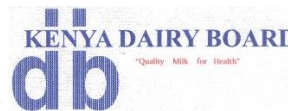


# Situational analysis of safety of animal-source foods, fruits and vegetables in Kenya

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# **EXECUTIVE SUMMARY**

Food safety is the assurance that any kind of food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use. Mycotoxins, pesticide, foodborne bacteria, and drug residue are some examples of harmful elements that can contaminate food. Importantly, hygiene and sanitation in the production of food is equally critical in maintaining food quality and safety. The components of food safety are quality safety culture, compliance, and traceability and food safety management systems.

In Kenya, the food safety control system is multi-sectorial in approach and is embodied in various statutes implemented by various agencies under different ministries and using several laws. However, the coordination mechanism among these institutions is currently inadequate because of the overlapping roles, gaps in policy and legislative frameworks, and inadequate coordination in the enforcement due to unclearly understood mandates in the operations of the food control system. This has created inefficiencies in the national and county food safety control system resulting in recurrence of food safety-related hazards and other undesirable consequences.

The overall objective of this food safety situational analysis is to understand the present food safety situation of animal source foods, fruits, and vegetables in order to improve it.

The analysis covered the whole country. The analysis involved both secondary and primary data. The principal sources of data were the Ministry of Public Health and Sanitation, Directorate of Veterinary Services, University of Nairobi, Kenya Plant Health Inspectorate Service, Kenya Meat Commission, student theses, newspaper archives, and studies on the national burden of foodborne disease.

The analysis reports highlighted the roles played by the key stakeholders and legislation under which they operate to ensure food safety and quality from “farm to fork” in Kenya. The situational analysis addresses the Kenya Food Safety Control System (FSCS), laws and regulations in food safety, and major food safety problems in the country.

## ACRONYMNS

AFA	Agriculture and Food Authority
AgCK	Agriculture Council of Kenya
AFIPEK	Kenya Fish Processors and Exporters Association
AHITI	Animal Health and Industry Training Institute
AIN	Agricultural Industrial Network
AMR	antimicrobial resistance
ASAL	arid and semi-arid lands
ASF	animal source foods
BDS	business development services
BSE	Bovine Spongiform Encephalopathy
CAC	Codex Alimentarius Commission
CDC	Centers for Disease Control and Prevention
CIN	Consumer Information Network
DALY	disability-adjusted life year
DVS	Directorate of Veterinary Services
FAO	Food and Agriculture Organization
FBD	foodborne disease
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
FPEAK	Fresh Produce Exporters Association of Kenya
GAHP	Good Agricultural and Hygiene Practices
GAP	Good Agricultural Practices
GDP	good distribution practices
GDP	gross domestic product
GMO	genetically modified organism
GMP	Good Manufacturing Practices
GoK	Government of Kenya
HACCP	Hazard Analysis Critical Control Point
HCDA	Horticultural Crops Development Authority
HPAI	Highly Pathogenic Avian Influenza
ICRAF	World Agroforestry
ILRI	International Livestock Research Institute
IPPC	International Plant Protection Convention

ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KAAA	Kenya Agri-business and Agro Industry Alliance
KALRO	Kenya Agricultural and Livestock Research Organization
KAM	Kenya Association of Manufacturers
KARI	Kenya Agricultural Research Institute
KDB	Kenya Dairy Board
KDPA	Kenya Dairy Processors Association
KDSCP	Kenya Dairy Sector Competitive Project
KEBS	Kenya Bureau of Standards
KEMRI	Kenya Medical Research Institute
KEPHIS	Kenya Plant Health Inspectorate Service
KEPSA	Kenya Private Sector Alliance
KMC	Kenya Meat Commission
KMFRI	Kenya Marine and Fisheries Research Institute
KNBS	Kenya National Bureau of Statistics
KNCCI	Kenya National Chamber of Commerce and Industry
KOFA	Kenya Organic Farmers Association
LMIC	low- and middle-income countries
MOH	Ministry of Health (Kenya)
NBA	National Biosafety Authority
NCST	National Council for Science and Technology
NFSCC	National Food Safety Coordination Committee
PCPB	Pest Control Products Board
PVOC	Pre-Export Verification of Conformity
RETRAK	Retail Trade Association of Kenya
SCAO	sub-county agricultural officers
VMD	Veterinary Medicine Directorate

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## Definitions/Glossary

Contaminant	Any biological or chemical agent, foreign matter, or other substances not intentionally added to food that may compromise food safety or suitability
Feed	Any single or multiple material, whether processed, semi-processed, or raw, that is intended to be fed directly to food-producing animals
Food	Any substance, whether processed, semi-processed, or raw, that is intended for human consumption and includes any substance that has been used in the manufacture, preparation, or treatment of "food" that eventually becomes part of the food but does not include cosmetics or tobacco or substances used only as drugs
Food handler	Any person who directly handles food, food equipment and utensils, or food contact surfaces and it therefore expected to comply with food hygiene requirements
Food hygiene	All conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain
Food premises	Any facility, whether stationary or moveable, where food is processed, prepared, packaged, stored, served, or sold. Typical premises will include food factories, kitchens, canteens and catering operations, restaurants, and fast-food establishments.
Food safety	All measures to ensure that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use
Foodborne disease	A general term used to describe any disease or illness resulting from eating contaminated food or drink
Hazard	Anything microbiological, chemical, or physical that can cause harm to a consumer. A microbiological hazard means the unacceptable contamination,



growth, or survival of a pathogenic microorganism, and/or the unacceptable production or persistence in food or a microbiological toxin.

Risk analysis	A process consisting of three components: risk assessment, risk management, and risk communication
Risk	The probability of an illness as a result of a hazard occurring in a food. Although a pathogen may represent a serious hazard, if it is unlikely to occur in a food (or at low numbers), then the risk to the consumer is very small. The risk to consumers is also influenced by the dose, so the more consumed, the more likelihood of a health hazard.
Street-vended food/street food	Foods prepared and/or sold by vendors in streets and other public places for immediate consumption or consumption at a later time without further processing or preparation. This definition includes fresh fruits and vegetables that are sold outside authorized markets for immediate consumption.
Unsafe food	Food that has the potential to cause injury or harm to health due to the presence of physical, chemical, or microbiological hazards
Food system	A setup composed of different actors in the food value chain, all of whom have different roles to play to ensure food is safe

# 1 Background

Food is central to any society as it has cultural, economic, social, and psychological significance. Access to sufficient amounts of safe and nutritious food is key to sustaining life and promoting good health. Global concerns about food safety are rising as unintended effects of food consumption continue to rise. Unsafe food is a threat to food and nutrition security and an impediment to national development. Unsafe food containing harmful bacteria, viruses, parasites, or chemical substances from biological, physical, or chemical contamination, causes more than 200 diseases. Globally, an estimated 600 million (almost 1 in 10 people in the world) fall ill, and 420,000 die every year as a result of consuming unsafe food (WHO, 2019). Unsafe food accounted for more than 33 million disability-adjusted life years (DALYs) in 2010. The economies of low- and middle-income countries (LMIC) economies lose about US \$95 billion annually in productivity (Fang & Cao, 2014); (FAO, 2019).

The real tragedy of food safety is in the developing countries, where foodborne diseases and non-communicable diseases are on the rise. In Africa, overall, the proportion of food sold through modern formal retail (supermarkets and convenience chain stores) is still low, even in cities (Grace, 2015). Informal or traditional food markets sell both perishables and dry products, and often both live and slaughtered animals. Many do comply, or try to comply, with government regulations when these are available and known, but most lack effective food safety management systems and are unregistered, hence the term “informal.” Urban consumers get their products from many different outlets and the food value chains are often complex (Kiambi et al., 2018)

Recent studies have shown that developing country consumers are concerned about foodborne diseases (FBDs), that most of the known burden of FBD comes from biological hazards, and that most FBD is the result of consumption of fresh and perishable foods. FBD is likely to increase in LMIC as the result of massive increases in the consumption of risky foods (livestock and fish products and produce) and lengthening and broadening value chains (Grace et al., 2020).

According to the classification of world economies, Kenya is a LMIC, with a human population of about 47 million, and 42% living below the poverty line (KNBS, 2019). Kenya National Bureau of Statistics (KNBS, 2019) estimates that 50.6% of the population lack access to adequate food and even the little they get is of poor nutritional value and quality.

Agriculture is still the cornerstone of the national economy, contributing directly to about 26% of the gross domestic product (GDP), 60% of the export earnings, providing nourishment to the population, and employing nearly 75% of the population, with the majority in the rural areas (National Livestock policy revised 2014; (Kenya Meat Trust, 2019). The livestock sector contributes about 12% of the national GDP, 40% of the agricultural GDP, and employs 50% of the agricultural labor force (FAO, 2017).

Sporadic cases of foodborne illnesses and zoonosis have been reported over time. The most recent is the outbreak of Rift Valley Fever in 2017, which caused 199 confirmed animal cases, 21 human cases, 11 human mortalities, and a loss of close to KSh 4 billion to the economy (Africa CDC, 2017). The numbers of cholera and typhoid cases are routinely encountered and reported. Besides pathogens and misuse of antimicrobial drugs, illegal use of food additives has been reported as a threat to food safety in Kenya. The routine acute food shortages in some parts of Kenya have negatively impacted food safety status of the affected communities (Government of Kenya, 2017).

Though a fairly strong regulatory framework on plant and animal health, safety, and quality of food and feed exists in Kenya, the country is still faced with foodborne-related threats. The main challenge facing the food control system is that the country rarely undertakes well-structured risk assessments and enforcement of laws and regulations is weak.

The threat of foodborne diseases is the main cause of loss of consumer confidence in the food safety management system. There have been cases of prevalence of foodborne illnesses. Foodborne diseases remain a problem in Kenya with more than 70% of all episodes of diarrhea being attributed to ingestion of contaminated food and water. The most prevalent diseases are typhoid, dysentery, and gastroenteritis. Others include aflatoxin poisoning, brucellosis, and cholera. Generally, attention given to foodborne illnesses is reactive rather than proactive. This has led to recurrence of foodborne illnesses negatively impacting public health and food/feed trade. In addition, available statistics are not well documented and processed for use in decision making.

Increased urban population in Kenya has contributed to an increase in street-vended, ready-to-eat, and convenience foods as well as urban and peri-urban farming. This has exerted pressure on the provision of services, including safe water and sanitation, posing a risk to public health.

The objective of this report is to evaluate the food safety of animal source foods (ASF), fruits, and vegetables in Kenya. Attempts will be made to understand who the players are, policy environment, food safety issues in the products value chain, and the challenges facing food safety in Kenya. This situational analysis assesses and documents implementation of key components of the food safety

management system in the country, identifying strengths, weaknesses, and challenges of the system, as well as opportunities for improvement. The analysis also identifies major food safety risks that occur in the country, frequency of occurrence, and their impact on public health and market access. Additionally, the analysis documents the legal framework supporting implementation of the food safety management systems and how effective and responsive they are to food safety challenges, institutions involved, their mandates and capacity (skilled human resource and laboratory capacity), capacity-building efforts, and coordination of various institutional activities and stake holders involved.

The report also indicates the level of compliance with set food and food safety standards by food manufacturers and food service providers, etc., and outlines challenges faced and opportunities for improvement

## **Risk of foodborne illnesses in Kenya**

FBDs are still a major problem in Kenya because of the enormous informal sector in the food industry accounting for at least 80% of the supply to the domestic markets where hygiene controls are rudimentary (Levine et al., 2020; Disease, Epidemiology, and Group, 2015). Aflatoxins and other mycotoxins are among the important food safety health risks with significant implications for developing countries such as Kenya (Lindahl et al., 2018; Ahlberg et al., 2018). In April 2004, one of the largest aflatoxicosis outbreaks occurred in rural Kenya, resulting in 317 cases and 125 deaths.(E. et al., 2005; Lewis et al., 2005) Aflatoxin-contaminated homegrown maize was the source of the outbreak (Muture & Ogana, 2005).

FBD risks from ASFs are mainly food parasites (*Cryptosporidium* species from dairy products, *Toxoplasma gondii* spp from meats, dairy, and eggs) and bacterial pathogens (*Brucella* species, *Campylobacter* species, non-typhoidal *Salmonella* species, and Shiga-toxin producing *E. coli*). Fresh fruit and vegetable FBD risks are similarly also from food parasites (*Ascarid* spp, *Cryptosporidium* spp, *Entamoeba histolytica*, *Giardia* spp, and *Toxoplasma gondii*) and bacterial pathogens (*Campylobacter* spp, non-typhoidal *Salmonella* spp, and Shiga toxin producing *E. coli*) (Hoffmann et al., 2017).

FBD risks with fruits and vegetables largely occur during production when they are subjected to pests, diseases, chemicals, water contaminations, and post-harvest losses and degradations. Hence,

for example, contaminated fruits and vegetables have been demonstrated to contribute to recent cholera outbreaks that killed 76 and sickened 3,967 people in the first eleven months of 2017, reported in Kenya (WHO, 2017). Of 1,579 fresh produce samples analysed by the Kenya Plant Health Inspectorate Service (Kenya Plant Health Inspectorate Service, 2017) 1.7% were found to contain pesticides above the EU recommended maximum residue limit. However, as most of the samples analysed by KEPHIS were destined for export markets, this rate of compliance is not representative of local markets.

Other than pathogens, misuse of antimicrobial drugs is a growing health threat in Kenya that has led to antimicrobial resistance (AMR) to most antibiotics available (Muthuma et al., 2016); (Muloi, Kiiru, et al., 2019). A study carried out to generate quantitative information to evaluate antimicrobial usage patterns from 1995 to 1999 in Kenya revealed that the tetracyclines, sulfonamides and trimethoprim, nitrofurans aminoglycosides, beta-lactams, and the quinolones are the most commonly used drugs in food-producing animals in Kenya (Mitema et al., 2001). Another study by Muloi, et al. (2019) in Nairobi, Kenya, revealed that 100% of most veterinary and 52% of human drug stores sold antibiotics without a prescription. In addition, they noted that customer preference was an important factor when prescribing antibiotics in half of the drug stores. Penicillin (93%), tetracycline (79%), and sulfonamides (90%) were reported to be amongst the four most commonly purchased antibiotic classes. These findings highlight the need for immediate strategies to improve prescribing practices across the pharmacists in Kenya. Therefore, more research is needed to understand the drivers of antibiotic consumption and misuse. Another study (Kosgey et al., 2018) periodically observed presence of antibiotics residues in milk vending machines (MVMs) and milk sold by street vendors. A controversial perspective between satisfying both customers and producers needs could significantly lead to food safety risks. In terms of customer demand, providing already-ripe, ready-for-consumption fruits bear the risk of postharvest losses due to price fluctuations and short shelf life. Therefore, preservatives have emerged for both climacteric and non-climacteric fruits and the vegetables. These preservatives have been associated with complex health problems, such as cancer. For example, bisphenol-A (BPA) and hydrogenated oils in fruits and vegetables have been reported to be carcinogenic. Moreover, high levels of omega-6 fatty acids and the N-nitroso composites can contribute to heart problems and cancer-related challenges. The investment by government and the private sector has significantly expanded and brought milk cooling services closer to the farmers. This has discouraged tendencies to preserve raw milk with hydrogen peroxide and other unapproved additives. Some Kenyan butchers are said to be using large quantities of sodium metabisulfite (a chemical that is mixed with water and smeared on meat

to give it fresh look) to preserve meat. A recent investigation carried out in 2017 revealed that 98mg of sodium metabisulfite per kilogram of minced meat was detected. Scientists say the chemical can cause cancer and, by international standards, fresh meat is not supposed to contain any preservatives.

However, there are food preservatives like sorbitol that have been proven effective in increasing shelf life without health problems. In a bid to address this, proper packaging and illustrations have now been advocated for specifically to target different clients. Currently, gluten free products and allergic descriptions on products exist as well.

The informal sector must be keenly monitored by the food safety agencies to uphold the application of HACCP and fair trade since it's the main supplier of food products to the domestic markets (Grace et al., 2020). Safety and quality management in the food supply chain has cost implications and income is a limiting factor for all the stakeholders and the success of food safety management systems (Kutto et al., 2011). Poverty alleviation would stimulate the purchasing power of domestic consumers, consequently promoting hygiene-based demand instead of price-based demand for food. The current challenges to food safety in Kenya are uncoordinated food safety and control activities and inadequate capacity building in food safety principles. Furthermore, lack of consumer awareness programs, inadequate surveillance systems, and inadequate laboratory services have led to an increase in the cases of food poisoning (Oloo, 2010).

Some of the and media reports and food safety issues in Kenya reported between January and December 2017 are listed below.

### **Media reports**

- “Groom dies of ‘food poisoning’ just two months to wedding” (<https://www.standardmedia.co.ke/article/2001248211/groom-dies-of-food-poisoning-just-two-months-to-wedding>)
- “NASA leader Raila Odinga treated for food poisoning” (<https://www.standardmedia.co.ke/article/2001231961/nasa-leader-raila-odinga-treated-for-food-poisoning>)
- “What health authorities had been told about Nairobi food” (<https://www.standardmedia.co.ke/health/article/2001248318/what-health-authorities-had-been-told-about-nairobi-food>)

## Food safety issues

- January research reports showed contamination; researchers warned the Ministry of Health (MOH) not to license any untrained food handlers.
- Up to a third of food handlers seeking medical certificates carry highly drug-resistant germs:<https://www.standardmedia.co.ke/health/article/2001262112/eastlands-blamed-for-recent-food-poisoning-in-city-hotels>.
- Punish traders using toxic chemicals in human food:  
<http://www.nation.co.ke/oped/letters/Punish-traders-using-toxic-chemicals-in-human-food/440806-4209476-cggovc/index.html>.
- Nairobi County bans open-air cooking, food hawking. Read more:  
<https://www.standardmedia.co.ke/article/2001247672/nairobi-county-bans-open-air-cooking-food-hawking>.
- Bacterial contamination of kales-common vegetables:  
<https://pdfs.semanticscholar.org/49d6/7960628796ad8e38d0a2cd425c160dba4c98.pdf>
- CSs Rotich and Mohammed hospitalized with cholera symptoms. Read more at <https://www.standardmedia.co.ke/article/2001247561/css-rotich-and-mohammed-hospitalised-with-cholera-symptoms>.

## 2 Emerging and re-emerging food safety challenges

### 2.1 *Street vending*

The emerging and re-emerging food safety challenges include street-vended foods, convenient and ready-to-eat foods, genetically modified foods, and foodborne illnesses (food poisoning and diseases). Street food vending offers business opportunities for developing entrepreneurs. However, street food vendors are often poor, with limited information on food safety requirements and therefore lack appreciation for safe food handling. Street-vended foods pose health risks of FBD to consumers (Birgen et al., 2020) (Birgen et al., 2019).

Products designated as convenience or ready-to-eat foods are often prepared food that can be sold as hot, ready-to-eat dishes; as room-temperature, shelf-stable products; or as refrigerated or frozen products that require less preparation. Such foods may be a source of various pathogenic bacteria, parasites, and viruses and may carry chemical contaminants due to unhygienic

practices and deliberate contamination. Other predisposing factors include environmental factors, such as unsafe water, unsafe waste disposal, exposure of food to insects and dust, undercooked food, and prolonged storage of cooked food without refrigeration. Genetically modified foods refer to foods of plants or animal origin manipulated using the molecular techniques to enhance the desired traits. Such foods require proper regulation and information for their use by consumers.

Foodborne diseases/illnesses have a significant impact not only on health but also on economic development. Moreover, globalization of the food trade and development of international food standards have raised awareness of the interaction between food safety and export potential for developing countries.

### **Challenges:**

1. Street-vended foods that are prepared and sold under unhygienic conditions pose a major public health risk.
2. Genetically modified foods are perceived to cause environmental hazards, human health risks, and economic concerns.
3. Most ready-to-eat foods may be a source of various food contaminants due to unhygienic practices, deliberate contamination, and poor storage.
4. Inadequate capacity for foodborne disease surveillance.
5. Limited export trade potential of food due to low adherence to international food safety standards.

## **3 Coordination and enforcement of laws and regulations**

The Kenyan food safety control system is multi-sectorial in approach and is embodied in several statutes implemented by various government ministries/departments and regulatory agencies. This is with an ultimate aim of promoting public health, protecting the consumer against health hazards, and enhancing economic development. Each agency operates independently to fulfill the function for which it was established. The coordination mechanism among these institutions is currently inadequate. This has created inefficiencies in the national food safety control system resulting in recurrence of food-related hazards, rejections of food exports by importing countries, and other undesirable consequences.

This necessitated the formation of an ad hoc committee referred to as the National Food Safety Coordination Committee (NFSCC) to address the overlaps on mandates. The Principal Secretary,



Ministry of Agriculture, Livestock, and Fisheries is the Chair while the Ministry of Health is the Secretariat. The NFSCC is responsible for coordinating food safety activities with the overall mandate of ensuring control of foodborne diseases and compliance with international trade practices on import and export products into and from Kenya. By recognizing that protecting the health of the people is one of the country's most important issues, the NFSCC's primary responsibilities can be summarized as follows:

- a. Conducting risk assessment on food in a scientific, independent, and fair manner, and making recommendations to relevant ministries based upon the results of the risk assessment
- b. Implementing risk communication among stakeholders, such as consumers and food-related business operators
- c. Responding to foodborne incidents, emergencies, and notifications from trading partners
- d. Mobilizing resources
- e. Updating existing legislation to be in tandem with the current food safety requirements
- f. Establishing a databank on food safety issues to improve on information, education, and communication
- g. Strengthening systems that will ensure traceability from farm to fork
- h. Strengthening laboratory infrastructure, human resource capacity, and management of systems to comply with national and international food safety requirements
- i. Strengthening mechanisms, including validation, certification, and self-assessment, for food safety practices along the food chain and instituting early warning mechanisms to prevent food hazards
- j. Strengthening existing institutional capacities and linkages and facilitating public/private sector partnership
- k. Harmonizing and strengthening coordination, enforcement, and functionality of the existing national food safety control system
- l. The MOH provides integrated preventive and curative health services

However, this is an ad hoc committee that is not anchored in any policy or law, making it inefficient to deliver its mandate fully. It operates purely under a Memorandum of Understanding (MOU).

### **Challenges:**

1. Inadequate coordination in the enforcement of various Acts of Parliament that cover the entire food chain.
2. Overlapping roles and responsibilities due to unclearly understood mandates in the operations of the food control system resulting in ambiguity and weaknesses in inspection and analysis.
3. Some of the Acts have not been updated to keep abreast with changing local and international trends. Attempts to carry out piecemeal reviews have not resolved the food safety challenges that prevail.
4. Emerging issues, such as street-vended foods, have not been formally recognized in the various legislative frameworks.

Recommendation: the government should put in place a coordination mechanism by establishing a National Food Safety Law.

## **4 Kenya's food control system and its effectiveness**

In Kenya, the food safety control system is multi-sectorial in approach and is embodied in various statutes implemented by various agencies under different ministries and using several laws. Food safety control agencies operate under the ministries of Trade, Industrialization, Health, Agriculture, Livestock, Fisheries, and Cooperatives. The agencies that regulate food crop safety include Kenya Bureau of Standards (KEBS), Kenya Agricultural and Livestock Research Organization (KALRO), Kenya Plant Health Inspectorate Services (KEPHIS), Department of Public Health (DPH), Weights and Measures Department (WMD), Government Chemist's Department, Kenya Dairy Board (KDB), and Agriculture and Food Authority (AFA), among others (Table 1 gives a summary of the main stakeholders in food safety in Kenya for ASF and fruits and vegetables). The functions of these agencies include sensitization and implementation of codes of hygiene and agricultural practices by stakeholders throughout the food chain. This is with an ultimate aim of promoting public health, protecting the consumer against health hazards, and enhancing economic development.

## **5 Public institutions involved in implementation of food control system in Kenya**

The leading agencies for each food safety control activity are listed below.

### **5.1 Agriculture and Food Authority (AFA)**

The Agriculture and Food Authority (AFA) is responsible for the implementation of Agriculture and Food Authority Act 2013 and the Crops Act 2013, so as to provide for safety of crops and crop products while in the field as well as crops and crop products in the licensed warehouses.

### **5.2 Kenya Plant Health Inspectorate Service (KEPHIS)**

The Kenya Plant Health Inspectorate Service (KEPHIS) is the government parastatal whose responsibility is to ensure the quality of agricultural inputs and produce to prevent adverse impact on the economy, the environment, and human health by implementing the KEPHIS Act 54 of 2012. The institution is represented as the following, among others:

- Member of the National Biosafety Authority Board and Institutional Biosafety Committees (IBCs)
- Secretariat of the Kenya Standing Technical Committee on Imports and Exports (KSTCIE)
- Member of National Food Safety Coordination Committee (NFSCC)
- Member of National Codex Committee
- Participant in major international forums (including the Ad Hoc Intergovernmental Taskforce on Food Derived from Recombinant DNA Plants of the Codex Alimentarius Commission)
- International Plant Protection Convention (IPPC) standard setting body
- Commission on Phytosanitary Measure
- WTO SPS Committee

It also implements the Fertilizer and Animal Feedstuffs Act (Cap 345), Plant Protection Act (Cap 324), Agricultural Produce Act (Cap 319), and Seed and Plant Varieties Act (Cap 326).

### **5.3 Pest Control Product Board (PCPB)**

The Pest Control Products Act (Cap 346) is an act of Parliament to regulate the importation, exportation, manufacture, distribution, and use of products for the control of pests and of the organic function of plants and animals and for connected purposes (Pest Control Products Act, 1982). The laws of Kenya under this act are regulated by the Pest Control Products Board (PCPB), which is a statutory organization of the Kenya government established under the Pest Control Products Act (Cap 346). This board undertakes evaluation and registration of pesticides in the country for safety, efficacy, and quality before registration. In addition, it regulates trade of pests control products

through inspection, licensing, and product certification (PCPB, 2019). Through the PCPB, 247 active ingredients are registered in 699 products for horticultural use.

#### **5.4 Directorate of Veterinary Services (DVS)**

The Veterinary Public Health Division is charged with the responsibility of inspection and certification of food of animal origin, namely meat and meat products, milk, honey, and eggs, as well as animal feeds. It approves establishments for meat and meat products and milk processing plants for purposes of local and international trade. The Directorate of Veterinary Services (DVS) is in charge of meat inspection services in the country and implements the Veterinary Surgeons and Veterinary Para-professionals (VSVP) Act No. 366; Meat Control Act (Cap 356); Food, Drugs and Chemical Substances (General) Regulations (Cap 254); and Fertilizer and Animal Feedstuffs Act (Cap 345).

#### **5.5 Kenya Dairy Board (KDB)**

The Kenya Dairy Board (KDB) enforces the Dairy Industry Act (Cap 336). Activities undertaken include inspection and licensing of milk handling premises and surveillance on the quality and safety of milk and milk products along the dairy value chain. These aim for consumer protection and facilitation of trade.

#### **5.6 Veterinary Medicine Directorate (VMD)**

The Veterinary Medicine Directorate (VMD) is responsible for safety of veterinary medicines and devices, including pest control products used on animals. It implements Veterinary Surgeons and Veterinary Para-professionals (VSVP) Act No. 366; Meat Control Act (Cap 356); Food, Drugs and Chemical Substances (General) Regulations (Cap 254); Fertilizer and Animal Feedstuffs Act (Cap 345); and Animal Diseases Act (Cap 364).

#### **5.7 Kenya Fisheries Service (KFS)**

Kenya Fisheries Service (KFS) is a body established under the Fisheries Management and Development Act No. 35 of 2016. The purpose of the service is to conserve, manage, and develop Kenya fisheries and aquaculture resources. The functions of the fisheries department include fisheries policy formulation and review, fisheries licensing, management and development of marine fisheries (including the Exclusive Economic Zone or EEZ), management and development of freshwater fisheries, commercialization (including formulation of fisheries groups for local fishermen), promotion of fish quality assurance, value addition and marketing, development of

aquaculture, marine and fisheries research, promotion of recreational fisheries, facilitation of ice production and cold storage at landing sites, promotion of credit facilitation to the fishery sub-sector in liaison with financial institutions, promotion of affordable and safe fishing boats and appropriate gears, and promotion of appropriate fishing technology (Fishery industry challenges, 2012).

The agency interacts with the Kenya Marine and Fisheries Research Institute (KMFRI), a state corporation that was established by an Act of Parliament (Science and Technology Act, Cap 250 of the Laws of Kenya) in 1979 and is run by a board of management. The research mandate of KMFRI is defined by article No. 4 of the Science and Technology Act of 1979, Cap 250. The institute is empowered to carry out research in marine and freshwater fisheries; aquatic biology; aquaculture; environmental chemistry; ecological, geological, and hydrological studies as well as chemical and physical oceanography.

### **Challenges**

- Use of illegal and unregulated gears by fishermen, which in turn results in the capture of young fish and thus reduction of fish population in the lake. In addition, this also leads to capture of underweight fish, which cannot fetch a good price for the fisherman.
- Use of outdated technologies; the crafts with or without motors are common in occurrence in the fishing community.
- Use of modern fishing gears is negligible and hence quality and quantity of the captured fish is severely affected.
- Use of remote sensing and geographic information systems is non-existent, which otherwise would have helped in augment the capture by the fishermen (Ministry of Fisheries Development, 2008).

### **5.8 National Biosafety Authority (NBA)**

The National Biosafety Authority (NBA) is responsible for the safety of food from genetically modified organisms and use of genetically modified organisms in food production and manufacture of medicines. NBA uses Biosafety Act No. 2 of 2009. Kenya signed the Cartagena Protocol on Biosafety in 2000 and ratified it in 2003. The protocol requires member countries to designate competent authorities and National Focal Points (liaison officers) to deal with national genetically modified organisms (GMO) matters and liaise with the international secretariat of the CBD. The Biosafety Act, 2009 makes provision for establishment of a legal framework for the safe handling, use, and transfer of genetically modified organisms. It also sets up the NBA as the focal point of all biosafety matters in Kenya. The NBA exercises general supervision and control over dealings in

GMO with a view to ensuring safety to human and animal health and protection of the environment. The mandate of NBA includes the following:

- Consider and determine applications for approval for the safe transfer, handling, and use of GMOs
- Coordinate research and monitor activities on all GMO work as per the Act
- Strengthen national technical capacities and capabilities for biosafety
- Develop regulations to operationalize the Biosafety Act, 2009
- Provide advisory services on matters of biosafety
- Establish and maintain as biosafety clearing house (BCH) mechanism (web-based information sharing of national database that is linked to the international BCH)

## **5.9 Department of Public Health**

It safeguards the health of consumers through food safety and quality control, surveillance, prevention, and control of foodborne diseases/illness. It also performs regulatory and conformity roles including standards development, quality assurance, and testing. It draws its mandate from and implements Health Act, 2017; Public Health Act (Cap 242, Rev. 2002); Food, Drugs and Chemical Substances (General) Regulations (Cap 254, Rev. 2002); Radiation Protection Act (Cap 243); Liquor, Licensing Act (Cap 121); Traditional Liquor Act (Cap 122), Meat Control Act (Cap 356, Rev. 1980).

## **5.10 The Kenya Bureau of Standards (KEBS)**

KEBS is a body under the Ministry of Industrialization mandated by the Standard Act Chapter 496. The aim of this body is to coordinate all activities concerning the development and implementation of both local and international standards relevant to Kenya. In addition, it gathers information on quality concerns through industrial visits and receives private complaints samples for laboratory analysis as part of quality assurance. Laboratory services are also provided by KEPHIS, KALRO, KEMRI, and ILRI. Furthermore, KEBS implemented the Pre-Export Verification of Conformity (PVOC) program in 2005.

Standards for food and agricultural products are developed by technical committees, which are about 30 in number, with their secretariats at KEBS (Oloo, 2010). Food standards give specifications for the compositional requirements, microbial requirements, tolerance limits for contaminants, packaging, labelling, and the hygiene conditions necessary for manufacture of products (KEBS,

2005). Kenyan standards are practically adopted from international ones, including International Organization for Standardization (ISO) and Codex Alimentarius Commission (CAC), following the philosophy of World Trade Organization (WTO) Sanitary and Phytosanitary Standards (SPS) and Technical Barrier to Trade (TBT) agreements.

## **6 Other Stakeholders Involved in Food Safety Control Systems of ASF and FVs**

### **6.1 County Government**

The role of county government in food safety includes:

- Ensuring food control laws are implemented
- Reviewing current by-laws and regulations pertinent to food safety to provide clearly defined mandates in the food control system
- Facilitating data collection and feeding the databank information on the food control system
- Supporting food safety training for the various stakeholders
- Establishing a strong and effective communication network to reach the relevant stakeholders
- Developing a communication framework to address pertinent issues regarding food safety in the county
- Putting in place provisions to facilitate traceability of food, feeds, and their ingredients
- Facilitating information sharing, education, communication, and training to stakeholders across the farm-to-fork continuum
- Providing for data capture, storage, and retrieval to be used by all the stakeholders

### **6.2 Private food processors**

Though government and public sector institutions engage in the development of agro-food industry in Kenya, the private sectors remain a critical driver with the highest level of investment and impact in the industry. Considering the high incidence of post-harvest losses in Kenya, agro-processing companies have a vital role in turning primary agricultural products into consumable commodities. They constitute more than 80% of the actors within the food value chain. The agro-processing companies who serve most urban markets account for close to 80% and 30% of the informal and formal markets for processed foods, respectively.

Private food processors provide direct market access to producers. For example, BIDCO Kenya provides market access for more than 10,000 farmers. East African Breweries, through East African Maltings Limited, provides immediate market access for more than 10,000 sorghum producers. They invest in hard and soft infrastructure at rural and urban levels (such as Brookside, Unilever),



transfer production and processing technologies through training to farmers and supporting farmers mobilization (BIDCO, Nestlé, East African Maltings), process and supply food and food products to the population, engage in direct export, and sometimes provide land. In addition, they reduce hunger and malnutrition, ensure year-round supply of food, and reduce post-harvest losses. Furthermore, they spur rural development, provide enormous employment to women and youth, and provide market for financial institutions within the agribusiness settings. Moreover, they offer direct employment not only to producers but also to agriculturists, food scientists, and business management professionals (UNDP, 2012).

## **Challenges**

- Challenging economic policy operating environment
- Difficulty in obtaining high-quality raw materials, low volume of local raw materials for processing, and high cost of imported raw materials due to world food price hikes
- Inadequate technical processing skills as well as engineering skills to efficiently operate processing equipment
- Minimum support service institution to provide the requisite technical know-how to suppliers
- Limited ability to meet high quality requirements of international markets (UNDP, 2012)

### **6.3 Consumer organizations**

Consumer organizations in Kenya include the Kenya Consumers Organization, Consumer Information Network, and Consumer Insight, among others. The ultimate concern on food safety solely dwells on the consumers. Negative impacts on food safety are based on biological, chemical, and physical hazards associated with production flow that could be harmful to the consumer.

### **6.4 Food Business Operators**

Kenyan importers, wholesalers, and retailers trading in food products are responsible for food safety and the quality of their merchandise. Laws that regulate players in this sector include the Standards Act (Cap 496); Public Health Act (Cap 242); the Foods, Drugs and Chemical Substances Act (Cap 254); the Weights and Measures Act (Cap 513); and Trade Descriptions Act (Cap 505); among others (Laws of Kenya, Cap 513). These stakeholders are compelled to take all reasonable precautions and exercise due diligence in the avoidance of failure, whether in development, manufacture, distribution, advertising, or sale of food products to the consumer (BRC, 2005). Such obligations prompted the development of standards such as EurepGAP and British Retail

Consortium, or BRC, which is now Brand Reputation through Compliance Global Standards, or BRCGS. Giant retail outlets such as Naivas, Quickmart, Foodplus, and Carrefour are presumably compliant with basic laws of food safety. However, Kenya retailers should emulate their peers in Europe by insisting on traceability, which is the foundation of EurepGAP and BRC (Oloo, 2010).

Exporters of fruits and vegetables in Kenya are expected to follow prerequisite requirements in the export of fresh fruits and vegetables that include export license from HCDA, phytosanitary and conformity certificates from KEPHIS, Euro 1 Certificate (for EU Markets), GlobalGAP Certification, and MRL limit compliance (EU). UK supermarkets also require RRCGS certification. The private standard in EU, non-EU, and other countries (e.g., US, Japan, and Middle East) keep on changing with time and, therefore, individual markets may have additional private standard requirements.

Exporters of ASF in Kenya are expected to follow the prerequisite requirements in the export ASF, including export license from the DVS, Meat Control Act (Cap 356).

## **6.5 Industry associations in the fresh vegetable and fruit value chain**

### **1. Fresh Produce Exporters Association of Kenya**

The Fresh Produce Exporters Association of Kenya (FPEAK) was established in 1975. It is a members' association dedicated to the welfare and enhancement of members' business activities through lobbying, information, and marketing support and promoting members' compliance with international standards. The FPEAK membership comprises large- and small-scale farmers and exporters.

### **2. Fresh Produce Consortium of Kenya (FPC Kenya)**

It is a trade association committed to driving the growth and success of fresh produce companies in Kenya and their partners. Registered in 2017, FPC Kenya is a new outlook of an association that started in 2013 as the Kenya Association of Small Exporters of Fruits and Vegetables of Kenya (KEFE). However, in 2017 the association took a new name, Fresh Produce Consortium of Kenya, in response to the growing need to address challenges faced by players in the domestic market space.

The FPC Kenya comprises producers, traders, and service providers for Kenya's fresh horticultural produce. FPC Kenya represents the interests of member companies (including family owned, private, and publicly traded businesses as well as local and regional companies) throughout the fresh produce supply chain. With increased diversity of its membership, and in view of the opportunities

presented in domestic, regional, and global markets, it was necessary to change the mandate of FPC Kenya.

### 3. Avocado Society of Kenya

This is a national association of growers, exporters, and other value-chain players in Kenya. We also welcome international individual and corporate memberships.

### 4. Kenya National Farmers' Federation (KENAFF)

It comprises around 36 commodity associations that are registered with the federation to not only represent their interests but also for increased synergies in conducting mutual activities, especially in lobbying and advocacy.

## **6.6 Industry associations related to animal source foods**

### 1. Kenya Livestock Producers Association (KLPA)

KLPA was formed in 2004 as an apex association for all livestock producers in Kenya. It draws its membership from individual farmers, farmer groups, cooperative societies, self-help groups, community-based organizations, and corporate organizations in livestock agribusiness. The current membership stands at more than 1,500,000 farmers spread all over Kenya.

KLPA has participated in lobbying and advocacy on livestock policies and represented the interests of livestock farmers by being a member of Kenya Private Sector Alliance (KEPSA), Kenya Association of Manufacturers (KAM), Kenya National Chamber of Commerce and Industry (KNCCI), Agricultural Industrial Network (AIN), Agriculture Council of Kenya (AgCK), and Kenya Agri-business and Agro Industry Alliance (KAAA).

### 2. Kenya Livestock Marketing Council (KLMC)

KLMC, established in 2000, is an umbrella organization of livestock producers and traders in arid and semi-arid areas of Kenya. KLMC derives its strength and membership from grassroots efforts whereby producers, traders, user associations, and other interested stakeholders become members in all the counties.

### 1. Retail Trade Association of Kenya (RETRAK)

RETRAK is a powerful, unified retail voice. RETRAK drives and shapes the retail agenda whilst making sure one's own business priorities are represented. RETRAK campaigns and lobbies for the retail sector, ensuring that the industry's voice is heard at the relevant industry platforms. RETRAK holds networking events. These events are an ideal forum for members to meet up and discuss the

latest industry issues. RETRAK engages with government, media, and other stakeholders in the identified areas for the development of the retailers, with an objective to improve the retail environment in Kenya.

## **7 Policy and Regulatory Framework on Food Safety in Kenya**

The Kenya government has established a policy and regulatory framework to address food quality and safety across the food value chains. Leading policies for each food safety control activity are: Constitution of Kenya, 2010; National Agricultural Policy; Kenya Veterinary Policy, 2015; National Fisheries Policy; and National Policy on Prevention and Containment of Antimicrobial Resistance, among others. The policies relating to the ASF, fruit and vegetables products value chain includes are listed below.

### **7.1 Constitution of Kenya, 2010**

The Fourth Schedule devolved some specified functions from the national government in health and agriculture to the county government and stipulated that the two levels of government shall conduct their mutual relations on basis of consultation and cooperation.

### **7.2 Kenya Vision 2030**

Kenya Vision 2030 is the government blueprint strategy for economic prosperity aimed at making Kenya a medium-income country by year 2030 through increased productivity. Kenya Vision 2030 has identified strategic key thrusts such as increasing market access of livestock products through value addition, processing, packaging, and branding.

### **7.3 Kenya Veterinary Policy, 2015**

The Kenya Veterinary Policy provides for enabling environment for safeguarding animal life, health, and welfare as well as animal propagation and production for food security and economic development. The policy aligns development in the animal resource industry to the Constitution of Kenya as well as Kenya Vision 2030 and the international animal health laws, treaties, agreements, and conventions ratified by Kenya. The policy identifies Veterinary Public Health as part of public health that links people, animal and environment.

### **7.4 National Action Plan (NAP) on Containment of Antimicrobial Resistance, 2017-2022**

This strategy provides a regulatory and implementation framework to establish and strengthen systems to contain the emergence and spread of AMR. The National Action Plan aims to provide a

coherent policy framework and priority actions to contain the emergence and spread of AMR, through the following strategic objectives:

- To improve awareness and understanding of antimicrobial resistance through effective communication, education, and training.
- To strengthen the knowledge and evidence base through surveillance and research.
- To reduce the incidence of infection through effective sanitation, hygiene, and prevention measures.
- To optimize the use of antimicrobial medicines in human and animal health.
- To develop an economic case for sustainable investment that takes into account the need of the country and investment into new medicines, diagnostics, tools, vaccines and other interventions.

The joint venture between the Ministry of Health, Agriculture, Livestock and Fisheries is using the one-health approach to promote prudent use of antimicrobial agents to ensure that there is continued successful treatment and prevention of microbial diseases by ensuring that effective, quality, and safe antimicrobials are accessible to all who need them. The policy interventions address

1. improving awareness and understanding of antimicrobial resistance,
2. strengthening the knowledge and evidence base on AMR,
3. reducing the incidence of infection,
4. optimizing the use of antimicrobials in human, animal, and plant health, and
5. Supporting sustainable investment in new medicines, diagnostic tools, vaccines, and other interventions.

It recognizes the diversity in the different sectors and emphasizes that an all-out effort is needed to effectively combat AMR. Despite these, Kenya experiences major problems of non-compliance with basic food safety and agricultural health practices in local markets. The level of awareness of the said practices among small producers is negligible. However, this action plan requires strong government commitment and collaborative actions across the sector.

## **7.5 Agricultural Sector Transformation and Growth Strategy (ASTGS), 2019–2029**

The strategy is anchored in the belief that food security requires a vibrant, commercial and modern agricultural sector that is sustainably supported. The ASTGS prioritizes three anchors that are expected to drive the ten-year agriculture transformation:

**Anchor 1:** Increase small-scale farmer, pastoralist, and fisher folk incomes

**Anchor 2:** Increase agricultural output and value add by establishing six large-scale agro and food processing hubs across the country

**Anchor 3:** Increase household food resilience

## **7.6 Kenya Environmental Sanitation and Hygiene Policy, 2016–2030**

This policy commits the Government of the Republic of Kenya at both national and county levels to pursuing a robust strategy that will not only enable all Kenyans to enjoy their right to the highest attainable standards of sanitation but also to a clean and healthy environment as guaranteed by the Constitution of Kenya 2010.

## **7.7 Ministry of Agriculture, Livestock and Fisheries Strategic Plan, 2013–2017**

Market access of agriculture products including livestock and livestock products as a key to growth of the agriculture sector has been emphasized. This is aimed to be achieved through the focus on four strategies, namely promotion of agriculture products and produce in the local and international markets, establishment of export zones with a focus to promote the country's export of livestock and livestock products, capacity enhancement for compliance with domestic and export trade measures, and value addition enhancement for agriculture products along the value chain.

## **7.8 Directorate of Veterinary Services Strategic Plan, 2018–2022**

The strategic plan outlines the role of Directorate of Veterinary Services in ensuring safety of foods through inspection, licensing, and approval of slaughterhouses, meat containers and carriers, milk processing plants, and animal feed processors. The Directorate also promotes private investment in slaughterhouses and meat processing plants

## **7.9 Draft National Livestock Policy, 2019**

This policy addresses the challenges in value addition and marketing and research and extension. Section 2.11.3 deals with quality and safety standards, section 3.2.4 on feeds inspectorate, and section 3.3.1 on animal disease reporting with highlights on antimicrobial resistance (AMR).

## **7.10 Pest Control Product (PCP) Bill, 2019**

This bill aims to create an independent Pest Control Products Authority (PCPA) to regulate the sector, a PCPA board of directors to formulate policies and oversee regulation, and a tribunal to hear appeals on registration and pest control product regulation. In addition, it will create a set of

seven regulations that include pest control products registration, licensing of premises and business, labelling, advertising and packaging, importation and exportation, license fees, and other charges.

### **7.11 Changes in the Food Laws in Kenya between 2010 and 2020**

Some of the laws that have undergone/are undergoing changes include the following:

- National Food Safety Policy, June 2020: Kenya has not had a national food safety policy; however, a draft national policy on food safety has now been developed and is expected to be enacted soon. The draft policy attempts to harmonize and coordinate food quality inspectorate activities by the various regulatory authorities. Some of the goals are building capacity for the food control system, identifying food safety challenges, and creating awareness to the general public and other stakeholders on food safety.
- Meat Control Act (Cap. 356): changed in 2010 to include slaughterhouse categorization (Legal Notice 110 of 2010). This led to establishment of three categories of slaughterhouses based on their capacities: A, B, and C. Some county governments (e.g., Kitui and Kiambu) have developed their own Meat Control Acts.
- Veterinary Surgeon Act (Cap 366) was deleted and replaced with VSVP Act Number 29 of 2011, which makes provisions for the training, registration, and licensing of veterinary surgeons and veterinary paraprofessionals to provide for matters relating to animal health services and welfare.
- Development of veterinary medicine regulations leading to establishment of a Vet Med Directorate (VMD) to regulate veterinary medicines.
- Proposed bills, including Animal Health, Animal Welfare, and Veterinary Public Health bills, seek to consolidate the various veterinary laws and align them with the Constitution of Kenya for promotion of animal health, food safety, and fair-trade practices.
- Veterinary policy aligns the animal resource industry in Kenya to the Constitution, the relevant provisions of the World Organization for Animal Health (OIE), the WTO Agreement on the Application of Sanitary and Phytosanitary measures, the Codex Alimentarius Commission, and the EAC Treaty.
- The Fertilizer and Animal Foodstuff Act (2015) amended and established the Fertilizer and Animal Foodstuff Board to regulate fertilizer and the animal foodstuff industry in Kenya.
- The Food, Drugs and Chemical Substances Act (Cap 254) has been revised in sections as follows:
  - Legal notice number 167 of 2012 on mandatory food fortification
  - Legal notice number 157 of 2015 is an amendment on mandatory food fortification

- Legal notice number 105 of 2010 addresses the use of pictorials in labeling of water-based drink
- Proposed Environmental Health and Sanitation bill (2019) to regulate environmental health and sanitation services, including food safety
- Health Act of 2017, a new law encompassing all health services, including food safety
- Alcoholic Drinks Control Act of 2010
- The draft Dairy Policy and Bill have been completed and are awaiting the due legal enactment process. The draft policy recognizes milk from sources other than cattle that are currently not covered by the Dairy Industry Act (Cap 336), such as milk from goats and camels. The policy seeks to address measures to transform the informal sector toward formalization through development of appropriate low-cost technologies, capacity building, and consumer education, among others.
- Animal Feeds Policy: The Ministry of Agriculture, Livestock, Fisheries and Cooperatives has completed a draft Animal Feeds Policy that seeks to improve the regulation of the animal feeds manufacturing industry. The quality and safety of animal feeds is a major concern in Kenya. The policy seeks to lay a strong regulatory framework through gazette notice of qualified feed inspectors and analysts. The policy will be supported by an Animal Feeds Act, which is currently being developed.
- National Dairy Master Plan: the revision of the Dairy Master Plan of 1993 by the Ministry of Livestock Development is ongoing. The Plan will provide a broad vision for the dairy sector on the issues of production, quality assurance, value addition, marketing, etc., in line with Vision 2030.
- Animal Health Bill: the bill provides for the prevention, detection, control, and eradication of diseases and pests of animals, to provide for measures to promote animal health, sustainable improvement of animal health, to provide for effective and efficient veterinary governance and for related purposes. It repeals the following: Animal Diseases Act (Cap 364), Rabies Act (Cap 365); Cattle Cleansing Act (Cap 358), and the Branding of Stock Act (Cap 35).
- Veterinary Public Health Bill: the bill provides for safety of food of animal origin, to provide for construction and control of slaughterhouses and establishments where food of animal origin is processed, to provide for animal feed safety, to provide for control of non-food animal products, and to provide for marketing and trade in food of animal origin and animal products. It provides for the repeal of the Meat Control Act (Cap 356) and Hide, Skin



and Leather Trade Act (Cap 359) except the Hide, Skin and Leather Trade (Leather Development Council) rules, 2010.

- Animal Welfare and Protection Bill: the bill aims at providing for the welfare and protection of animals and prevention of ill treatment of animals; to provide for the monitoring of and mitigation of animal abuse and for connected purposes. On safety of foods of animal origin, it provides for animal disease prevention and provision of veterinary care, appropriate shelter, management, nutrition, humane handling, and humane slaughter or killing of animals.
- Livestock Bill: the principal objective of this bill is to establish a legal framework to provide for the promotion, development, research, management, processing, marketing, and regulation of livestock and livestock products. The bill seeks to anchor the existence and practice of matters related to livestock resources done under legal notices in statute law and provides for the harmonization and coordination of the public livestock agencies.

#### **7.12 Challenges of the existing laws and policies in the food control system**

- Silo enforcement of various Acts of Parliament that cover the entire food chain
- Overlapping roles and responsibilities among the agencies involved in the food safety system
- Outdated legislative frameworks that do not keep abreast with the changing local and international trends
- Emerging issues, such as street-vended foods, have not been formally recognized in the various legislative frameworks
- Underdeveloped, underutilized, and poorly coordinated system of generating, collecting, collating, and rapid dissemination of food safety information
- General low public awareness on food safety issues.
- Inadequate mainstreaming of emerging food safety issues into curricula and implementation by relevant training institutions as a result of weak linkages between research, regulatory agencies, training institutions, and industry.
- Weak and ineffective communication network amongst the food safety chain stakeholders, thereby compromising effectiveness of risk communication among the consumers. Each of the stakeholders has various interests and mandates, hence the need for a well-established and coordinated communication network.
- Inadequate awareness on the importance of food and feed traceability by the various actors along the food chain. This has led to wrong perceptions of traceability; some actors fear it

may be used for purposes of penalizing them while others feel traceability is the responsibility of the government.

- Limited capacity for the implementation of appropriate food traceability systems.
- Inadequate number of accredited and approved laboratories. Limited scope of analysis and equipment and in some cases not up-to date with the new technologies. High investment required for an effective food safety assurance system in terms of competencies, skills, institutional development, costs of operations and maintenance, implementation of international trade agreements (WTO/SPS), infrastructure.
- Limited human resource capacity for food safety operations across the various agencies mandated to carry out food safety activities.
- Inadequate capacity to facilitate risk analysis in order to comply with the WTO/SPS agreement and effectively participate in the development of international food safety standards.
- Limited export trade potential of food due to low adherence to international food safety standards.
- Low adoption of modern food safety approaches like Hazard Analysis and Critical Control Point (HACCP) by food industry actors.

## 8 Implementation of appropriate food safety management systems

### 8.1 Fruit and vegetable food supply chain operators

Farmers, sellers, and manufacturers must adhere to the good agricultural practices (GAP), good distribution practices (GDP), and good manufacturing practices (GMP), respectively. Table 1 specifically summarizes food supply chain actors, stakeholders, and their mandate in ensuring food safety.

**Table 1: Chain actors, stakeholders, and their roles**

ACTOR	GUIDING PRINCIPLE	COMPOSITIONAL	GOVERNING ACTS/LAWS	SUPPORTING ORGANIZATIONS
Farmers	GAP	Variety and seed selection, soil preparation, crop and pest control	<ul style="list-style-type: none"> <li>▪ Agriculture Act (Cap 318)</li> </ul>	<ul style="list-style-type: none"> <li>▪ County governments: sub-county agricultural officers (SCAO)</li> </ul>

		management, harvesting methods, sorting, grading and packaging	<ul style="list-style-type: none"> <li>▪ Agricultural Produce (Export) Act (Cap 319)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Kenya Organic Farmers Association (KOFA)</li> <li>▪ Fresh Produce Exporters Association of Kenya (FPEAK)</li> <li>▪ Kenya Plant Health Inspectorate Service (KEPHIS)</li> <li>▪ Horticultural Crops Development Authority (HCDA)</li> </ul>
Food processors	GMP	Raw material handling and control, product and process management and control (including documentation of all work routines), and human resource management	<ul style="list-style-type: none"> <li>▪ Weights and Measures Act (Cap 513)</li> <li>▪ Trade Descriptions Act (Cap 505)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Kenya Association of Manufacturers (KAM)</li> <li>▪ Kenya Fish Processors and Exporters Association (AFIPEK)</li> </ul>
Food importers, wholesalers, and retailers	<ul style="list-style-type: none"> <li>▪ GDP</li> <li>▪ Eurep GAP</li> <li>▪ British retail Consortium (BRC) Global</li> </ul>	Avoidance of failure, whether in development, manufacture, distribution, advertising, or sale of food products to the consumer	<ul style="list-style-type: none"> <li>▪ Public Health Act Chapter 242</li> <li>▪ Food, Drugs and Chemical Substances Act (Cap 254)</li> <li>▪ Weight and Measures Act (Cap 513)</li> <li>▪ Trade Descriptions Act (Cap 505)</li> </ul>	<ul style="list-style-type: none"> <li>▪ KEBS</li> </ul>
Consumers		Product selection, storage, preparation, consumption, and disposal of household waste	<ul style="list-style-type: none"> <li>▪ Competition Act Part VI (Sections 55 to 70)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Kenya Consumers Organization</li> <li>▪ Consumer Information Network</li> <li>▪ Consumer Insight</li> </ul>

**Table 2: Kenyan production, consumption, export, and import figures for fruits and vegetables**

<b>Fruit or Vegetable</b>	<b>Consumption (per capita annual food consumption)</b>	<b>Total production (MT)</b>	<b>Exports (MT)</b>	<b>Imports (MT)</b>
Apples	-	300	450	15476
Bananas	27.5	143,4162	104	1296
Carrots and turnips	-	199394	9934	0
Cauliflowers and broccoli	-	1029	462	8
Mangoes	-	822264	21999	10545
Oranges	-	72437	318	42748
Pineapples	7.7	399972	309	2431
Spinach	-	130808	5	0
Tomatoes	8.5	507142	264	16635

Source: FAOSTAT 2017, KENYA ECONOMIC D-SURVEY 2019

## **8.2 Animal food supply chain operators**

Food animals include cattle, sheep, goats, pigs, poultry, rabbits, camels, donkeys, beefs, fish, other aquatic animals, and emerging livestock. They provide humankind with animal-derived proteins, carbohydrates, fats, and minerals that are key requirements for nutrition and food security. Animal byproducts provide dressing, manure, fertilizers, feedstuffs, ornaments, musical instruments, adhesives, beddings, medicines, perfumes, and polish, among others. Animal products are also marketed, thus earning income and contributing to the national economy (Agriculture, 2015).

The major animal source foods include red meat, milk, poultry, pork, eggs, and honey and fishery products. It is approximated that two-thirds of the meat consumed in Kenya is beef (Alarcon et al., 2017)(Kirui & Karugia, 2019)

Production of bovine and shoat meat is mainly from the arid and semi-arid areas of Kenya that account for more than 90% of the livestock population in the country (Kenya Market Trust, 2014). Most of the animal source food purchases are from the wet markets where the animals are slaughtered, inspected, and sold to the butchereries who in turn sell to consumers.

Table 3 below shows the production, consumption, export, and import figures of animal source foods in Kenya.

**Table 3: Kenyan production, consumption, export, and import figures for animal source foods**

Animal source food	Consumption (T)	Total production (MT)	Exports (MT)	Imports (MT)
Beef	588,220	588,693	941	468
Shoat	94,124	97,094	2,979	9
Poultry	35,361	35,090	1	272
Camel	72,784	72,784	-	-
Pork	13,095	12,953	1,008	1,150
Eggs	-	1,587,787,000 pieces	3	511
Milk and milk products	-	3,569,702	2,074	10,809
Fish	-	201,903	30,346	21,278

Source: FAOSTAT 2017

## 8.2.1 Animal source food products

### 8.2.1.1 Beef

There are many actors in the beef value chain with a population of 14.3 million beef cattle in Kenya. The primary producers are the livestock owners, who are mainly pastoralists in the arid and semi-arid areas. Thirty-three percent of the dairy herd is culled annually, and this proportion enters the beef value chain. The dairy herd comprises 4.5 million heads of cattle (FAO, 2019) From the primary producers, live animals pass through a number of intermediary livestock traders before slaughter. A total of 545,574 cattle was slaughtered in the estimated 2,000 slaughterhouses/slabs, seven of these being export-licensed slaughterhouses (MOALF&C, 2017). The main companies dealing with fresh beef are KMC, Choice Meats, Alpha Fine Foods, Quality Meat Packers, Neema Livestock and Slaughtering Investments Limited, and Ken Meat EPZ Ltd.

### **8.2.1.2 Sheep and goats**

The main primary producers are the pastoralists in the arid and semi-arid areas. The shoats' population was estimated to be 44.5 million, with goats having a population of 25.7 million (MOALF&C, 2017). In 2017, a total of 510,926 sheep and 1,446,108 goats were slaughtered. The total meat production is estimated at 97,094 MT (FAOSTAT, 2017). The major markets for shoats' meat are the urban centers of Kenya. The main player in Nairobi is the Kiamaiko slaughterhouses, which sell whole carcasses.

### **8.2.1.3 Poultry**

Poultry production is undertaken by a varied number of stakeholders utilizing different sets of resources in a wide spectrum of sociocultural and socioeconomic conditions. Major poultry species kept include chicken, ducks, guinea fowls, turkeys, pigeons, quails, and ostriches, of which chicken dominate the industry. Poultry is one of the most important livestock enterprises in rural households, where over 70% (24 million) of the country's human population live and derive their livelihood. Kenya has an estimated poultry population of 49 million birds, with chicken forming the largest proportion(FAO, 2017).

The major chicken production systems are the following:

1. Indigenous free-range chicken (76%)
2. Broilers—six to eight weeks to maturity (13.2%)
3. Hybrid layers—one to two years of production systems (8.6%)
4. Specialized production—hybrid cockerels, chicken breeds, organic chicken, etc. (2.2%)

Commercial sources of breeding stock in Kenya include one-day-old chicks from hatcheries such as Kenchic, Maluku, Kenbrid Farms, and Sigma Supplies Ltd. Kenchic is the major supplier of chicken meat. Kenya's poultry industry is composed of 29,615/1000 heads (29,615,000; FAOSTAT, 2009). This population produces about 68,600 tons of eggs. Smallholder farmers are the main actors.

### **8.2.1.4 Pork**

Kenya has a pig population of 554,301 head(FAO, 2019). Estimated slaughter volume was 12,953 tons of pork (FAOSTAT, 2017). The main pig products dealer is the Farmer's Choice Limited, with its contract farmers in Central, Eastern, Western, and Rift Valley Provinces. Farmer's Choice Limited is the main exporter and importer of pig products.

### **8.2.1.5 Milk and milk products**

Kenya's dairy sector is largely dominated by smallholder farmers, who produce more than 80% of the milk in Kenya. The majority of these smallholder farmers are organized under various dairy cooperatives for the sole reason of marketing milk. Most of the marketed milk (82%) is sold through informal marketing channels(Thorpe et al., 2000)(Erastus et al., 2014). The major processing (private/public) entities are New Kenya Co-operative Creameries Limited, Brookside Dairy Limited, and many other medium/small dairies serving an estimated 1.6m smallholder dairy farmers. The major dairy products are pasteurized and long-life liquid milk. In 2007, the country produced about 2,300 tons of butter and 330 tons of cheese (FAOSTAT, 2007).

The milk value chain has a number of food safety hazards (drug and pesticide residues, aflatoxins, heavy metals, and zoonotic diseases). In Kenya, for instance, most chemical food safety hazards originate at the farm level. The biggest challenges are drug and pesticide residues and aflatoxin M1. Drug and pesticide residues are due to lack of observing withdrawal period by farmers, especially after administering the antibiotics and pesticides. The government, in partnership with other stakeholders, have enhanced farmers' awareness through sensitization meetings and trainings on the importance of observing withdrawal period and handling of chemicals. Processors are keen on quality tests and only milk of good quality is aggregated for processing to ensure safety. On aflatoxins, farmers are sensitized on keeping quality animal feeds, knowing that poor storage conditions of animal feeds contribute to contaminations, leading to aflatoxins. The biggest challenge, however, emanates from homemade feeds that are not properly regulated or inspected. The government is improving the policy, regulatory, and standardization framework to manage the quality and safety of feeds (for example, through the draft Animal Feeds Policy and the revisions to the Fertilizer and Animal Foodstuffs Act (Cap 345). The standards for dairy products are regularly reviewed and benchmarked with those of Codex. To improve regulatory sampling and testing of milk and milk products, key government agencies have invested in laboratory capacities. These include Kenya Bureau of Standards (KEBS), Directorate of Veterinary Services, Kenya Agricultural and Livestock Research Organization (KALRO), and Kenya Dairy Board. This capacity is complemented by those of several private milk testing capacities.

Large-scale milk processors are well equipped to identify and reject contaminated milk owing to adherence to international standards. All large-scale processors have invested in modern laboratory systems that are accredited internationally, meaning they subscribe to all codes of manufacturing practices and they are closely monitored by the regulating authorities. A majority of them are also

certified to Food Safety Management Systems. On the other hand, small-scale milk traders dealing in informal milk marketing are faced with a number of challenges; including

- Lack of advanced milk testing infrastructure, including rapid kits to detect complex hazards like aflatoxins, drugs, and pesticide residues
- Lack of adequate knowledge and skills on milk handling and standards
- Lack of recommended equipment for milk handling due to lack of adequate resources

Most processors use basic milk traceability systems whereby farmers are contracted and registered either as individual farmers or through cooperative societies. They are allocated unique membership numbers for identification. Through this unique number milk can be traced back to specific source of origin. Most processors have automated their processes, including milk reception operations, improving traceability and data management. To small-scale farmers, this system can apply so long as they are:

- Adequately sensitized on traceability
- Maintain farm-level records on animal health and production among others
- Organized into groups for ease of traceability management
- Records are maintained at the point of milk aggregation, including suppliers and batch numbers.

### **8.2.2 Traceability**

Traceability is defined as the ability to trace the history, application or location of an item or Activity by means of recorded identifications. This involves two main aspects: on the one hand, Identification of the product by marking; and, on the other, the recording of data regarding the product all the way along the production, processing and distribution chain(FAO-FLEGT, 2016). This trace-back system has many potentials uses in food safety as it assigns responsibility of provision of safe food to primary producers, input manufacturers, processors, and retailers. It allows easy recall of products that are found to be unfit for human consumption.

In Kenya, trace-back systems are in operation in big private companies like Farmer's Choice Limited and Kenchic. These are privately set up systems, run by the companies to satisfy their markets' requirements.

A live animal pilot project by the Ministry of Livestock Development has shown that use of electronic transponders in the rumen of the animals can be used to trace back the origin of the



animals and may serve as a good tool for disease surveillance and control. This live animal trace-back system has not yet been operationalized.

For meat, each approved slaughterhouse/slab has a unique roller stamp that serves to identify the slaughterhouse/slab and subsequently the source of the meat. The law requires that the inspecting officer stamps the carcass where the stamp can be easily seen. The presence of this stamp assures the customer that the meat has been inspected and found fit for human consumption (GOK, Cap 356, 1977).

The stamp allows a trace back of the carcass to the originating slaughterhouse/slab. The slaughterhouses/slabs, however, lack a mechanism to link the carcass information with the movement permit data in order to trace the carcass to the area of origin of the live animal. This trace-back system would require an electronic centralized data depository and archiving system.

By law, all meat, including game, should be slaughtered at an approved slaughter facility and should display the inspection stamp (GOK, Cap 356, 1977). Fish bear no inspection marks though they are inspected. Poultry carcasses are inspected, but only one is stamped in a batch of every ten. Traceability in these two products starts mainly from the processing factories.

Milk traceability is a bit cumbersome due to bulking at various levels (collection centers, cooperatives, cooling plants, and finally at the dairy processing plants). However, the significance of traceability is not lost to the dairy sector as an e-dairy traceability pilot project by KDB is under trial. Major processing plants have operationalized trace-back systems for milk and milk products.

### **8.2.3 Marketing of animals and animal source products**

Live cattle, shoats, pigs, and poultry are traded per head at farm gate. Some livestock (cattle and shoats) are traded at livestock markets. The price is negotiated on a willing buyer/willing seller principle at farm gate and livestock markets. Cattle in some ranches, pigs, and live animals are traded per kg/live weight. After slaughter the carcasses (cattle, shoats, pigs, and poultry) are traded on kg/dressed weight. At point of sale of meat, the price is per kg weight.

The informal sector sells raw milk by volume while the formal market sells by weight. Processed liquid milk is sold by volume. Other products, like cheese and butter, are sold by weight.

#### **8.2.4 Payment for regulatory services in wet markets**

The payment for services offered by the regulatory agencies varies depending on the product. For beef, chicken, shoats, and pigs at the slaughterhouse/slab, an inspection fee is charged per head/animal. This is standardized by the MoLD. For milk, there is no fee levied on the producer by the companies as they carry out flat form tests. However, a consumer levy of 3% is charged and collected by the processor and remitted to the KDB.

#### **8.2.5 Pricing and quality**

There is no premium price levied for meat and milk products bearing inspection stamps. In slaughterhouses/slabs, meat is graded to enable the butcheries and processors to estimate the meat yield per carcass. In some instances, the price per kg is based on the grade of the carcass. For milk, quality information on the packets is mainly on the average composition. This guides the consumer on the quality type of milk he would like to purchase. All products traded must bear a logo of quality from KEBS. This logo means that KEBS has routinely sampled and tested the product and found that it complies with the relevant product standard.

Consumers in the upper- and middle-class population are aware of the standard mark of quality. In the informal sector and wet markets, quality awareness is low and mainly compromised by pricing.

#### **8.2.6 Inferior-quality products**

In situations where product quality is not enforced, products of inferior quality enter the product value chain at diverse points.

In the meat value chain, inferior meat that has not been inspected enters the chain when unscrupulous individuals slaughter animals at night, which might be at point of death or already dead, and sell the uninspected meat to unsuspecting customers.

The informally marketed milk is open to adulteration at many different points in the value chain.

#### **8.2.7 Cold chain in the product value chain**

In the meat and milk value chains, cold chain is essential for reduction of microbial proliferation that causes spoilage of the product. In the meat value chain, cold chain is not provided at all levels. At the slaughterhouse/slab, many establishments do not have cooling facilities. Carcasses are sold hot to the butcheries that equally may not have cooling facilities. Carcasses sold under this system are not expected to stay for more than two days after slaughter before they get spoilt. Few establishments (export) maintain a cold chain to product dispatch. At the retail outlets (supermarkets), most of the meat products are kept under refrigeration.

Offal from cattle and shoats is sold at slaughterhouses to consumers. Offal from cattle fetches a higher price than those from shoats. In establishments that have processing facilities, offal may be processed into by-products. Supplementing animal feeds intended for ruminants with animal source proteins was banned in 1996 because of association of Bovine Spongiform Encephalopathy (BSE) with consumption of animal feeds containing animal proteins. However, processing of offal into animal feeds for poultry is still practiced.

Milk value chain has no better cold chain than meat. After production, milk is delivered to collection centers (either owned by farmer groups, private individuals, or processing plants), bulked, and transported to processing plants. However, some of the collection centers chill the milk before delivery to the processing plants or other outlets. The main milk processing companies have embarked on schemes to promote chilling of milk by paying a premium for cooled milk. At processing, milk is under strict cold chain but after leaving the milk processing plants to points of sale, the chain is broken except for supermarkets.

## **9 Infrastructure and capacity: Availability of competent human resources, laboratory facilities, and risk analysis capacity**

### **9.1 Laboratory services in food safety**

There are various designated and gazetted analytical laboratories that provide food sample analysis as part of quality assurance and testing services that include Kenya Bureau of Standards (KEBS), Kenya Plant Health Inspectorate Service (KEPHIS), Water Resources Management Authority, Kenya Agricultural and Livestock Research Organization (KALRO), government chemist food laboratory, national public health laboratory (food and nutrition lab), University of Nairobi, Jomo Kenyatta University of Agriculture and Technology (JKUAT), Kenya Industrial Research and Development Institute (KIRDI), Nairobi City Water and Sewerage Company Limited, Lake Victoria North Catchment Area Water Laboratories, and Egerton University, among others. The private laboratories include Analabs Limited, plant nutrition laboratory services, Quest laboratories Limited, and SGS Kenya Limited, among others.

Official analytical services are provided by government laboratories. However, in case of lack of capacity, private laboratories both locally and foreign are used. The government laboratories are part of government ministries or government parastatals. An example of a private laboratory is the International Livestock Research Institute.

## **Challenges**

- The rate at which the available resources are diminishing because of the poorly performing economy.
- The budget allocations have to be trimmed and analytical services are first in line to feel the impact of these restricted budgets
- A lot of strain in the provision of efficient and quality laboratory services in public institutions. There is an overlap in food laws and this makes it difficult for the labs to understand where to start when it comes to compliance.
- Information about business licenses for private labs and the location of the testing labs is scarce

### **9.2 Training institutions**

Universities, polytechnics and technical institutes train students at certificate, diploma, undergraduate, and graduate levels in food science and technology. Three Kenyan public universities, namely Jomo Kenyatta University of Agriculture and Technology, University of Nairobi, and Egerton University, produce a combined annual turnover of about 200 graduates in food science and technology. Tertiary colleges train specifically those in the food service sector. Technical institutions, including the Kenya Industrial Research Development Institute, Kenya Medical Training Institute, Meat Training Institute, and Dairy Training Institute (DTI), train food processors and inspectors.

Research is key to evidence-based policy formulation and universities are pacesetters in research worldwide. Food science and technology research enhances food safety, reduces spoilage, and develops healthier and more appealing foods that meet consumer expectations and export potential. The impact of research output by Kenyan universities on the food industry is currently unknown. All researchers require clearance (approval and licensing) from the National Council for Science and Technology (NCST) under the Ministry of Higher Education Science and Technology. The government, through NCST, provides limited research funds for graduate Kenyan students at local universities. University–industry alliance must be strengthened to provide the needed research funds.

## Challenges

- There exists gross misplacement of personnel in the food industry despite the availability of qualified food technologists.
- Inadequate active professional societies that can regulate food manufacture and trade by imposing professional codes of practices and promotion of professional interaction and research on food processing and preservation.
- The existing Kenya Institute of Food Science and Technologists (KIFST) is a registered society currently moribund.

## 10 Effectiveness of inspection and certification procedures

Farmers, as food supply chain operators, ensure food quality and safety through variety and seed selection, soil preparation, crop and pest control management, harvesting methods, sorting, grading, and packing, guided by GAP. The Agriculture Act (Cap 318) governs the agricultural sector, whereas Agricultural Produce (Export) Act (Cap 319) provides for the grading and inspection of agricultural markets and few high-class local consumer markets are strictly active in applying Good Agricultural Practices (GAP). The Ministry of Agriculture has Agriculture Extension officers up to divisional levels to enforce GAP as stipulated in the Agriculture Act. They are very few and not adequate to cover the range of farmers and crops/animals. Farmers targeting the export market, predominantly Europe, are supported by private producer organizations such as Kenya Organic Farmers Association (KOFA) and Fresh Produce Exporters Association of Kenya (FPEAK). The associations emphasize the application of GAP by administering KenyaGAP. KenyaGAP is a private standard affiliated to the European Retailers Produce working group for Good Agricultural Practice (EurepGAP). Food safety standards in Europe emphasize traceability, maximum pesticide residue levels (MRL), and process standards. KenyaGAP certification acknowledges that exporters are meeting internationally and nationally recognized production practices and standards for fresh produce, and provides customers with a “guarantee of confidence.” Internal auditing or pre-auditing among exporters is done by FPEAK, while external certification is done by internationally recognized certification bodies such as KEBS and AfriCert. AfriCert specializes in agribusiness certification. Kenya Plant Health Inspectorate Services (KEPHIS) was established in 1996. It offers inspectorate services on all matters related to plant health and quality control of agricultural inputs and produce. These are achieved by enforcing the Plant Protection Act (Cap 324), the Seeds and Plant Variety Act (Cap 326) of 1972, the Suppression of Noxious Weeds Act (Cap 325), and the

Agricultural Produce (Export) Act (Cap 319). These legislations empower KEPHIS to implement regulations/procedures for importation/exportation of any form of plant materials, fertilizers, pesticides, and herbicides; plant breeding; and registering seed merchants.

Food processors in Kenya apply good manufacturing practices (GMP) through raw material handling and control, product and process management, and control, including documentation of all work routines and human resource management. They are supported by private organizations such as Kenya Association of Manufacturers (KAM) and Kenya Fish Processors and Exporters Association (AFIPEK). The KAM exposes its members to business information on trade regimes like the East African Community (EAC); Common Market for Eastern and Southern Africa (COMESA); South African Development Community (SADC); African, Caribbean, and Pacific-European Union (ACP-EU); and WTO. Such information includes safety and quality standard requirements the products must meet to be able to access these markets. Kenya fish industry produce accounted for 0.3% gross domestic product (GDP) for the period 1999–2003 and 30% of this was exported to Europe and other countries, namely Israel, Japan, and Australia. The industry operates under the Fisheries Act (Cap 378) Laws of Kenya that provides for development, management, utilization, and conservation of fisheries and of connected purposes. Fish export standards are based on European Union (EU) Standards such as 91/493 EU and 91/942 outlined in the Kenya Gazette Supplement No. 55 and other policy documents.

The livestock sector in Kenya contributes 3.3% of the GDP. Directorate of Veterinary Services (DVS) enforces several laws that impact livestock marketing. These include the Animal Diseases Act (Cap 364) of 1972 (revised in 1989), the Dairy Industry Act (Cap 336), the Pig Industry Act (Cap 361) and the Meat Control Act (Cap 356). The Meat Control Act (Cap 356) is applied by both the DVS and DPH. Approximately 88% of marketed milk in Kenya is sold unprocessed, outside regulated channels. The DVS and Kenya Dairy Board (KDB) play both the supporting and enabling roles by promoting and regulating activities in the dairy/livestock sector.

## **11 Local and international trade-level of implementation of SPS measures**

Food standards give specifications for the compositional requirements, microbial requirements, tolerance limits for contaminants, packaging, labelling, and the hygiene conditions necessary for manufacture of products. Kenyan standards are practically adopted from international ones, International Organization for Standardization (ISO) and Codex Alimentarius Commission – Codex

(CAC), following the philosophy of World Trade Organization (WTO) Sanitary and Phytosanitary Standards (SPS) and Technical Barrier to Trade (TBT) agreements. According to WTO, food safety issues are the realm of SPS agreement while TBT considers food quality issues.

Foodborne diseases remain a problem in Kenya. Approximately 70% of all episodes of diarrhea are attributable to ingestion of contaminated food and water. Processed foods constitute 75% and 25% of the diets in the urban and the rural areas of Kenya, respectively. The informal sector in the food industry comprises small and medium-sized enterprises (SME) and food vendors, which supply at least 80% of the food products to domestic markets, including meat and milk, under rudimentary hygiene controls. Aflatoxin poisoning during January–June 2004 in Eastern Kenya resulted in a total of 317 reported cases with 125 deaths. Maize sampled from the affected area had aflatoxin B1 concentrations of 4400ppb, which is 220 times greater than the 20ppb allowed by food safety standards. Fatalities linked to the consumption of meat from Rift Valley Fever infected animals have caused public health concerns in the recent past, indicating the weaknesses of food safety control agencies in Kenya.

The liberalization of agro-industrial markets and the worldwide integration of food supply chains have made the assurance of food quality and safety a major concern. Approximately 75%–80% of the Kenyan population is dependent on subsistence agriculture economy and 20% of all the agricultural food commodities are marketed. Global trading needs standardized products under the WTO's SPS and TBT agreements. Legal requirements for quality assurance systems and food safety controls along the entire food chain have increased considerably. The major prerequisite for ensuring food quality and safety is that all stakeholders in the food supply chain recognize that primary responsibility lies with those who produce, process, and trade, and that public control should be based on (scientific) risk assessment.

## **12 Information, education, and communication**

There is minimal awareness and application of basic hygiene practices among food handlers and consumers. Consumers participate in the food supply chain through product selection, storage, preparation, consumption, and disposal of household waste. By reading the food labels, they ensure that the products meet safety standards. They should demand the “diamond mark” of quality that indicates that the product has been certified by KEBS as safe and of the right quality. Consumer organizations in Kenya include the Kenya Consumers Organization, Consumer Information

Network, and Consumer Insight, among others. They aim to protect consumers against unfair trade practices and purchase of unsafe or substandard food products, as well as representing consumers at the National Codex Committee. Kenyan consumers are uninformed on their rights, yet the fundamental duty of any consumer organization should be consumer education focusing on consumer rights. Poverty with attendant food insecurity hinders effective participation by Kenyan consumers in the food supply chain.



## Annex

**Table 4: Main stakeholders in food safety in Kenya – ASF & FV**

Agency	Ministry	Level in food chain	Laws	Implementation mechanisms
Department of Environmental/ Public Health	Health	-Production -Processing -Handling -Storage -Distribution -Premises -Service -Products	-Public Health Act (Cap 242) (Rev.2012) -Food, Drugs and Chemical Substances Act (Cap 254) (Rev. 2012) -Radiation Protection Act (Cap 243) -Liquor Licensing Act (Cap 121) -Traditional Liquor Act (Cap 122) -Meat Control Act (Cap 356) (Rev. 2012) -Alcoholic Drink Act (2012) -Biosafety Act (2009)	<b><u>National</u></b> -Regulations (food standards, food production, and service premises) -Issue of health certificates (import/export) -Surveillance (food premises, imports, production, personnel, disease) -Laboratory support services (pathogens, aflatoxins, water) -Capacity building -Policy research and national surveys -Risk management and communication -Consumer information

				<p><b><u>County</u></b></p> <ul style="list-style-type: none"> <li>-Food hygiene license</li> <li>-Inspection, licensing</li> <li>-Surveillance (food premises, imports, production, personnel, disease)</li> <li>-Closure of premises, withdrawal and recall orders</li> <li>-Power to prosecute</li> <li>-Risk management and communication</li> <li>-Extension services in public health concerns during production</li> </ul>
National Public Health Laboratories	Health	<ul style="list-style-type: none"> <li>-Production</li> <li>-Processing</li> <li>-Handling</li> <li>-Storage</li> <li>-Distribution</li> </ul>	<ul style="list-style-type: none"> <li>-Food Drugs Chemical Substances Act (Cap 254) (Rev.2002)</li> <li>-Public Health Act (Cap 242)</li> </ul>	-Analysis of all food articles

			-Products		
Kenya Medical Research Institute (KEMRI)	Health		-Research and Development  -Services (medical examination)	Research laws	-Human disease control (foodborne illnesses)  -Training, research, and surveillance  -Laboratory analysis  -Biotechnology
Pharmacy and Poisons Board	Health		Production input	Pharmacy and Poisons Act (Cap 244)	-Evaluation, approval, and registration of human drugs  -Licensing and inspection of human drugs' local production  -Import/export  -Distributors  -Warehousing  -Surveillance
Directorate of Veterinary Services	Ministry of Agriculture, Livestock, Fisheries and		-Production  -Processing	-Animal Diseases Act (Cap 364)  -Meat Control Act (Cap 356)	<b><u>National</u></b>  -Regulations (animal health, diseases, veterinary drug residues)

	Cooperatives (MOALF&C)	<ul style="list-style-type: none"> <li>-Storage</li> <li>-Distribution</li> <li>-Handling</li> <li>-Marketing</li> </ul>	<ul style="list-style-type: none"> <li>-Fertilizer and Animal Feedstuffs Act (Cap 345)</li> <li>-Public Health Act (Cap 242)</li> <li>-Food, Drugs and Chemical Substances Act (Cap 254)</li> <li>-Dairy Industry Act (Cap 336)</li> </ul>	<ul style="list-style-type: none"> <li>-Inspection, licensing, and issue of health certificates (animals for slaughter and transportation, premises, animal products, export, imports)</li> <li>-Surveillance (animal health, disease, drugs and pesticides, meat, and milk)</li> <li>-Laboratory analysis (drugs, pesticides, chemicals, pathogens) also in collaboration with research institutions</li> <li>-Capacity building on veterinary public health, including feeds and feedstuffs</li> <li>- Development of standards in collaboration with KEBS</li> </ul> <p><b><u>County</u></b></p> <ul style="list-style-type: none"> <li>-Extension services in veterinary public health concerns during production.</li> <li>-Inspection and licensing of slaughter premises</li> </ul>
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				<ul style="list-style-type: none"> <li>-Issuance of movement permits for animals</li> <li>-Livestock marketing</li> <li>-Transport certification for animals and animal products</li> <li>-Livestock disease and pest control</li> <li>-Animal welfare</li> </ul>
Directorate of Livestock Production	MOALF&C	<ul style="list-style-type: none"> <li>-Production</li> <li>-Processing</li> <li>-Storage</li> <li>-Distribution</li> <li>-Handling</li> <li>-Marketing</li> </ul>	<ul style="list-style-type: none"> <li>-Fertilizer and Animal Feedstuffs Act (Cap 345)</li> <li>-Kenya Meat Commission Act (Cap 363)</li> </ul>	<p><b><u>National</u></b></p> <ul style="list-style-type: none"> <li>-Policy, strategies, laws, and regulations</li> <li>-Development of standards in collaboration with KEBS</li> <li>-Policy research</li> <li>-Capacity building</li> <li>-Marketing research and development</li> </ul>

				<u>County</u> -Livestock extension services -Livestock production and marketing -Livestock promotion and development
Veterinary Medicine Directorate (VMD)	MOALF&C	Production input	VMD Regulations (2015)	-Evaluation, approval, and registration of veterinary drugs -Advisory services -Licensing and inspection of local production import/export -Distributors -Warehousing -Surveillance
Kenya Dairy Board	MOALF&C	-Production -Processing -Distribution -Marketing	-Dairy Industry Act Cap 336 -Food, Drugs and Chemical Substances Act (Cap 254) -Public Health Act (Cap 242)	-Regulation of production, processing, marketing, and distribution of dairy produce -Market research -Quality assurance
Kenya Fisheries Service (KFS)	MOALF&C	-Handling -Processing	Fisheries Management and development Act (2016)	<u>National</u>

		<ul style="list-style-type: none"> <li>-Distribution</li> <li>-Premises</li> <li>-Storage</li> </ul>		<ul style="list-style-type: none"> <li>-Regulations on fish hygiene and quality assurance</li> <li>-Inspection, licensing, and issue of health certificates for export/import of fish products</li> <li>-Inspection of fish premises, landing beaches, and vessels for export</li> <li>-Development of standards for fish products and fish feeds in collaboration with KEBS</li> <li>-Laboratory services</li> <li>-Capacity building</li> <li><b><u>County</u></b></li> <li>-Inspection, surveillance, and licensing (landing beaches, vessels, and premises)</li> <li>-Fishery extension services</li> <li>-Local fish marketing</li> </ul>
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Kenya Marine and Fisheries Research Institute (KeMFRI)	MOALF&C	The entire value chains	Science, Technology and Innovation Act (2013)	Country-wide research stations for marine and freshwater fisheries
State Department of Agriculture	MOALF&C	-Production -Processing -Storage -Distribution -Handling -Marketing	Crops Act (2013)	<b><u>National</u></b> -Policy, strategies, laws and regulations -Development of standards in collaboration with KEBS -Policy research -Capacity building -Marketing research and development <b><u>County</u></b> -Agriculture extension services -Crops production and marketing -Crops promotion and development
Pest Control Products Board (PCPB)	MOALF&C	-Production input -Storage	Pest Control Products Act (Cap 346)	-Registration of pesticides



		-Distribution		-Inspection, surveillance, and licensing (premises, exports/imports, industry, market)  -Information dissemination  -Training and advisory (pesticide use)
Kenya Plant Health Inspectorate Services (KEPHIS)	MOALF&C	-Production inputs  -Production  -Implementation of official controls at farm level and points of exit and entry  -Products  -Markets  -Transportation  -Importation and exportation  -Grading at points of entry	-KEPHIS Act 54 (2012)  -Fertilizer and Animal Foodstuffs Act (Cap 345)  -Pest Control Products Act (Cap 346)  -Plant Protection Act (Cap 324)  -Seeds and Plant Varieties Act (Cap 326)	-Plant health regulations  -Inspection (farm, market, exports/import licensing, and health certificates)  -Surveillance (diseases, pests, pesticides, and fertilizers)  -Laboratory analysis (produce, pesticides, fertilizers, soil, commodities)  -Information dissemination  -Training and advisory (fertilizer use)  -Phytosanitary certification  -Seed certification  -Plant variety testing and release

				-Plant breeders rights registry
Kenya Agricultural Livestock Research Organization (KALRO)	MOALF&C	Food crops and livestock research	KALRO Act (2013)	-Research and development -Plant/seed varieties -Biotechnology -Animal and plant disease research -Information dissemination and advisory -Laboratory analysis in relation to research
Agriculture and Food Authority (AFA)  <u>Departments</u>  Horticultural Crops Department	MOALF&C	-Production -Processing -Marketing -Grading -Storage	AFA Act (2013)	-Regulation and promotion of agriculture -Inspection and licensing horticultural processors and exporters -Inspection and licensing of fruit tree nurseries

<p>Department of Nuts and Oil Crops</p> <p>Sugar Department</p>		<ul style="list-style-type: none"> <li>-Collection</li> <li>-Transportation</li> <li>-Warehousing</li> </ul>		<ul style="list-style-type: none"> <li>-Laboratory services in collaboration with KEPHIS</li> <li>-Management of warehouses for export of horticultural crops</li> <li>-Surveillance for GAP (horticultural farms)</li> <li>-Quality assurance assistance</li> <li>-Specialized training and advisory on horticulture</li> </ul>
<p>Kenya Bureau of Standards (KEBS)</p>	<p>Industrialization Trade and Co-operatives</p>	<ul style="list-style-type: none"> <li>-Inputs (production and processing)</li> <li>-Production</li> <li>-Processing</li> <li>-Distribution</li> <li>-Handling</li> <li>-Packaging</li> <li>-Product</li> </ul>	<p>Standards Act (Cap 496)</p>	<ul style="list-style-type: none"> <li>-Development of national standards</li> <li>-Inspection, surveillance, and issuance of certificates/reports of analysis (industry, market, exports/imports)</li> <li>-Product certification</li> <li>-HACCP compliance audit certificates</li> <li>-Laboratory analysis (pathogens, heavy metals, pesticides, aflatoxins, water)</li> </ul>

		-Management systems		-Information dissemination (standards, HACCP)  -Training and advisory (standards, HACCP, ISO 9001, 14000)  -System certification
National Commission for Science, Technology and Innovation	Ministry of Education, Science and Technology	Research approvals and licensing	Science, Technology and Innovation Act (2013)	-Policy development and advancement of science and technology  -Approval of research and development and licensing
National Biosafety Authority (NBA)	Ministry of Education, Science and Technology	-Production  -Handling  -Storage  -Distribution  -Processing and marketing of genetically modified (GM) foods	Biosafety Act (2009)	-Regulations of Genetically modified organisms (GMOs) (Contained-use; Environmental release; Import, export and transit; Labelling)  - GMO surveillance  -National Bio-safety clearing house  -Approval of research and development for GMOs

				-Issues      GMO-free      certificates (import/export)  -Biosafety awareness crea
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**Table 5: Food supply chain actors, stakeholders, and their mandate in ensuring food safety**

<b>ACTOR</b>	<b>GUIDING PRINCIPLE</b>	<b>COMPOSITIONAL</b>	<b>GOVERNINING ACTS/LAWS</b>	<b>SUPPORTING ORGANIZATIONS</b>
Farmers	GAP	Variety and seed selection, soil preparation, crop and pest control management, harvesting methods, sorting, grading, and packaging	<ul style="list-style-type: none"> <li>▪ Agriculture Act (Cap 318)</li> <li>▪ Agricultural Produce (Export) Act (Cap 319)</li> </ul>	<ul style="list-style-type: none"> <li>▪ County governments: sub-county agricultural officers (SCAO)</li> <li>▪ Kenya Organic Farmers Association (KOFA)</li> <li>▪ Fresh Produce Exporters Association of Kenya (FPEAK)</li> <li>▪ Kenya Plant Health Inspectorate Services (KEPHIS)</li> <li>▪ Horticultural Crops Development Authority (HCDA)</li> </ul>
Food processor	GMP	Raw material handling and control, product and process management and control (including documentation of all work routines), and human resource management	<ul style="list-style-type: none"> <li>▪ Weights and Measures Act (Cap 513)</li> <li>▪ Trade Descriptions Act (Cap 505)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Kenya Association of Manufacturers (KAM)</li> <li>▪ Kenya Fish Processors and Exporters Association (AFIPEK)</li> </ul>
Food importers, wholesalers, and retailers	<ul style="list-style-type: none"> <li>▪ GDP</li> <li>▪ EurepGAP</li> <li>▪ British Retail Consortium (BRC) Global</li> </ul>	Avoidance of failure, whether in development, manufacture, distribution, advertising, or sale of food products to the consumer	<ul style="list-style-type: none"> <li>▪ Public Health Act (Cap 242)</li> <li>▪ Food, Drugs and Chemical Substances Act (Cap 254)</li> <li>▪ Weights and Measures Act (Cap 513)</li> <li>▪ Trade Descriptions Act (Cap 505)</li> </ul>	<ul style="list-style-type: none"> <li>▪ KEBS</li> </ul>

Consumers		Product selection, storage, preparation, consumption, and disposal of household waste	<ul style="list-style-type: none"> <li>▪ The Consumer Protection Department enforces Parts VI (Sections 55 to 70) of the Competition Act</li> </ul>	<ul style="list-style-type: none"> <li>▪ Kenya Consumers Organization</li> <li>▪ Consumer Information Network</li> <li>▪ Consumer Insight</li> </ul>
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