



Food Legislation and Fraud in the Kenyan Beef Trade: A Review

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Abstract

Beef is the most consumed red meat in Kenya. Over the years, incidents of beef fraud, described as the false substitution of non-cattle meat for beef, have been on the rise, with the sale of donkey meat being the most prevalent. The slaughter and consumption of donkey meat perpetually occur in the geographically secluded backyards of select donkey-keeping communities, despite the government's declaration of the donkey as a food animal in 1999. However, the meat of illegally slaughtered donkeys and wildlife has been intercepted in transit or at retail, to unsuspecting beef consumers on numerous occasions. Therefore, the study objective was to determine the factors along the beef value chain that lead to beef misrepresentation. A Google Scholar search performed between March and May 2025 identified relevant articles published between 2015 and 2025. The search strategy generated 52 articles that met the inclusion criteria suitable for critically analyzing beef value chain actors, their activities, and prevailing circumstances. Food laws and legal frameworks were scrutinized using the strength, weakness, opportunity, and threat (SWOT) tool to identify their impact and effectiveness in addressing beef fraud in the domestic market. The review found that the lucrative global donkey skin trade incentivized beef fraud, in addition to the presence of informal value chain actors, non-digitization of livestock and meat mobility certificates, weak regulatory enforcement of the subsector, and poor business ethos. This study recommends implementing the National Food Safety Policy, which outlines the establishment of a specific legal framework to mitigate beef fraud risk. Public-private partnership research on the nutritional, therapeutic, and sensory quality of donkey meat

should be prioritized to support the Government's intended outcome of enhancing food security, guaranteeing meat safety, consumer confidence, and fair beef trade.

Subject Areas

Food Science & Technology

Keywords

Beef Fraud, Legislation, Value Chain, Donkey Meat, Domestic Market

1. Introduction

The livestock sector plays a vital role in Kenya's economy, contributing at least 12% of the overall GDP and approximately 42% of the agricultural GDP. Livestock also contributes 22% to food systems GDP, food and nutrition security, and livelihoods [1]. Of the red meats commonly consumed in Kenya (beef, mutton, goat, and camel meat), beef is the most consumed, with a per capita consumption of 12 kg out of the overall 15.08 kg of red meat [2]. Although the slaughter of the less accepted red meats of donkey and horse had been provisioned for in the Meat Control (Local Slaughterhouse) Regulations, 2010 [3], principally to boost food security and curb bush slaughter, their public slaughter and retail are uncommon. Donkeys are predominantly slaughtered in the backyards of the Turkana community, which accepts the consumption of their meat [4] and reveres it for its nutritional and therapeutic attributes [5]. However, as a consequence of the global donkey skin trade, which has created a disproportionately higher demand for donkey skins than for donkey carcasses, the abundant availability of donkey meat has created an opportunity for fraudsters to illicitly trade it in the beef market.

To date, there is no harmonized definition of food fraud [6] [7]; however, several descriptions in academic literature and by regulatory bodies regularly allude to food fraud as the intentional placing of food in the market after part of it or the food in its entirety has been "substituted", "adulterated", "tampered", "modified", or its packaging and other associated documents have been presented with misleading information to deliberately misinform or deceive the consumer for economic gain or financial advantage [7]. An international survey on food fraud and related terminologies summarized food fraud as "illegal deception for economic gain using food" [7]. Therefore, in this publication, beef fraud is defined as the intentional substitution of non-cattle meat for beef for economic gain.

Beef fraud, particularly when beef is substituted with donkey meat, is a rising concern in Kenya, as it undermines consumers' informed choices, meat safety, public health, public trust, and places genuine beef traders at a competitive disadvantage. A consumer preference study (n = 857) reported a reduction in beef consumption when 19% and 10% of high- and middle-income earners, respectively, were suspicious of the product's genuineness [2]. Several legislative Acts, namely

the Standards Act (Cap 496) [8], the Competitions Authority Act [9], Consumer Protection Act [10], and Trade Description Act [11], have provisions to protect consumers from unfair and misleading trade practices. Despite elaborate legislation, beef fraud persists, with an increasing number of undeclared animal species, both livestock and wildlife. A recent media exposé reported on a criminal syndicate of donkey owners, livestock brokers, slaughter facilities, and hide traders involved in the malpractice [12]. This exposé highlights the increasing organization of beef value chain actors, entrepreneurs, and rogue law enforcement officers incentivized to engage in beef fraud. Currently, researchers in Kenya have not treated beef fraud detection in much detail, and much of the detection is done subjectively. One recent study [13] used emerging technologies to authenticate the origin of meat from various animal species; however, the routine application of such technology by veterinary and public health inspectorates remains a challenge due to inadequate human, technical, and infrastructural capacity, resulting in insufficient regulatory oversight [14]-[17].

Few published studies have examined the opportunities that lead to beef fraud in Kenya. Using a value chain approach, this study conducted a systematic review of earlier studies to determine the opportunities and motivations leading to beef fraud, with a central focus on beef industry actors and their activities. The activities of beef value chain actors (individuals, companies, or institutions that participate in the movement of cattle and beef, vertically along the value chain up to the final consumer) were studied to address vulnerabilities to beef fraud. Food safety and trade policies and laws were scrutinized by conducting a SWOT analysis to identify their impact and effectiveness in addressing beef fraud. Additionally, this review examined legislative documents pertaining to donkey slaughter. The 3 review questions were, “What are the prevailing causal factors along the beef value chain that may contribute to beef fraud?”, “What weaknesses exist in Kenya’s current food legislation that hinder the effective regulation of beef fraud?” and “Does legislation shape consumer perceptions of donkey meat as a legitimate food source?” If left unchecked, this situation will lead to a vulnerable beef safety environment that produces meat of unknown origin [16]. The effective regulation of the beef industry will protect beef consumers against beef fraud, prevent meat-borne illnesses from uninspected animals, and boost a stronger brand reputation for the domestic red meat industry. Therefore, the results of this study make a major contribution to research on the sustainable production and trade of genuine, safe, traceable, and legally compliant beef.

2. Methodology

This descriptive research relied on secondary data obtained from a Google Scholar search to identify opportunities and vulnerabilities for beef fraud along the beef value chain and across food legislation. The search adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [18]. PRISMA guidelines were used to select the search terminologies based on the population, intervention, comparison groups, and outcome (PICO). The search conducted

between March and May 2025 identified relevant articles published from 2015 to 2025, and the search terms used are summarized in **Table 1**.

Table 1. Review Search Strategy.

PICO Strategy	Search terms
population	“beef value chain” OR “actors” OR “slaughterhouse” OR “butcherries”
intervention	“food safety policy” OR “legislation” OR “inspection” OR “enforcement” OR “transportation” OR “regulation”
comparison groups	“beef” OR “red meat” OR “illicit meat” OR “game meat” OR “donkey meat”
outcome	“fraud” OR “beef fraud” OR “meat fraud” OR “meat misrepresentation” OR “meat malpractice” OR “meat adulteration”

Inclusion and exclusion criteria of literature sources

The studies included addressed the activities of beef value chain actors, incidences of beef fraud, and food laws. Food legislation documents were scrutinized to identify their objectives, contexts, impact, and effectiveness in addressing beef fraud. Previous studies have utilized the SWOT analysis technique to analyze policies [19]. Therefore, this study used the SWOT analysis technique to identify internal factors (strengths and weaknesses) and external factors (opportunities and threats) across the legislative documents. These included the drafted National Food Safety Policy [16], together with 7 food-related Acts of Parliament namely; Meat Control Act [3], Public Health Act [20], The Animal Diseases (Animal Identification and Traceability System) Regulations [21], Trade Descriptions Act [11], Competitions Authority Act [9], Consumer Protection Act [10], and the Standards Act [8].

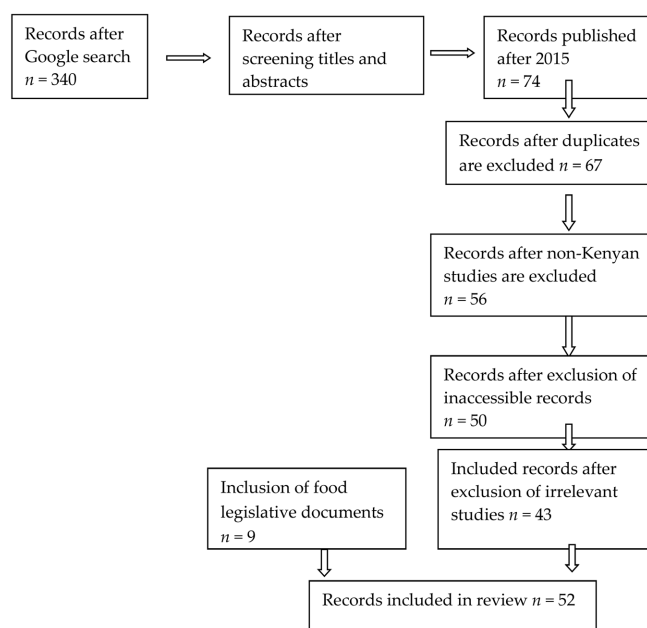


Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) diagram illustrating the search process.

In total, 112 articles were identified. Articles were screened for inclusion based on their titles and abstracts. Comprehensive screening was performed by reading the articles' introduction, findings, and discussion sections whenever necessary. Microsoft Excel was used for screening, and articles were excluded based on the following exclusion criteria; studies conducted outside of Kenya, duplicate articles, publications written in languages other than English, studies older than 2015, articles without full text accessibility, and topics that were deemed irrelevant. The pertinent papers were saved and downloaded for inclusion and screening. A total of 52 articles were reviewed, including nine food legislative documents, 24 journal papers, 8 governmental and institutional reports, six media articles, three books, two theses, and one court case, as illustrated in the PRISMA flow diagram in **Figure 1**. Article citation information was uploaded into the Mendeley reference software.

3. Results

3.1. Donkey Meat in Kenya

The presence of donkeys in Kenya's farming systems is invaluable, offering direct income through draught power services of transportation and farm work, as well as through the sale of donkey manure [22]. In rural and peri-urban informal sectors, donkeys support women in performing their duties as caregivers or household and farm workers by shortening time and sparing energy in transporting water and other commodities [22] [23]. Despite donkey meat consumption being documented in Kenya, it remains a cultural peculiarity of the Turkana community, referred to by its local name "*Epong Edewa*". The meat and its soup are utilized for their therapeutic capacity against various ailments such as stomach ache and skin rashes, and as an immune booster [4] [5]. Despite this belief, other regions of Kenya and even cosmopolitan areas of Turkana have not adapted to the consumption of donkey meat [5]. Even with the population's unwillingness to accept donkey meat, the Kenyan government officially designated donkeys as food animals, alongside horses, rabbits, quails, and ostriches, in Legal Notice No. 146 of 1999, which aimed to counter bush slaughter and boost food security by increasing sources of animal-derived proteins [24]. To date, this provision remains valid under the current legislation of the Meat Control (Local Slaughterhouses) Regulations [3]. Following the revision of this regulation, and the prevailing demand for donkey skin from China, an opportunity presented itself where between April 2016 and December 2018, the Government licensed 4 slaughter facilities in donkey-dense population areas (Turkana, Baringo, Nakuru and Machakos) to slaughter and process donkey meat for export. During this period, a study revealed that 15.4% of Kenya's donkey population had been slaughtered in these slaughterhouses. The authors suggested that the actual figures might be higher due to widespread unreported bush slaughter, which fueled the illegal trade in donkey skins [4]. In the same year, reports surfaced that approximately 3000 donkeys were smuggled into Kenya from Ethiopia via the Moyale border to meet the demand

from the Baringo and Nakuru donkey slaughterhouses [25]. It appears that the misrepresentation of donkey meat as beef in Kenya's domestic market is a result of the more profitable global donkey skin trade, rather than an overwhelming demand for beef. Following the report on the declining donkey population [4], by March 2020, the Ministry of Agriculture banned donkey export licenses through Legal Notice Number 63 of 2020 [24]. However, due to the government's failure to respond, the High Court overturned the ban in May 2021, leading to the continued slaughter of donkeys for meat and hide export across four export-oriented slaughterhouses [24]. In light of this, the Kenya Veterinary Association in 2025 petitioned for a total ban on donkey slaughter and the export of its skin, arguing that the trade poses threats to public health, animal welfare, and Kenyan culture [26].

3.2. Pre-Slaughter Proponents of Beef Fraud

Several studies on the Kenyan beef value chain reveal its fragmented and intricate structure across various beef production regions, attributed to its multiple pathways, the influence of seasonality, and the mobility inherent in pastoralism [1] [27]-[29]. Opportunities for beef fraud have been identified by examining the activities of the actors within the beef value chain, and these have been categorized into pre-slaughter and post-slaughter elements.

3.2.1. Input Suppliers: Purchase of Cattle

At the initial stage of the beef value chain, cattle breeds are purchased for slaughter through both formal and informal channels. Informal cattle trade prevails in livestock markets nationwide, where buyers and traders agree to transact using cash or mobile money transfers, leaving no paper trail [28] [29]. This absence of ownership and transactional documentation, along with a lack of record-keeping in informal markets, creates opportunities for livestock and meat fraud later in the supply chain.

3.2.2. Livestock Keepers: Production System

The primary beef production system in Kenya is pastoralism, where pastoralists engage in transhumance and nomadism [30], a mobility strategy employed to manage drought, other climate risks, and to diversify livelihoods [27]. While pastoralism and agro-pastoralism are subsistence-focused, other beef production systems, such as ranching and feedlots, are commercially driven and operate as registered businesses [30]. This study reveals that pastoralism poses distinct challenges for animal and food traceability due to the unpredictable movements of livestock keepers and herds, as well as the absence of a fixed "farm", a situation that could be exploited by fraudsters to perpetrate beef fraud.

3.2.3. Livestock Traders: Transportation of Cattle

Livestock traders are crucial in both the formal and informal sectors of the beef

value chain, serving as intermediaries between livestock producers and markets. They facilitate the transport and trade of livestock and livestock products, share market information, and negotiate prices [27] [28]. In Kenya, the two primary methods of transporting cattle—trekking and using trucks or lorries—are influenced by factors such as herd size, cost, road conditions, and the animal's health status [28] [31]. However, like many livestock owners, numerous livestock traders remain unregistered, a situation that compromises the safety and integrity of the beef supply chain by providing opportunities for beef fraud. Before livestock can be moved, a no-objection permit and a movement permit [31] [32]—official handwritten documents from a sub-county veterinary officer—are required, granting permission for specific livestock to be transported from one location (e.g., point of sale) to another (e.g., farm or slaughterhouse). The absence of livestock trader registration and digitalized trade documents increases the risk of beef fraud, allowing unscrupulous traders to falsify information about livestock origin, species, and herd size along the supply chain.

3.3. Slaughter and Post-Slaughter Proponents of Beef Fraud

3.3.1. Slaughter Facilities: Categorization and Inspection

Slaughterhouses play a crucial role in transforming livestock into meat through the process of slaughter. The Meat Control (Local Slaughterhouses) Act classifies these facilities primarily based on the daily volume of animals slaughtered, categorizing them as large (category A), medium (category B), and slaughter slabs (category C) [7]. However, recent data from the Directorate of Veterinary Services reveals that approximately 26% (478 out of 1831) of these facilities operate without categorization [33]. Before slaughter, antemortem inspections are conducted to identify the livestock species, breed, and sex, and to check for any signs of animal diseases. Postmortem inspections ensure that the meat, offal, and organs are fit for market distribution [32]. Despite these measures, studies have highlighted the absence or inconsistency of both antemortem and postmortem inspections, leading to uninspected meat being sold in butcheries [34] [35]. This issue is exacerbated by the limited capacity of the meat inspectorate [8], allowing uninspected meat from various livestock sources to be sold, potentially being misrepresented as other types of meat [13].

3.3.2. Transportation of Beef

After purchasing meat from a slaughter facility, a meat transportation certificate [32] issued by the meat inspector is required for its transport. This handwritten document indicates the meat's origin and destination [29] but is susceptible to fraudulent reproduction by dishonest transporters. Since 2009, this study has documented 16 instances where donkey and game meat (including zebra, wildebeest, and buffalo) en route to major towns were intercepted by either the Kenya Police or Kenya Wildlife Service officers, as detailed in **Table 2**. The geographical distribution of these incidents is illustrated in **Figure 2**.

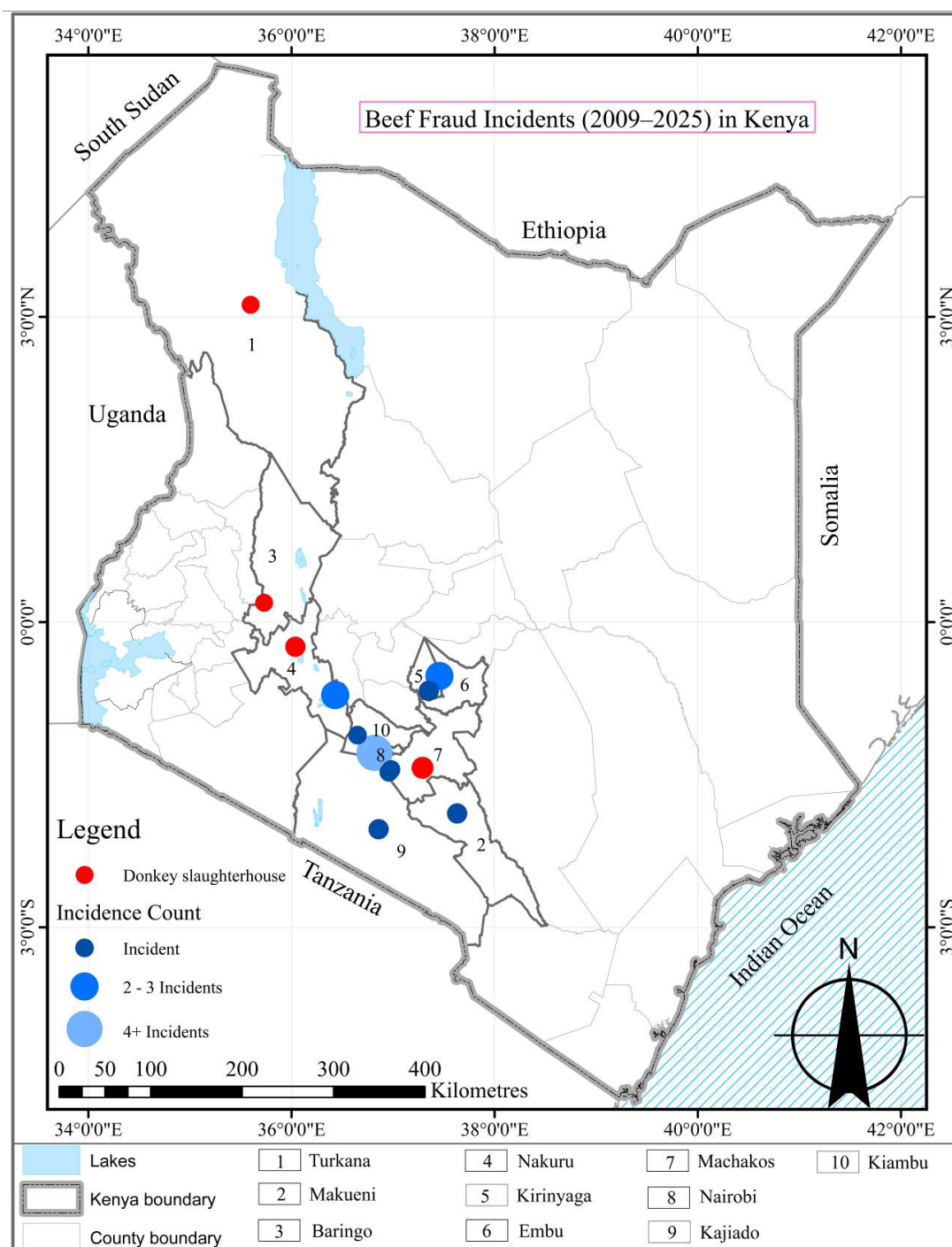


Figure 2. Geographical distribution of beef fraud incidents in Kenya.

Table 2. Reported beef fraud incidences in Kenya (2009-2025).

County	Year	Incident	Value chain point of weakness
Nairobi	2009	Zebra and wildebeest meat seized on transit to Nairobi	Meat transport
Nakuru	2011	Arrests of zebra bush slaughter near Naivasha town.	Slaughter
Kajiado	2012	Reports of sale of donkey meat in Kitengela	Meat retail

Continued

Nairobi	2019	800kg zebra meat seized on transit to Burma Market	Meat retail
Nakuru	2020	200kg buffalo meat seized on transit to Nairobi	Meat transport
Machakos	2022	Reports of donkey bush slaughter in Athi River	Slaughter
Nakuru	2022	Reports of donkey bush slaughter in Mbaruk	Slaughter
Embu	2023	Donkey theft and bush slaughter	Slaughter
Kirinyaga	2023	Donkey theft and bush slaughter	Slaughter
Makueni	2023	15 donkeys stolen and bush slaughtered at Kwa Kathoka	Slaughter
Kiambu	2023	Reports of 25 donkey carcasses found in Ndeiya forest	Slaughter
Nairobi	2023	Arrested with donkey meat intended for sale in Burma market	Meat retail
Nairobi	2023	Donkey meat from Makueni seized on transit to Shauri Moyo market	Meat transport
Embu	2025	1500 kg donkey meat seized on transit to Embu town.	Meat transport
Embu	2025	2000 kg donkey meat seized on transit to Embu town.	Meat transport

3.3.3. Retail Outlets: Monitoring and Inspection

Meat retail outlets are licensed by the respective County and inspected by public health officers. However, inadequate monitoring and inspection of such outlets have been reported, due to strained human capacity and insufficient infrastructural and economical capacity, posing concern for beef fraud and other emerging and re-emerging food safety issues [16]. This situation is explained by the presence of an extensive base of butcheries and red meat retail outlets against a very narrow inspectorate in the department of public health. According to a laboratory mapping report, the country has 7 National Public Health Laboratories with 86 staff. Furthermore, inspection resources at these facilities have prioritized the testing of communicable diseases, notifiable trade diseases, aflatoxins, zoonoses and bacterial diseases of food safety concern [36].

3.4. Effectiveness of the Food Safety Policies and Legal Frameworks

Food safety regulation in Kenya encompasses a variety of laws, policies, legislation, and acts, under multiple ministries and agencies, all of which function to assure public health, food security, and trade [16]. Over the years, food safety components have been introduced in food legislation and their chronology is summarized in **Table 3**.

Table 3. Chronology of food safety development in Kenya.

Year	Food safety development	Provision
1974	Standards Act, Cap 496	Promote the standardization and specification of commodities
1978	Food, Drugs and Chemical Substances Act, Cap 254	Prevention of selling of adulterated or falsely labelled/marketted food, drugs and chemical substances

Continued

1980-1991		Amended to strengthen regulatory framework for food hygiene
1999	Legal Notice Number 146 of 1999	Declares donkey, horse, rabbits and other animals as food animals
2002	Public Health (Meat Inspection) Rules, Cap 242	Consumer protection through inspection of meat
2010	Competitions Authority Act	Consumer protection from unfair and misleading market conduct
2012	Consumer Protection Act	Consumer protection from prevention of unfair trade practices in consumer transactions
2012	Meat Control Act Cap 356 (1980)	Production of wholesome meat via meat inspection at slaughter facilities Amended to refine post-mortem inspection and meat condemnation procedures
2012	Trade Description Act, Cap 505	Prohibit misdescriptions, false or fraudulent indications on goods and services
2020	The Animal Diseases Act (Animal Identification and Traceability System) Regulations	Procedures and means for identification and traceability of animals and animal products
2021	National Food Safety Policy framework	Creation of an integrated system for managing food safety and control.
2023	The Food and Feed Safety Control Co-ordination Bill	Strengthening food safety governance and coordination across public institutions and county governments

A review of crucial legislative documents revealed their impact and effectiveness in addressing beef fraud in the country.

3.4.1. National Food Safety Policy (2021) Draft

The National Food Safety policy (2021) draft's [16] overarching objective is to ensure that customers are protected by safe food through coordinating local food control with regional and international standards, in order to facilitate trade and raise food safety awareness. Different from its 2013 predecessor policy document that lacked clarity in its institutional set up, roles and functions, resulting in overlapping mandates of the institutions, the draft policy will be implemented through the national food control strategy that will leverage on strengthening food safety institutional frameworks, and infrastructure and enhancing compliance to food safety requirements. While the policy has not defined food fraud, it outlines it among other emerging and re-emerging food safety issues (food adulteration, mislabeling, poor ethos) under Policy Issue No. 7. Consequently, the policy pledges to establish a research framework for risk mitigation, to strengthen enforcement to curb the malpractices and improve surveillance capabilities regarding food fraud [16]. All these will be subject to a successful implementation framework, financing model and oversight.

3.4.2. Meat Control Act, Chapter 356

The Meat Control Act Chapter 356 (Revised 2012) [3], under the Ministry of Ag-

riculture's Directorate of Veterinary Service (DVS), exerts control to be exercised over meat and meat products intended for human consumption. The Act regulates licensing of slaughter and meat processing facilities, specifies standards for their operations, controls the inspection and supervision of facilities, operations, products and personnel, controls import and export of meat and prescribes forms and fees for slaughter, inspection, transportation, and trade of meat and meat products. Legislative inefficiencies have been identified in the widespread licensing of uncategorized slaughter facilities [33], inadequate antemortem and post-mortem inspection capacity [34] [35], and inadequate control over transportation of live animals and meat products [28] [29] [31]. Similarly, the Legal Notice No. 146 of 1999 introduced in response to bush slaughter has equally been ineffective in curbing the practice, with the main challenge being an overwhelmed inspectorate. These inefficiencies have negatively impacted the beef value chain, creating opportunities and motivation for beef fraud.

3.4.3. Public Health (Meat Inspection) Rules Cap 242

The Public Health Act Chapter 242 (Revised 2012) [20], under the Ministry of Health's State Department of Public Health and Professional Standards makes provisions for securing and maintaining health. Through its subsidiary documents, the Public Health (Meat Inspection) Rules and the Public Health (Importation of Meat) rules, the Act provides rules for antemortem and postmortem inspection at large slaughter facilities and meat retail outlets, prohibiting the availing, sale and importation of unwholesome meat and meat products. The preceding legal framework appears to be duplication of function between the health inspectors and the veterinary meat inspectors under the DVS, leading to overlapping mandates and responsibilities, resulting in oversight inefficiencies [37]. Similarly, the narrow health inspectorate appears to be overwhelmed by the extensive base of meat retail outlets in the country, creating loopholes and motivation for fraudulent traders to engage in beef fraud.

3.4.4. The Animal Diseases Act (Animal Identification and Traceability System) Regulations

This Act provides procedures and means for the identification and traceability of all animals born in or imported into Kenya and associated products [21]. It aspires to establish the Animal Identification and Traceability System (ANITRAC) which envisions enhancing trade in animals and animal products through a "farm to fork" traceability to support livestock production, animal health, and animal welfare and guarantee the safety of food of animal origin. ANITRAC is framed on the objectives of the earlier Livestock Identification and Traceability System Regulations, 2019 (LITS) [38] that suffered in implementation due to several factors such as; a lack of a cohesive national strategy, poor stakeholder engagement, inadequate funding and infrastructure, all compounded by a general perception of low priority for mandatory traceability. The 2020 launched Animal Identification and Traceability Strategy 2020-2030, presently guides the implementation of these reg-

ulations, that has made provisions for registration of all livestock owners and their premises, for the financing, acquisition, application and retrieval of the identification and tracking devices, and the appointment of inspectors, thus guarantying a self-sustaining food safety environment, free of fraudulent activities in the red meat industry [38].

3.4.5. Trade Descriptions Act, Competitions Authority Act, and the Consumer Protection Act

The Kenyan Parliament, under the Trade Description's Act (Cap 505) [11] prohibits false trade descriptions of commodities, whereas the Competitions Authority Act (2010) [9] and the Consumer Protection Act (2012) [10] serve to protect the consumer from unfair and misleading trade practices. The drafted National Food Safety Policy has identified food fraud among other malpractices (food adulteration, mislabeling, poor ethos) as re-emerging issues requiring both a research and policy framework to strengthen capacity for surveillance, strengthening enforcement to curb the malpractices, and to strengthen collaborative mechanisms among stakeholders to address food safety issues. The efficient implementation of these Acts currently suffers from complexity in identifying beef fraud offences due to the informal structure in the red meat industry and the lack of rapid verification tests at point of sale, a loophole that creates motivation for malpractice.

3.4.6. The Standards Act

The Standards Act [8] serves to promote the standardization of the specification of commodities, and to provide for the codes of practice. While the Standards Act can serve as a tool to improve conditions in the informal sector, it suffers greatly in implementation in the red meat sector that is primarily informal, with estimates indicating that 80% to 90% of red meat output originates from the informal pastoral system, encompassing poorly regulated slaughter and trade [39]. Yet, the official government veterinary stamp marked on carcasses, not only verifies that a carcass has passed post-mortem inspection and is wholesome [32], but also serves to guarantee confidence against beef fraud. However, inefficiencies in inspection across the extensive base of slaughter facilities and butcheries, and lack of consumer awareness of the quality mark creates opportunities for fraudulent malpractice. Therefore, to combat beef fraud, a combination of robust inspection and traceability systems, clear product labelling and the ongoing enforcement of regulations against meat misrepresentation is necessary to build consumer confidence and ensure the integrity of the meat supply chain.

3.4.7. The Livestock Bill 2024

The Livestock Bill 2024 [40], avails a robust regulatory framework that serves to regulate and coordinate the development of the livestock sector. This proposed law has several objectives, including; regulating production and utilization of livestock products, guiding livestock identification and traceability, enhancing consumer protection and safety of animal-derived foods and realizing food and nutrition security. This review finds that for effective regulation of the first three

objectives and in addressing beef fraud, the drafted law would require establishing regulations for the registration of all livestock value chain actors (particularly livestock keepers, livestock traders and transporters and retailers) to prevent participation of illegal entrants, since as captured in the review, opportunities for beef fraud occur at production, transportation (of livestock and meat) and retail. The successful implementation of the data management framework dubbed Kenya Integrated Agriculture Management Information System (KIAMIS) [41] is viewed to facilitate the regulation. Similarly, in addressing food and nutrition security and food safety, the disconnect between legislation (the Kenyan government's designation of the donkey as a food animal) and societal norms (the widespread rejection to donkey meat consumption among the majority of Kenyans) needs prompt resolution. The nutritive and therapeutic value of both donkey meat and milk has been long established, traditionally and scientifically [5] [42], and therefore other than promoting a total ban on donkey products, the drafted law could propose food safety and public health regulations specific for donkey products, as has been provisioned for other red meat animals. Consequently, it is imperative to prioritize the donkey's value in the domestic market (draft power, cultural delicacy and nutraceutical from meat and milk) against its value in the global market (traditional medicine from the skin) to ensure sustained production, utilization, and trade, while minimizing disruption in the beef value chain.

3.4.8. SWOT Analysis Results

The SWOT analysis (Table 4) represents a tabled overview of the strengths, weaknesses, opportunities, and threats related to food legislations in relation to beef fraud in Kenya. This analysis was derived from literature review of the legislative documents.

Table 4. SWOT Analysis of food legislation in Kenya with a beef fraud lens.

Legislation	Strength	Weakness	Opportunity	Threats
National Food Safety	Robust regulatory framework proposed Sound financial model proposed Human capacity development strategy developed Monitoring and evaluation framework proposed	Inadequate budgetary allocation towards food safety in some line ministries	Political will Increasing consumer awareness and demand for safe food Increased broadening of food distribution systems Liberalization of food markets	Resource (human/ financial/ infrastructural) mobilization for implementation
Meat Control Act	Robust regulatory framework	Weak and inconsistent enforcement, gaps in meat sanitation, inspection, inadequate capacity due to resource constraints	Improving value chain linkages, increasing market coordination, and leveraging technology for better monitoring	inadequate stakeholder capacity, weak enforcement, infrastructure deficits, lack of funding for enforcement and oversight

Continued

Public Health (Meat Inspection) Rules Cap 242	Robust regulatory framework	Weak and inconsistent enforcement, poor resource distribution, inadequate capacity due to resource constraints	Integrating with global health initiatives Leveraging new technologies	Meat inspection system fragmentation into counties socioeconomic disparities emerging public health hazards and emergencies
Livestock Bill, 2024	Robust regulatory framework Investment in capacity building	Potential marginalization of stakeholders due to strict regulatory/licensing requirements Inadequate skilled personnel	Market growth and competitiveness Technological integration of digital services	Resource mobilization for implementation
The Animal Diseases Act (Animal Identification and Traceability System) Regulations	Robust regulatory frameworks, A national database	Stakeholder non- compliance, Previous system's (LITs) limitations	Harmonize with regional standards, boost farmer livelihoods	Insufficient veterinarian presence, challenges of nation-wide implementation
Competitions Authority Act (Cap 504)	Independent mandate to regulate competition Focus on consumer and supplier welfare	Challenges in enforcing buyer power provisions, Potential legal interpretation difficulties, Need for more specific regulations or guidelines	Policy intervention across sectors	dynamic economic environment overly broad regulations
Consumer Protection Act	Robust legal framework, Well defined consumer rights, Prohibiting unfair practices	Weak implementation due to overlapping roles of regulatory bodies Challenges keeping pace with emerging markets like digital credit.	Modernizing information sharing, Improving consumer awareness Leveraging data for better policymaking	Participation of unlicensed meat traders, Challenges in enforcement consumer education
Trade Descriptions Act	Independent mandate to protect consumers from misleading information, Provision for legal recourse against false claims about goods	Weak enforcement due to complexity of identifying and prosecuting offenses	Addressing new forms of misleading advertising	Inadequate resources for enforcement, Potential for businesses to find ways to circumvent regulations.
Standards Act (Cap 496)	Independent mandate to promote industry and commerce standardization, Establishment of the Kenya Bureau of Standards (KEBS)	Weak implementation in the largely informal red meat market Weak enforcement due to resource constraints potential gap between established standards and market adoption	Leveraging standardization for export competitiveness Improving local quality Integrating with international standards to enhance trade	Informal markets' resistance to standards Lack of consistent enforcement

The strengths of food legislation in Kenya are evident in its comprehensive legal and regulatory framework, exemplified by the drafted National Food Safety Policy (2021), Meat Control Act, Public Health Act, Livestock Bill, Animal Disease (ANI-TRAC) Act, and Consumers Protection Act. Although the institutional framework is designed to enhance capacity through effective collaboration, its coordination, particularly in resource mobilization and distribution, as well as in defining roles and functions, is viewed as a weakness. Conversely, the legal and regulatory strengths are also reflected in the Competitions Authority Act, Trade Act, and Standards Act, which operate with autonomous mandates. However, complexities in legal interpretation, identifying and prosecuting offences, and the absence of specific definitions, guidelines, and regulations undermine the legislation. For example, to adequately address beef fraud, food fraud—both generally and within specific value chains—needs to be clearly defined in Kenyan law, with appropriate penalties prescribed.

Opportunities within Kenyan food legislation are political, social, economic, and technological, encompassing effective policies, political will, consumer awareness, transparent market linkages, compliance with provisions aligned to the entire beef value chain, enhanced technological capacity of enforcement officers, technology integration in research, surveillance, inspection, and marketing services.

Economic factors pose threats to food legislation due to the significant investment required in research, human resources, technology, and infrastructure enhancement. For instance, rapid technological advancements in animal identification and traceability, employing a farm-to-fork approach, can disrupt production systems, incentivizing only highly-resourced, export-oriented beef value chain actors to comply. Similarly, policy interventions proposed to address food fraud and other emerging food safety issues will depend on budgetary allocations from the involved ministries. Legislation requiring nationwide implementation faces political threats during execution, in the event of contestation over mandates between the national and county governments. Additionally, due to non-specific regulations in the Competitions Act, the Trade Descriptions Act, and the informal nature of the livestock industry, legal threats are anticipated to challenge the successful implementation of food legislation.

3.5. Detection of Beef Fraud in Kenya

In Kenya, the detection of beef fraud has traditionally relied on visual inspection methods. As previously mentioned, subjective evidence of beef fraud include the presence of zebra and buffalo heads and skeletons, as well as reports of donkey theft and bush slaughter. Additionally, the seizure of carcasses in transit without meat inspection stamps or transport certificates are suggestive of beef fraud. The low likelihood of detecting zebra and donkey meat cuts from those of acceptable food-animal species [13] [43] by unsuspecting consumers and law enforcers has also been seen as an opportunity for the malpractice. Few studies have focused on

beef fraud detection in Kenya. During the review period, one article reported using a three mitochondrial gene PCR-high-resolution (PCR-HRM) melting analysis to detect livestock species substitution in meat sold in Nairobi [44]. The study found that by targeting three mitochondrial genes—cytochrome oxidase 1 (CO1), cytochrome b (cyt b), and 16S rRNA—through PCR-HRM, followed by sequencing amplicons of the 750 base pair segment of the CO1 barcoding region, 10.3% ($n = 107$) of the samples were found to be substituted. The most misrepresented meat was goat ($n = 30$), which was substituted with mutton (13.33%) and beef (10%), while beef ($n = 61$) was substituted with goat (3.3%) and camel meat (1.64%). Pork ($n = 9$) was also substituted with beef (11.11%). No substitution was reported for chicken and camel meat. The authors further noted that the detection method was both affordable and rapid, recommending it as a suitable technology for identifying species substitution. An earlier study that had determined the presence of illegal bush-meat within Nairobi butchereries using Cytochrome b Mitochondrial DNA marker [13] reported that although bush-meat was not detected, 11.6% ($n = 138$) of the meat samples had been mislabeled by the traders. Previous studies have highlighted insufficient regulatory oversight in detecting food fraud, with a greater emphasis placed on microbial safety concerns in sub-Saharan Africa [45] [46]. The low probability of detection has been attributed to a complex supply chain, inadequate enforcement of regulations, lack of value chain transparency, and insufficient traceability of livestock and animal products [17] [47].

4. Discussion

Although the Kenyan government designated the donkey as a food animal over 25 years ago, there is still a notable lack of formal donkey slaughter and retail of donkey meat for the domestic market, reflecting a strong consumer aversion to the meat. Beyond cultural norms, other factors contributing to the rejection of donkey as a food animal have been examined. The economic value of the donkey's draught power makes it more valuable alive than dead, and its slaughter is considered impractical and counterproductive [22] [23]. One study highlighted an emotional and ethical attachment, viewing the donkey as a close companion and reliable helper [48]. The poor living conditions and neglect during the donkey's life, coupled with illegal bush slaughter, raise concerns about the food safety and hygiene of its meat [23], potentially discouraging its acceptance. This review indicates that for policies intended to alter consumer behaviour, such as the introduction of new food animals, public education is essential to build awareness, foster buy-in, and create the necessary social and cognitive shifts for lasting behavioral change. In 2008, the Egerton University spearheaded a one-day campaign to demystify the general notion that donkey meat is harmful for human consumption and to publicize its palatability. However, the short-lived campaign had low reach and an underwhelming impact [49]. Greater efforts are therefore needed to spur behavioural change and attain greater donkey meat acceptance. Apart from the Turkana, communities in Southern Ethiopia [50], West Africa [51], Southern

Peru and in Hebei, Shanxi and Shandong Provinces of China [52], eat donkey meat as part of their traditional dietary habit, with great reverence for its the nutritional, therapeutic, and sensory quality. Recently, more European countries have become more accepting of donkey meat and milk after gaining knowledge of the benefits of donkey products alongside legislation concerning production and benefits [42] [51]. There is, therefore, a definite need for continuous education and knowledge sharing directed at the Kenyan public regarding donkey production and utilization of its products. This will require collaborative research and advocacy amongst livestock keepers, academia, research institutions, private entities and the Government of Kenya.

The constant mobility of livestock owners and their stock, the lack of record-keeping practices and digitization of livestock mobility certificates, and the non-registration of beef industry actors are key pre-slaughter factors that create opportunities for beef fraud and other unethical practices. The widespread licensing of uncategorized slaughter facilities, strained inspectorate capacity, and lack of digitization of meat transportation certificates exacerbate beef fraud vulnerabilities.

While the 2020 ban on export slaughter temporarily halted the slaughter of donkeys and the exportation of their skins via the 4 licensed facilities; it is reported to have driven the activity underground into an illicit, lucrative industry, as a consequence of the State defaulting to respond in court [24] [25]. Additionally, this review suggests that the ineffective ban may be indicative of weakness in regulatory capacity and enforcement along the red meat value chain, as has been identified in the SWOT analysis.

Emerging technologies for authenticating the origin of meat from various animal species, such as molecular identification through DNA-species testing [13] [44], have been employed in Kenya to verify carcass species. However, their routine application by the veterinary and public health inspectorate remains challenging due to inadequate technical, human, and infrastructural capacity [17]. Traceability has become a global requirement for exporting livestock and livestock products, yet its implementation in the domestic market faces obstacles due to the low participation of livestock keepers, most of whom are smallholders with little financial incentive to engage. As outlined in the drafted Food Safety Policy [16], the successful implementation of a well-integrated food safety policy in Kenya will necessitate strengthening food safety infrastructure and institutional frameworks, ensuring compliance with food safety requirements, and promoting continuous training, public education, and stakeholder awareness. Currently, advancements in food safety within the meat industry, such as the application of Hazard Analysis Critical Control Points (HACCP), are practiced only in export-oriented slaughterhouses and processing facilities that implement the system to comply with the trade-driven requirements of importing countries [14]. However, since legislation has not mandated more stringent control beyond the classical visual inspection at antemortem and postmortem, which itself is not sufficiently enforced, such food safety advancements have not extended to facilities whose products are destined

for the domestic market [14]. It is a priority of the National government to implement a food safety policy that provides a framework for a food system that is not only safe and sustainable but also ethical. Poor ethics among some red meat industry actors and law enforcement authorities have created opportunities for fraudulent food practices [16]. Since the integrity and reputation of the food safety system largely depend on the integrity and skill of industry actors and enablers (veterinary and meat inspectorate), promoting good ethics and transparency can inspire good practice.

This study was limited by the insufficient scientific publications on beef fraud in the country, highlighting the crucial role of journalism in media coverage of this topic. Consequently, media reports, government and institutional reports, and other grey literature were included.

5. Conclusion

The primary factors contributing to beef fraud vulnerability are prevailing pre-slaughter and post-slaughter conditions, along with insufficient control measures by the veterinary and public health inspectorate. To meet the realistic expectations of curbing beef fraud as proposed in the national Food Safety policy, it is essential to consider the needs of the domestic red meat industry by clearly highlighting the livestock production systems and linkages to the overall value to both the stakeholders and the industry.

6. Recommendation

The study recommends implementing the national Food Safety Policy to establish a specific legal framework for mitigating beef fraud risk. It proposes a collaborative effort among multiple levels of actors, regulators, and enablers in the beef supply chain. Additionally, we propose a public-private partnership research in addressing the utilization donkey meat and other products, to better inform policy conceptualization, design and drafting, implementation.

Conflicts of Interest

The authors declare no conflicts of interest.

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