table 5: Self-assessment guideline for milk bars

Consideration	Requirements	Assessment criteria	Requirements met?	
			Yes	No
1. Preparatory stage of milk bar operations				
Premise	Premise is located away from sources of contamination	Physical inspection		
	The floors, walls and ceilings are impervious, easy to clean and sanitize	Physical inspection		
	The premise has adequate and protected lighting and ventilation	Physical inspection		
	Premise has adequate hand washing and sanitization facilities	Physical inspection		
	Premise has adequate and clean toilet and sanitary facilities	Physical inspection		

Consideration	Requirements	Assessment criteria	Requirements met?	
			Yes	No
	Premise is designed to prevent cross contamination of milk	Physical inspection		
Equipment and containers	Surfaces of milk containers intended to come in contact with milk are easy to clean and disinfect, corrosion resistant and not capable of transferring harmful substances to the milk	Physical inspection Rinse and swab tests on product contact surfaces are routinely conducted		
	The layout of the equipment should allow for adequate cleaning and prevent cross contamination	Physical inspection		
Cleaning and sanitation programme	The cleaning and disinfecting agents are effective, safe and easily rinsed.	Physical inspection		
		Rinse and swab tests of product contact surfaces are routinely conducted		
	Immediate cleaning and disinfection of the equipment and containers after use	Physical inspection		
Personnel	Milk handlers are free of contagious or infectious diseases which may be transferred through the milk or affect the quality and safety of the milk	Physical inspection of milk handlers		
		Medical examination by a certified medical examiner		
	Milk handling personnel observe personal hygiene, wear suitable protective attire and avoid undesirable behavior during milk handling	Physical inspection		
Water	Adequate and clean potable water for cleaning of equipments, facilities, utensils and containers is available	Physical inspection		
		Water quality tests are routinely conducted		
Waste management	Liquid and solid waste is disposed in accordance with the relevant regulations	Physical inspection		

Consideration	Requirements	Assessment criteria	Requirements met?	
			Yes	No
	Solid and liquid waste does not harbor flies, insects and other rodents	Physical inspection		
	Ensure solid and liquid waste does not harbor flies, insects and other rodents	Physical inspection		
2. Procurement and value addition				
Procurement of milk	Milk is wholesome and does not contain added water, preservatives, or other added substances as provided by the relevant standards	Testing of the milk for wholesomeness routinely conducted		
Value addition	Raw materials comply to specifications as provided by the relevant standards	Testing of raw materials		
	Process controls are in place to assure quality and safety of products	Recommended temperature and time combinations observed		
	Products conform to product specifications	Testing during and at the end of production conducted		
3. Retailing				
Storage of product before retailing	The product is stored under recommended conditions of hygiene and temperature	Physical inspection		
		Monitoring of storage temperatures and time		
Transfer of the milk to retail containers	The vessel used to measure and transfer milk is clean and made of food grade material	Physical inspection		
	Retail containers are clean and made of food grade material	Physical inspection		
4. Customer feedback				
Handling of customer feedback and complaints	There is a mechanism to receive and respond to customer complaints or feedback	Physical verification		

Consideration	Requirements	Assessment criteria	Requirements met?	
			Yes	No
	Customer complaints are addressed on time	Physical verification		

SAMPLE RECORDS

Equipment maintenance schedule

Name of the farm _____ Date: _____ Prepared by: _____ Submitted by: _____ Approved by: _____							
Equipment No.	Task description	Task duration	Due date	Target date	Resource name	Person responsible	Predecessor

Cleaning schedule

Section	Frequency	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Responsible	Remarks

REFERENCES

- (a) Public Health Act Cap 242, laws of Kenya
- (b) Food, Drugs and Chemical Substances Act Cap 254, laws of Kenya
- (c) Dairy Industry Act Cap 336, laws of Kenya
- (d) Draft Dairy Regulations 2017
- (e) Standards Act Cap 496, laws of Kenya
- (f) Kenyan Specifications for raw cow milk, KS EAS 67:2007
- (g) Code of hygienic practice for milk and milk products
- (h) FAO and IDF, 2011. Guide to good dairy farming practice
- (i) Ministry of Livestock Development, 2012. Dairy Farmers Training Manual
- (j) FAO. Milk processing Guide Series, Volume 2
- (k) Tetra Pak, 1995 : Dairy Processing Handbook

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Ministry of Agriculture
Livestock and Fisheries



Investing in rural people



Smallholder Dairy Commercialization Programme (SDCP) is a jointly funded programme by the Government of the Republic of Kenya (GOK) and the International Fund for Agricultural Development (IFAD) and beneficiary communities.

The Overall goal of the programme is to increase the income of poor rural households that depend substantially on production and trade of dairy products for their livelihood.