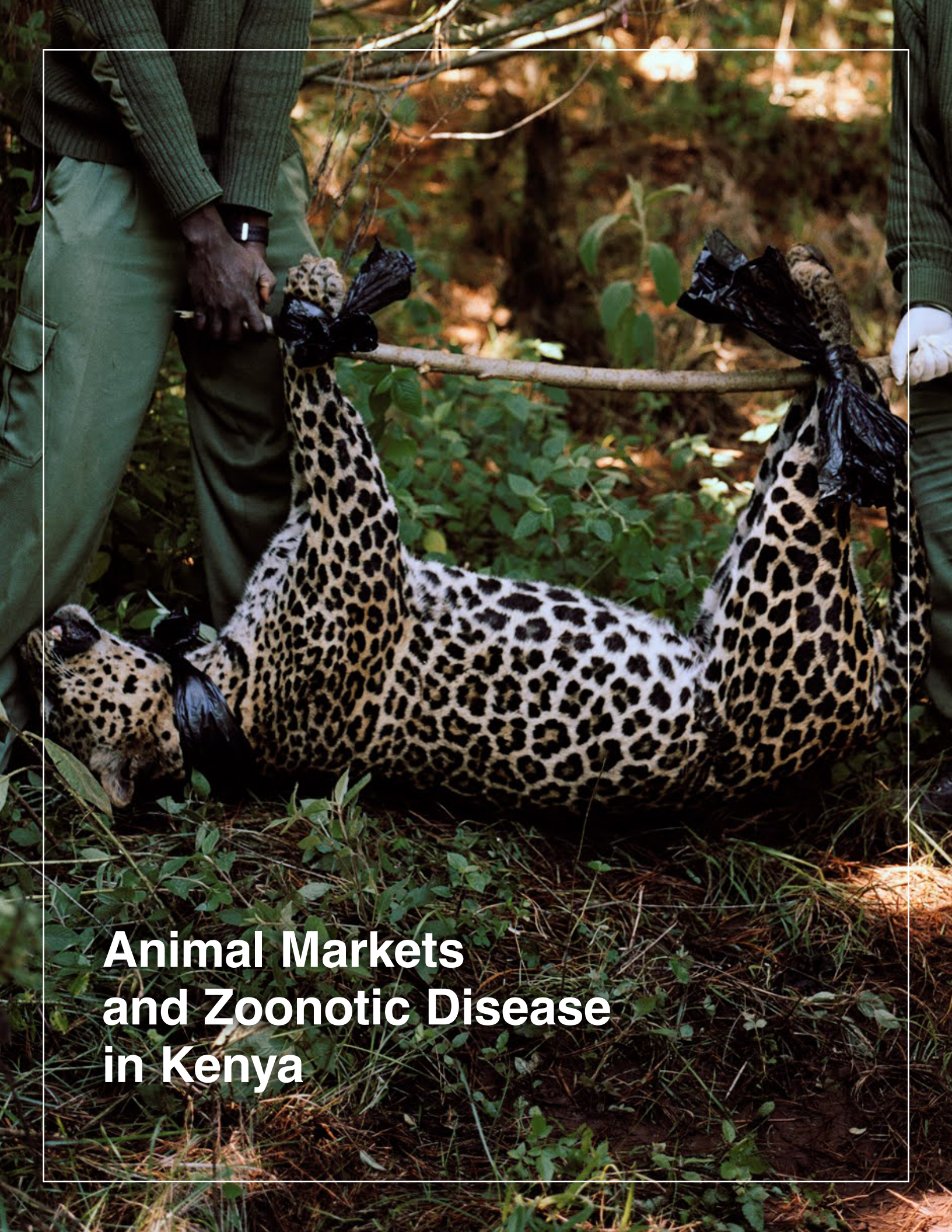

Animal Markets and Zoonotic Disease in Kenya

COUNTRY SUMMARY: KENYA

CULTURAL CONTEXT

Kenya is an East African nation bordering the Indian Ocean that is home to 53 million people and is the third largest producer of livestock in Africa. A democratic country with national and county level governments, Kenya is undergoing significant population growth that includes a transition to urban living, placing even more stress on a country where close to 6% of the current population have food security issues and 25% of children under five are estimated to be suffering from chronic malnutrition. Zoonotic diseases are quite common in Kenya and cause significant public health concerns as well as economic loss. In addition to Rift Valley fever (RVF) and highly pathogenic influenzas, brucellosis and bovine tuberculosis are estimated to cost the country up to US$4.8 billion a year while salmonellosis, found frequently in poultry, causes another US$1.0 billion per year in estimated losses.

ANIMAL MARKETS

The primary forms of animal markets in Kenya include wild animals that are legally farmed (sometimes referred to locally as “emerging livestock”), illegal poaching of protected free-roaming wildlife, and domestic livestock production, most of which is still done on a small-scale pastoral basis and usually sold for cash in open-air markets, though the use of online markets is growing and some market trades are enabled by middlemen brokers. Common livestock include cattle, sheep, pigs, goats, camels, ducks, and chickens. Certain wildlife species including crocodile, snail, frog, butterfly, ostrich, pigeon, and dove can also be legally farmed. Native wildlife are sometimes poached for food, including wild buffalo, impala, gazelle, giraffe, and occasionally monkeys. Elephant ivory, rhino horns, and big cat cats are the most sought after targets of illegal poaching because of the high prices they command. Given its coastal location and port infrastructure, Kenya serves as a key transit country for illegal wildlife sourced in other African countries for shipment to Asia, Europe, the Middle East, or the Americas. Kenya has yet to develop a meaningful legal livestock export trade.

DRIVERS OF ZOONOTIC DISEASE RISKS

A thriving illegal uninspected bushmeat trade, a small-scale farming system that mostly operates on an unregulated basis with no required health checks at the farm or market level, slaughtering facilities that often go uninspected, and widespread lack of biosecurity throughout the supply chain (especially during transportation and time of slaughter) all contribute to zoonotic disease risk in Kenya. It is also common for illegal and uninspected wild animal meat to enter into formal animal markets disguised as legal meat from livestock, increasing dangers to customers. The influx of illegal bushmeat can be facilitated by corruption at any point from source to market. Endemic poverty has helped recruit locals into the illegal

COVER PHOTO CREDIT: David Chancellor / KWS Rangers Holding Leopard Caught in a Snare Trap, Kenya

exploitation of wildlife.

RISK MITIGATION AND RELEVANT CHALLENGES

All forms of hunting have been banned in Kenya since 1977. As a founding member of CITES in 1963, Kenya has made a concerted effort to put in place regulations that protect its humans and non-human animals including through its Constitution, the Wildlife Conservation and Management Act of 2013, and the Meat Control Act. However, these regulations are generally poorly enforced. For instance, though the Meat Control Act requires antemortem and post-slaughter inspection, it was found that antemortem inspection is practiced only 7% of the time. Furthermore, the country has inadequate disease surveillance, in part due to poor communication between national and county governments.

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ACKNOWLEDGEMENTS

The following table includes the names and affiliations of key informants who helped in the creation of this research.

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S. Amirah	Senior Vet public health officer	Government of Kenya - National
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A. Kata	County vet officer	Government of Kenya - Kitui county
A. Dok	Businesswoman	Kisumu
M. Mwaniki	Livestock trader	Kiserian market
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INTRODUCTION

Kenya is an East African nation, with its eastern boundary bordering the Indian Ocean. Its neighboring countries are Somalia, Ethiopia, South Sudan, Uganda, and Tanzania. Lake Victoria forms part of its western border, standing between Tanzania and Uganda. At over 53 million people, its population ranks within the top 30 globally. Kenya's official language is English, and Kenyans are estimated at over 85% identifying as Christian, and 11% identifying as Muslim.[1] [2] There are over 120 recognized tribes in Kenya, with the Kikuyu tribe the largest, with over 8 million Kenyans (almost one-fifth of the country's population).[3]

The climate in Kenya ranges from tropical to arid, and the terrain varies broadly as well. Its geography contains about 40% permanent pastureland and just under 10% arable land suitable for crops, with the Kenyan Highlands—the area around the Rift Valley—considered a particularly noteworthy agricultural area in Africa.[4] The staple foods in Kenya include various cereals, such as maize and millet, eaten with various meats and vegetables. In 2022, over three million Kenyans were estimated to be experiencing extreme food insecurity caused by recent years' droughts affecting crop and livestock production, the high cost of domestic food production, and low purchasing power.[5] Over 25% of children in Kenya under the age of five are estimated to be suffering from chronic malnutrition.[6] At the same time, Kenya is projected to grow to nearly 100 million people by 2050. with a fourfold increase of urban populations, driving increased food demands and necessitating increased food supplies. Demand for "high value" animal-based food is expected to intensify in affluent urban centers.[7]

Kenya is the 10th largest African country, but it is the third-largest holder of livestock on the continent, with livestock production contributing 12% of Kenya's total GDP and 40% of the nation's agricultural GDP. Holdings are estimated at about 30 million goats, 18 million cattle, 17 million sheep, 44 million chickens, and over 600,000 pigs. These animals are mainly held by small-scale farmers as the vertically-integrated livestock operations seen in many countries are not common in Kenya. The Arid and Semi-Arid Lands, known as ASALs, are where most livestock are held. The ASALs cover about 80% of Kenya's land mass and are mainly in the Rift Valley and the provinces in the east, northeast, and along the coast.[8] About 30% of Kenya's human population and 70% of the nation's livestock live in these areas. In turn, livestock comprises 95% of household incomes in these arid lands, employing 90% of working inhabitants.[9]

1. "Explore All Countries: Kenya," The World Factbook, updated October 3, 2023, https://www.cia.gov/the-world-factbook/countries/kenya/.
2. "2020 Report on International Religious Freedom: Kenya," Office of International Religious Freedom, U.S. Department of State, May 12, 2021, https://www.state.gov/reports/2020-report-on-international-religious-freedom/kenya/.
3. Samantha Balaton-Chrimes, "Who are Kenya's 42(+) Tribes? The Census and the Political Utility of Magical Uncertainty," Journal of Eastern African Studies 15, no. 1 (2021): 43–62, DOI: 10.1080/17531055.2020.1863642.
4. *Explore All Countries: Kenya," The World Factbook, updated October 3, 2023, https://www.cia.gov/the-world-factbook/countries/kenya/.*
5. Explore All Countries: Kenya," The World Factbook, updated October 3, 2023, https://www.cia.gov/the-world-factbook/countries/kenya/.
6. "Kenya: Nutrition Profile," United States Agency for International Development, updated February 2018, https://2017-2020.usaid.gov/sites/default/files/documents/1864/Kenya-Nutrition-Profile-Mar2018-508.pdf.
7. Food and Agriculture Organization of the United Nations, Africa Sustainable Livestock 2050: Kenya Country Brief, (Washington DC: USAID, 2017), http://www.fao.org/3/i7348e/i7348e.pdf.
8. *World Bank, "Kenya: Arid and Semi-arid Lands Sector-wide Program," ReliefWeb, April 13, 2010, https://reliefweb.int/report/kenya/kenya-arid-and-semi-arid-lands-sector-wide-program#:~:text=The%20Arid%20and%20Semi%2DArid,Eastern%2C%20Northeastern%20and%20Coast%20Provinces.*
9. *Statistics and description derived from Kenya Markets Trust. A Study on Meat End-Market Trends in Kenya, 2019 Kenya Markets Trust 2019a), and citing Economic Survey, 2015; Republic of Kenya, Strategic Plan 2008–2012 b(Nairobi: Ministry of Livestock Development, 2010), https://land.igad.int/index.php/documents-1/countries/kenya/legislation-and-policies-3/policies-3/776-livestock-development-strategic-plan-2008-2012/file; Ministry of Agriculture, Livestock and Fisheries (MAL&F), 2015, p. 12.*

Kenya is also home to a diverse array of wildlife, including one of the largest wildlife preserves, Tsavo National Park, in the southeast of the country. In May 2021, Kenya Wildlife Service launched the country's first wildlife census with the goal to better understand population shifts as well as the associated risks to its vast but threatened wildlife populations.[10] Kenya was the site of the original drafting of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1963 and has taken measures to protect its wildlife, which are a primary attractant of tourists to the country.[11] However, Kenya also has a well-known history of elephant and rhino poaching and has seen a recent resurgence of such activities despite considerable efforts to control them.[12] Wildlife is also consumed in Kenya, either wild-caught, which is generally referred to as bushmeat, or, as discussed in detail below, as wild animals that have been taken into captivity for purposes of breeding and subsequent slaughter. This captive-farmed wildlife has been termed emerging livestock or farmed wildlife by the Kenyan authorities.

Zoonotic diseases are quite common in Kenya and cause significant public health concerns as well as economic loss. The top priority zoonotic diseases in the country are Rift Valley Fever, anthrax, rabies, brucellosis, trypanosomiasis, highly pathogenic influenza, foot and mouth disease, and salmonellosis.[13] [14] [15] There continues to be a rising risk of zoonotic disease in Kenya as farming systems, animal production, and trading patterns continue to change. At the same time, communication between human and animal health sectors continues to be a challenge, making effective reporting of disease events difficult. These challenges will only be amplified as a rapidly growing and urbanizing human population further increases animal production demands. In addition, the high volume of trade at live animal markets in Kenya drives interactions that carry zoonotic risk. Live animal markets are key sites where livestock farmers sell their animals to the middlemen who then aggregate the animals and sell them onwards for slaughter in major slaughterhouses or for live export. Killing and consuming wild animals, which has risen recently due to the economic hardships of the pandemic, also increases zoonotic disease risk. All these factors continue to burden Kenya's regulatory framework, which already struggles to keep pace with demands.[16]

TYPES AND USES OF ANIMALS

Animals play various roles within Kenya. They can be divided roughly into two categories: domesticated animals and wildlife. Wildlife can be further divided into free-roaming protected wildlife and wildlife that has begun to be farmed. This farmed wildlife, often referred to as "emerging

10. *Results of th*is survey are still pending. "National Wildlife Census 2021," Kenya Wildlife Service, May 7, 2021, *http://www.kws.go.ke/content/national-wildlife-census-2021.*
11. *"What is CITES?" CITES, accessed October 9, 2023, https://cites.org/eng/disc/what.php.*
12. *Fiesta Warinwa, Erustus Kanga, and William Kiprono, "Fighting Wildlife Trade in Kenya," UN Chronicle 51, no. 2 (2014): 36–39, https://www.un.org/en/chronicle/article/fighting-wildlife-trade-kenya.*
13. Ravikiran Keshavamurthy, Samuel M. Thumbi, and Lauren E. Charles, "Digital Biosurveillance for Zoonotic Disease Detection in Kenya," Pathogens 10, no. 7 (2021): 783, https://doi.org/10.3390/pathogens10070783.
14. "Innovative Tracking of Zoonotic Diseases," Centers for Disease Control and Prevention, last modified June 26, 2018, https://www.cdc.gov/globalhealth/countries/kenya/blog/innovative-tracking-of-zoonotic-diseases.html.
15. Dickson Machira Nyaguthii et al., "Knowledge and Risk Factors for Foot-and-Mouth Disease Among Small-Scale Dairy Farmers in an Endemic Setting," Veterinary Research 50, no. 33 (2019):33, https://doi.org/10.1186/s13567-019-0652-0.
16. *Known zoonotic risk factors in Kenya, such as the interaction between wildlife and livestock, have made it an important area for progressive veterinary research partnerships between American and Kenyan universities as of 2020. "New Doctoral Program in Kenya Focuses on Mitigating the Spread of Emerging Diseases," WSU Insider, May 11, 2020,* https://news.wsu.edu/2020/05/11/new-doctoral-program-kenya-focuses-mitigating-spread-emerging-diseases/.

livestock," includes once-wild animals that are brought into captivity and farmed in a way analogous to traditional livestock production. It is important to note that these farmed wild animals, despite the fact that Kenyan law and practice may refer to them as livestock, are not domesticated and are still wild species. The mere fact that humans have recently begun to raise them in captivity for food does not change that fundamental fact. This crossing-over of purpose creates its own specific zoonotic risk as discussed below.

Domesticated Animals

There are roughly three main domestic categories in Kenya: (1) pets, such as dogs, cats, and exotic birds like parrots, as well as pigeons, geese, and guinea fowl; (2) working animals, such as donkeys, oxen, and dogs who provide security; and (3) domestic livestock, which includes cattle, sheep, pigs, goats, camels, ducks, and chickens.

Pets are treated in a variety of ways in Kenya. Among the wealthy, they are highly valued and treated as family members. In contrast, lower socioeconomic classes usually see their pets filling instrumental roles, such as providing security or pest control.[17] It is estimated that there are five to six million dogs in Kenya, with more than 80% thought to be owned, though it is common practice in the country for the dogs to roam freely. These free roaming dogs create an environment where dog bites are common, leading to more exposure to the deadly rabies disease.[18] More recently, as breeding and sales of exotic dog breeds, exotic birds, and other rare poultry have increased, pets have become a major source of revenue. In such cases, the economic value attached to these pets can be quite high: certain breeds of puppies sell at US$100-$150, pigeons at US$5, guinea fowl and geese at US$30-$40, and ducks at US$10.[19]

Working animals are primarily donkeys and are used by women and young boys to transport household goods and other merchandise and on farms by farmers to carry heavy loads. Despite the valuable livelihood support they provide, these working species are assigned a lower economic and sociocultural value than livestock; however, these animals are still a major source of income and employment, especially in the peri-urban centers.[20] Donkeys in Kenya also fulfill a strong demand from the east, primarily China, for donkey skins and donkey meat. Kenya has become one of the largest African resources for donkey skin and helps to fulfill significant demand by the Chinese who use the donkey skins to produce "ejiao," a traditional Chinese medicine thought to prevent aging and increase libido. As the price of donkey skins has increased with increasing demand, illegal poaching of farmed donkeys has also increased, impacting the livelihood of many farmers who rely on donkeys to do heavy lifting and hauling on the farm.[21] There are four licensed donkey slaughterhouses in Kenya–- which

17. *A. Parsimei, personal communication, November 27, 2020.*
18. Patrick Muinde et al., "Who Let the Dogs Out? Exploring the Spatial Ecology of Free-Roaming Domestic Dogs in Western Kenya," Ecology and Evolution 11, no. 9 (2021): 4218–31, https://doi.org/10.1002/ece3.7317.
19. *C. Nyoro, personal communication, November 27, 2020.*
20. *"Animal Production & Welfare Programme," KENDAT, accessed October 9, 2023, https://kendat.org/animal-production-welfare-programme/.*
21. Sara Jerving, "Donkey Skin Ruling a 'Massive Blow' for Kenya's Smallholder Farmers," Devex, May 13, 2021, https://www.devex.com/news/donkey-skin-ruling-a-massive-blow-for-kenya-s-smallholder-farmers-99902.

together sometimes slaughter up to 1,000 donkeys a day— that help to both meet international demand and enable illegal donkey poaching, as many of these poachers sell to the slaughterhouses.[22]

Livestock is kept and raised mainly for food and sociocultural activities such as dowries or initiation ceremonies. Most livestock in Kenya is raised on small farms. Beef cattle and dairy farming are the largest stocks in the country, but goats, camels, donkeys, small ruminants, nonruminants, and poultry are also farmed. These small farms typically have low productivity, poor animal husbandry, and struggle with disease challenges.[23] Rift Valley Fever is a zoonotic disease Kenyan public health officials are particularly worried about among livestock given that the vector-borne transboundary disease has epidemic potential, has been known to be fatal to both humans and livestock, and can cause economic crises as a result of quarantines and bans on consumption of meat and/or travel. Due to the focus of public health officials on RVF, reporting and efficient responses have helped to prevent larger issues, but the disease still presents an ongoing challenge.[24] Other common zoonotic diseases found in livestock include anthrax, brucellosis, and bovine tuberculosis.[25] It is estimated that the latter two cost the country up to US$4.8 billion a year in harm to livestock and human health. Salmonellosis has been found frequently in poultry and has been estimated to cost the country over US$1.0 billion a year.[26]

Livestock consumed as meat is overseen by the Meat Control Act, which regulates how livestock is slaughtered and inspected for human consumption, as well as how meat is transported.[27] But research has shown frequent violations of the Meat Control Act, enabling occupational exposure to disease or injury and allowing contaminated meat to enter the consumer market. Though the Meat Control Act mandates antemortem and post-slaughter inspection, in a questionnaire of 142 slaughterhouses, it was found that although a meat inspector visited 90% of slaughterhouses, antemortem inspection was practiced only 7% of the time. As a result, animals with visible signs of illness may enter the food chain. Nine percent of slaughterhouses were found to slaughter sick animals—a practice that has been shown to transmit zoonotic diseases including anthrax, brucellosis, and leptospirosis. [28]

22. Dr. Monicah Maichomo et al., The Status of Donkey Slaughter in Kenya and its Implications on Community Livelihoods 2019 (Nairobi: Kenya Agricultural and Livestock Research Organization, 2019), https://www.thebrooke.org/sites/default/files/Kalro%20Report-Final.pdf.

23. "Livestock," Kenyan Agriculture and Livestock Research Organization, accessed July 28, 2022, https://www.kalro.org/divisions/livestock/.

24. Ravikiran Keshavamurthy, Samuel M. Thumbi, and Lauren E. Charles, "Digital Biosurveillance for Zoonotic Disease Detection in Kenya," Pathogens 10, no. 7 (2021): 783, https://doi.org/10.3390/pathogens10070783.

25. "Innovative Tracking of Zoonotic Diseases," Centers for Disease Control and Prevention, last modified June 26, 2018, https://www.cdc.gov/globalhealth/countries/kenya/blog/innovative-tracking-of-zoonotic-diseases.html.

26. Food and Agriculture Organization of the United Nations, The Future of Livestock in Kenya: Opportunities and Challenges in the Face of Uncertainty, Rome: FAO, 2019, https://www.fao.org/3/ca5369en/ca5369en.pdf.

27. The Meat Control Act applies to bulls, cows, heifers, calves, oxen, sheep, goats, pigs, hens, chickens, turkeys, geese, ducks, guinea fowls, and pigeons. Republic of Kenya, Meat Control Act, rev. ed. (Nairobi: National Council for Law Reporting with the Authority of the Attorney-General, 2012), Chapter 356, https://infotradekenya.go.ke/media/Meat%20Control%20Act%20Cap%20356_2.pdf.

28. Elizabeth Anne Jessie Cook et al., "Working Conditions and Public Health Risks in Slaughterhouses in Western Kenya," BMC Public Health 17, no 1 (2017): 14, https://doi.org/10.1186/s12889-016-3923-y.

Wildlife

Wildlife is a national resource according to the Constitution of Kenya.[29] All wild animals in Kenya belong to the state irrespective of the ownership of the land they are found on.[30] The main authority on wildlife in Kenya is the Wildlife Conservation and Management Act of 2013.[31] This Act explicitly prohibits sports hunting as well as other forms of recreational hunting, hunting for bushmeat, and subsistence hunting of wildlife species. But the Act allows certain wildlife species—such as crocodiles, snails, frogs, butterflies, ostriches, pigeons, and doves— to be: a) game farmed where wildlife is raised in a controlled environment; b) game ranched where wildlife is kept in its natural conditions; or c) culled where wildlife is selectively removed for management purposes.[32] Sometimes these animals are deliberately taken from the wild to be raised for food production. Other times, the process happens organically over time, with wild species attracted by food or other needs and gradually intermixing with domestic animals. It is increasingly common to keep domestic animals such as chickens along with wild animals such as guinea fowl and quail together in the same vicinity. In some cases, they even share space in chicken pens. Little is known about the biosecurity measures taken in these farmed wildlife operations before they are used domestically or exported.[33]

A license is needed for these consumptive uses of wildlife where "live captures" of animals from the wild are taken to be raised in captive farms. This is the only means by which to trade in wildlife legally in Kenya. But many operations exist without proper permits as enforcement is often lacking and sometimes complicated. Also, lines between wild and captive animals can become blurry. For example, on a small family farm of cows, outside a national park, the owner may find that a wild animal keeps coming to be fed. The humans eventually treat the wild animal as one of their owned animals. Operations that receive a license are then bound by the Meat Control Act.[34]

The logic on enabling consumptive uses of wildlife, as in other countries that have undertaken similar policies, is that raising wild animals for slaughter can support jobs and contribute to food security;

29. *Section 69 of the Constitution of Kenya obligates the State to "ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits." "Constitution of Kenya: 69. Obligations in Respect of the Environment," Kenya Law Reform* Commission (KLRC), accessed October 10, 2023, https://www.klrc.go.ke/index.php/constitution-of-kenya/118-chapter-five-land-and-environment/part-2-environment-and-natural-resources/236-69-obligations-in-respect-of-the-environment.

30. As noted by Francis Mwaura, "[s]tate ownership of wildlife heritage is associated with the vesting of all wildlife property rights by the state. Such heritage is usually characterized by public ownership and state custodianship because although it is largely under the custodianship of governments, it actually belongs to the citizens and the government is only holding it in trust on their behalf. State property wildlife heritage can therefore be accurately considered as public heritage in which the citizens should have a major say, especially in terms of its governance, utilization and even conservation and protection. In Kenya, most wildlife heritage is associated with this kind of ownership even within private land." Mwaura, Francis. "Wildlife heritage ownership and utilization in Kenya – past, present and future," in Conservation of Natural and Cultural Heritage in Kenya: A Cross-Disciplinary Approach, edited by Anne-Marie Deisser and Mugwima Njuguna (London: UCL Press, 2016), 129. See also: Benson Okita Ouma, Population Performance of Black Rhinoceros (Diceros bicornis michaeli) in Six Kenyan Rhino Sanctuaries, Dissertation. Durrell Institute of Conservation and Ecology (DICE), University of Kent, UK September 2004, http://www.rhinoresourcecenter.com/pdf_files/123/1238579811.pdf.

31. "Wildlife Conservation and Management Act of 2013," Kenya Gazette Supplement No. 18/ (Acts No. 47) , http://extwprlegs1.fao.org/docs/pdf/ken134375.pdf.

32. See Schedule 10 of Wildlife Conservation and Management Act of 2013 for a full list of species which are included in these consumptive uses. There is no consumptive utilization of wild animals classified as near threatened, vulnerable, endangered, and critically endangered under the IUCN Red list of threatened species.

33. In the period of 2015–2017, Kenya's Ministry of Tourism and Wildlife estimated this trade to include about 25,000 *live chameleons of various species, mainly exported to Germany, Spain, and Hong Kong from licensed chameleon farms and about 20,000 Nile crocodile skins exported primarily to Singapore. The crocodiles originated from both intensive-farmed captive breeding and ranching via wild egg harvesting from the lower Tana River. In defense of wild egg harvesting, the Ministry stated that it "maintains linkages with local people who derive benefits from such harvesting through egg collection fees paid to egg collectors engaged by the licensed farmers, social development projects to the community, collection of levies by the County Government of Tana River and reduction of human- crocodile conflicts."* Republic of Kenya, *The National Wildlife Conservation Status Report 2015–2017 (Nairobi: Ministry of Tourism and Wildlife, 2018), 220,* http://www.kws.go.ke/content/status-wildlife-report-2015-2017.

34. The Meat Control Act applies to bulls, cows, heifers, calves, oxen, sheep, goats, pigs, hens, chickens, turkeys, geese, ducks, guinea fowls, and pigeons. So not every animal that can be legally farmed under the Wildlife Conservation and Management Act of 2013 is covered by the Meat Control Act. But those wild species that are not covered are limited to reptiles, and reptile meat is seldom consumed in Kenya. Republic of Kenya, Meat Control Act, rev. ed. (Nairobi: National Council for Law Reporting with the Authority of the Attorney-General, 2012), Chapter 356, https://infotradekenya.go.ke/media/Meat%20Control%20Act%20Cap%20356_2.pdf.

however, this practice increases the level of zoonotic risk in the country as, through these activities, more species are brought into proximity to humans and domesticated species. Elsewhere in Africa, consumption of wild animals has been linked to many emerging infectious disease outbreaks, including Ebola, HIV, and mpox.[35] Disease spillover from wildlife can occur through contact with live animals or their bodily fluids as well as through handling, butchering, or consuming dead animals.[36] In some cases in Kenya, meat from wild animals, known as wild meat or bushmeat, may be passed off and sold as meat from domestic livestock. In such cases, consumers may be unaware of what type of animal they are eating and where it came from, possibly also underestimating their own zoonotic risk.[37]

Farmed wildlife is often sold to high-end consumers and the hotel industry in Kenya.[38] To supply the French hotels and restaurants, for example, Kenyans are being encouraged by the government to trade in frog legs, even though this kind of trade has no traditional or historic roots in Kenya. Government approval and support for commercial breeding of wildlife to fill demand may come with economic benefits but carry public health costs.

This concept of farming wild animals on a large scale is somewhat analogous to the practice of aquaculture, whereby wild-caught fish are confined in pens or tanks for the purpose of breeding and, later, slaughtering for food. Commercial fishing in Kenya is primarily done on an artisanal and subsistence basis, but it employs over 2 million people in the country. Close to 95% of the fishing is done in freshwater lakes (with Lake Victoria and Lake Turkana the fishing industry's two primary lakes).[39] Though there is a risk for disease transmission in the handling, killing, gutting or processing of fish, as well as the use of smaller fish for bait, the aquatic species pose a lower risk of zoonoses than terrestrial animals.[40] And while disease transmission can occur through contact with live or dead fish, humans acquire fish-borne parasitic zoonoses most commonly through the consumption of infected raw, undercooked, or inadequately preserved fish.[41] [42] [43]

The growing trend towards new and increased wildlife farming is a result of several drivers. Reduced profitability of traditional livestock farming due to poor yields and increased costs has been a significant driver.[44] Some have also attributed the growth to increased demand from some Kenyans to

35. Laura A. Kurpiers et al., "Bushmeat and Emerging Infectious Diseases: Lessons from Africa," in Problematic Wildlife: A Cross-Disciplinary Approach, edited by Francesco M. Angelici (Cham: Springer, 2016), 507–51, https://doi.org/10.1007/978-3-319-22246-2_24.
36. Laura A. Kurpiers et al., "Bushmeat and Emerging Infectious Diseases: Lessons from Africa," in: Problematic Wildlife: A Cross-Disciplinary Approach, edited by Francesco M. Angelici (Cham: Springer, 2016), 507–51, https://doi.org/10.1007/978-3-319-22246-2_24.
37. Laura A. Kurpiers et al., "Bushmeat and Emerging Infectious Diseases: Lessons from Africa," in: Problematic Wildlife: A Cross-Disciplinary Approach, edited by Francesco M. Angelici (Cham: Springer, 2016), 507–51, https://doi.org/10.1007/978-3-319-22246-2_24.
38. International Fund for Animal Welfare (IFAW), "IFAW Africa: Bush Meat Poaching in Kenya," Encyclopedia Britannica: Saving Earth, accessed October 10, 2023, https://www.britannica.com/explore/savingearth/ifaw-africa-bush-meat-poaching-in-kenya.
39. African Leadership University School of Wildlife Conservation, State of the Wildlife Economy in Africa: Case Study: Kenya (Pamplemousses: African Leadership University, 2020), https://irp.cdn-website.com/278b092c/files/uploaded/2020-StateOfTheWildlifeEconomyInAfrica-CaseStudy-Kenya.pdf.
40. Shane Boylan, "Zoonoses Associated with Fish," Veterinary Clinics of North America: Exotic Animal Practice 14, no 3 (2011): 427–38, doi: 10.1016/j.cvex.2011.05.003.
41. Carlos A. M. Lima dos Santos and Peter Howgate, "Fishborne Zoonotic Parasites and Aquaculture: A Review," Aquaculture 318, nos. 3-4 (2011): 253–61, https://doi.org/10.1016/j.aquaculture.2011.05.046.
42. Martha Iwamoto et al., "Epidemiology of Seafood-Associated Infections in the United States," Clinical Microbiology Reviews 23, no. 2 (2010): 399–411, doi: 10.1128/CMR.00059-09.
43. Joyce Evans, O. L. M. Haenen, and Frank Berthe, "Overview of Zoonotic Infections from Fish and Shellfish," Aquaculture America Conference (2013): 315, https://www.ars.usda.gov/research/publications/publication/?seqNo115=289136.
44. African Leadership University School of Wildlife Conservation, State of the Wildlife Economy in Africa: Case Study: Kenya (Pamplemousses: African Leadership University, 2020), https://irp.cdn-website.com/278b092c/files/uploaded/2020-StateOfTheWildlifeEconomyInAfrica-CaseStudy-Kenya.pdf.

"go back" to consuming native wild species as a response to concerns that livestock are contaminated by antibiotics and antimicrobials.[45]

The Wildlife Conservation and Management Act of 2013 also articulates legal nonconsumptive uses for wildlife including wildlife-based tourism, commercial photography and filming, education, research, and cultural and religious purposes.[46] For example, butterflies are legally used under this Act for nonconsumptive reasons such as companionship, entertainment, display, and other purposes related to livelihood and employment.[47] Snakes are farmed for their venom. And as wildlife plays an integral part of the spiritual life of many ethnic Kenyan communities, space has been made for these rituals. The hunting and killing of wildlife is illegal, but wild animals often are used in symbolic ways (some of which are amplified in folktales, such as the "slow tortoise" or the "cunning hare'). Wild animals commonly revered in this way include leopards, monkeys, foxes, antelopes, elephants, buffalo, crocodiles, tortoises and certain species of snakes such as the cobra, puff adder, and python.

Though licensed farming of wildlife is legal, there are other kinds of wildlife trade that are illegal, usually not well documented, and significant in volume. The illegal market is so large that, despite a near-total ban on hunting, Kenya is experiencing a decline in wildlife populations, especially herbivores outside of protected areas.[48] Large herbivores, such as zebras and giraffes, are among the animals most targeted by poachers. There is also a market for small wild animals hunted for meat such as hares, squirrels, and moles. Though efficient modern hunting technologies continue to be introduced in Kenya, making hunting easier and more unsustainable, a large part of Kenya's wildlife is still being killed by low-tech means—in snares and traps or poached with bow and arrows.[49] [50] These animals are killed by these methods for both subsistence and commercial reasons, the two primary drivers of illegal hunting. It is common for subsistence hunting to evolve into commercial operations.

Research has shown that poverty is the key driver of illegal exploitation of wildlife. In an effort to meet household subsistence needs of food and income, people turn to illegal hunting of bushmeat, especially when there is a scarcity of reliable water sources and adequate rainfall is unpredictable.[51] In a survey done of residents in an area south of Nairobi bordering the Tsavo and Chyulu Hills national parks in Kenya, subsistence killing was the most commonly cited reason for hunting of wildlife. Forty-one percent of those who participated in illegal hunting did so for subsistence purposes (41%) while another

45. Antimicrobials are commonly used among livestock farming in Kenya, though, in Kenya, the primary reason for administering antimicrobials is for maintenance of livestock health and not to change the livestock's natural processes, such as stimulating growth. Most antimicrobials that are administered on farms are obtained through informal means, often by staff without required qualifications. Steven A. Kemp et al., "A Cross-Sectional Survey of the Knowledge, Attitudes, and Practices of Antimicrobial Users and Providers in an Area of High-Density Livestock–Human Population in Western Kenya," Frontiers in Veterinary Science 8 (2021): 727365, https://doi.org/10.3389/fvets.2021.727365.

46. Nixon Sifuna, "The Legally Permissible Traditional Customary Uses of Wildlife and Forests under Kenyan Law," Open Journal of Forestry 11, no. 3 (2021): 292–314, doi:10.4236/ojf.2021.113018.

47. Butterfly farming has also been noted by the Ministry as a local economic and conservation motivator: "There are three licensed butterfly farmers in the country. Two of these farmers are in Malindi with a network of out-growers consisting of local members of communities around Arabuko Sokoke Forest Reserve and Shimba Hills National Reserve. The butterfly farming programme not only provides supplemental income to the local participating households but is important in motivating local people to conserve wild vegetation on which butterfly life depends. The live butterfly pupae were exported mainly to the United Kingdom and the USA." *Ministry of Tourism and Wildlife*, p. 220. https://s3-eu-west-1.amazonaws.com/s3.sourceafrica.net/documents/120895/NWCSR-Main-Compressed.txt

48. *[The CWU report is a great citation for this; speaks to the belief of a large amount of bushmeat. Seems that the Kenyan authors of our report downplayed it a little?]*

49. Danson K. Mwangi et al., "Socioeconomic and Health Implications of Human–Wildlife Interactions in Nthongoni, Eastern Kenya," African Journal of Wildlife Research 46, no. 2 (2016): 87–102, https://doi.org/10.3957/056.046.0087.

50. International Fund for Animal Welfare (IFAW), "IFAW Africa: Bush Meat Poaching in Kenya," Encyclopedia Britannica: Saving Earth, accessed October 10, 2023, , https://www.britannica.com/explore/savingearth/ifaw-africa-bush-meat-poaching-in-kenya.

51. Danson K. Mwangi et al., "Socioeconomic and Health Implications of Human–Wildlife Interactions in Nthongoni, Eastern Kenya," African Journal. of Wildlife Research 46, no. 2 (2016): 87–102, https://doi.org/10.3957/056.046.0087.

22% hunted animals for sale in the bushmeat trade (22%). Conflict between humans and wildlife or livestock and wildlife was another common cause of wildlife killing. Thirty-five percent of those who killed wildlife did so out of revenge for crop losses or livestock depredation by wildlife, which was experienced by over 75% of the respondents. This survey also suggested that public education may be limited on the topic of zoonotic disease. Less than a fifth of those surveyed were aware that diseases could be transmitted through handling and consumption of bushmeat.[52]

Some seek out bushmeat because it is cheaper; others because of taste, cultural preferences, or a lack of available alternatives. In certain cases, bushmeat may cost as little as one-fifth the price of meat from traditional livestock. This price disparity means that commercially hunted wild animals are often disguised and sold as traditional livestock meat such as beef or goat. In this way, bushmeat may covertly enter traditional livestock meat supply chains, as the supplier profits from the higher margins of the illegal activity. In such cases, the endpoint consumer is unaware they are eating bushmeat such as zebra or wildebeest and thus unaware of the additional disease risks associated with eating animals of unknown origin.[53] [54] In the event of a disease outbreak, blurry supply chains may undermine public health response efforts and obscure the source of the outbreak; however, there have been some efforts to increase use of DNA sampling to distinguish wildlife meat versus that of domestic livestock, but this effort is still only done on a small scale.[55]

Additionally, when a native species of wildlife is legally farmed, it can provide cover for a parallel industry in illegal hunting for that same species. In some cases, illegally killed bushmeat may be laundered through licensed game farming operations and passed off as legal, farm-raised meat. Hence, if someone manages to hunt a crocodile and colludes with another individual who has a license to raise crocodiles, then that poached meat may end up in the circuit of legal meat under the Meat Control Act. This pattern of behavior poses significant enforcement challenges, and, under the current system, postmortem inspectors have had no way of knowing whether meat was sourced legally from licensed game ranches or illegally from poached wildlife through mere visual inspection.

Although the Wildlife Management and Conservation Act of 2013 is clear that the killing of wild animals is not allowed without permission, the licensing regime itself has several loopholes or areas that lack clarification. These holes threaten to undermine the effectiveness of the law and the protection of the wildlife. There are also problems in the inconsistent implementation of regulations among different government entities. In some cases, competing definitions lead to conflicting results and regulatory confusion. One example of this is the Department of Fisheries definition of food. Many sharks are legally classified as protected endangered species in Kenya.[56] However, despite their protected status, the

52. Danson K. Mwangi et al., "Socioeconomic and Health Implications of Human–Wildlife Interactions in Nthongoni, Eastern Kenya," African Journal. of Wildlife Research 46, no. 2 (2016): 87–102, https://doi.org/10.3957/056.046.0087.

53. Pauline Kairu, "Bushmeat from Mara-Serengenti Could Kill You, Experts Now Warn," The East African, March 12, 2020, https://www.theeastafrican.co.ke/tea/news/east-africa/bushmeat-from-mara-serengenti-could-kill-you-experts-now-warn-1438444.

54. Elizabeth A. Kennedy, "Kenyans Unwittingly Eating Bushmeat, Not Beef," IOL, July 11, 2007, https://www.iol.co.za/news/africa/kenyans-unwittingly-eating-bushmeat-not-beef-361557.

55. Bill Clark, "Using DNA to Put Poachers Away," AWI Quarterly 62, no. 3 (2013): 22–25, https://awionline.org/awi-quarterly/2013-summer/using-dna-put-poachers-away.

56. Kenya Wildlife Services, Convention of the Conservation of Migratory Species of Wild Animals, and Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), both of which Kenya is a member of, all deem sharks in danger. John Waweru et al., National Wildlife 2021 Census Report (Nairobi: Kenya Wildlife Service and Wildlife Research and Training Institute, 2021), https://kws.go.ke/content/national-wildlife-census-2021-report.

Department of Fisheries allows the hunting and commercial sale of these animals.[57] [58] Similarly, although many turtle species are considered endangered, a different government agency gives out licenses for people to collect turtle shells. As a result, in a strange contradiction, one part of the government passes blanket provisions to protect endangered species, while another part permits the commercialization of those same species. There are efforts to address the contradictions through inter-departmental conversations and policy processes, amendment of laws to align with the constitution, and inter-agencies collaboration, coordination, and enforcement; however, inter-agency siloing threatens to undermine enforcement efforts and may prove a barrier to effectively addressing zoonotic disease risk until these discrepancies and communication gaps can be resolved.

Religious and superstitious uses also drive the illegal wildlife trade in Kenya. Owl eggs and certain species of reptiles are used for superstitious purposes. There are no animal markets that exclusively sell animals for religious or superstitious purposes in Kenya. However, animals are brought to the normal livestock markets and sold for this purpose. Traditional livestock species may also be employed for such uses. In a market setting, there may be indications that an animal is to be used for religious purposes such as when a person seeks a specific color or sex of certain animals such as a black rooster or a white male goat or ram. These animals are usually illegally slaughtered and the blood offered as sacrifice, mixed with other substances, or drunk raw. Some Kenyans surreptitiously keep snakes in their homes for witchcraft purposes.

OVERVIEW OF MARKETS

Types

In Kenya, most markets feature trade in many types of commodities, with sections of the market set aside for livestock including cattle, sheep, and goats. Animals are primarily purchased and paid for in cash, but the use of mobile money is growing noticeably.[59] Because "livestock" includes many species, sometimes also encompassing many animal species that are wild but are presented under the emerging livestock category as captive-raised wildlife, there are ample chances for close contact between a range of different species which may give rise to zoonotic spillover.

Live animal markets take the form of open-air markets. The animals gain entry to these markets with little or no hindrances and interact with people—both traders and consumers— as well as other livestock without restrictions.[60] The negotiation and selection process typically involves physical inspection without any precautionary measures or sanitization. There is therefore a risk of zoonotic transmission from one animal to another, from an animal to a human (and vice versa), as well as from the market to the community.[61] The risk of disease transmission is also present at fish markets where whole fish carcasses are sold, as selection entails physical contact such as touching the carcass with ungloved

57. No prohibition of shark hunting is mentioned in the Fisheries and Development Act of 2016. IOTC 2019 Compliance Report, Fisheries Management & Development Act 35/2016, IOTC-2019-CoC16-CQ12, http://extwprlegs1.fao.org/docs/pdf/ken160880.pdf.

58. "How Demand for Delicacy Drives Silent Massacre of Kenya's Sharks," Nation, updated July 3, 2020, https://nation.africa/kenya/news/how-demand-for-delicacy-drives-silent-massacre-of-kenya-s-sharks-803492.

59. Kenya Markets Trust, 2019a.

60. *Erick Ouma Omollo et al., "Mapping and Characterization of Stakeholders in the Fodder Value Chain in Southern Rangelands of Kenya: Understanding Their Roles, Interactions and Influences," Journal of Agricultural Science and Practice 4, no. 5 (2019): 38–43, https://doi.org/10.31248/JASP2019.162.*

61. *K. Maina, personal communication, November 28, 2020.*

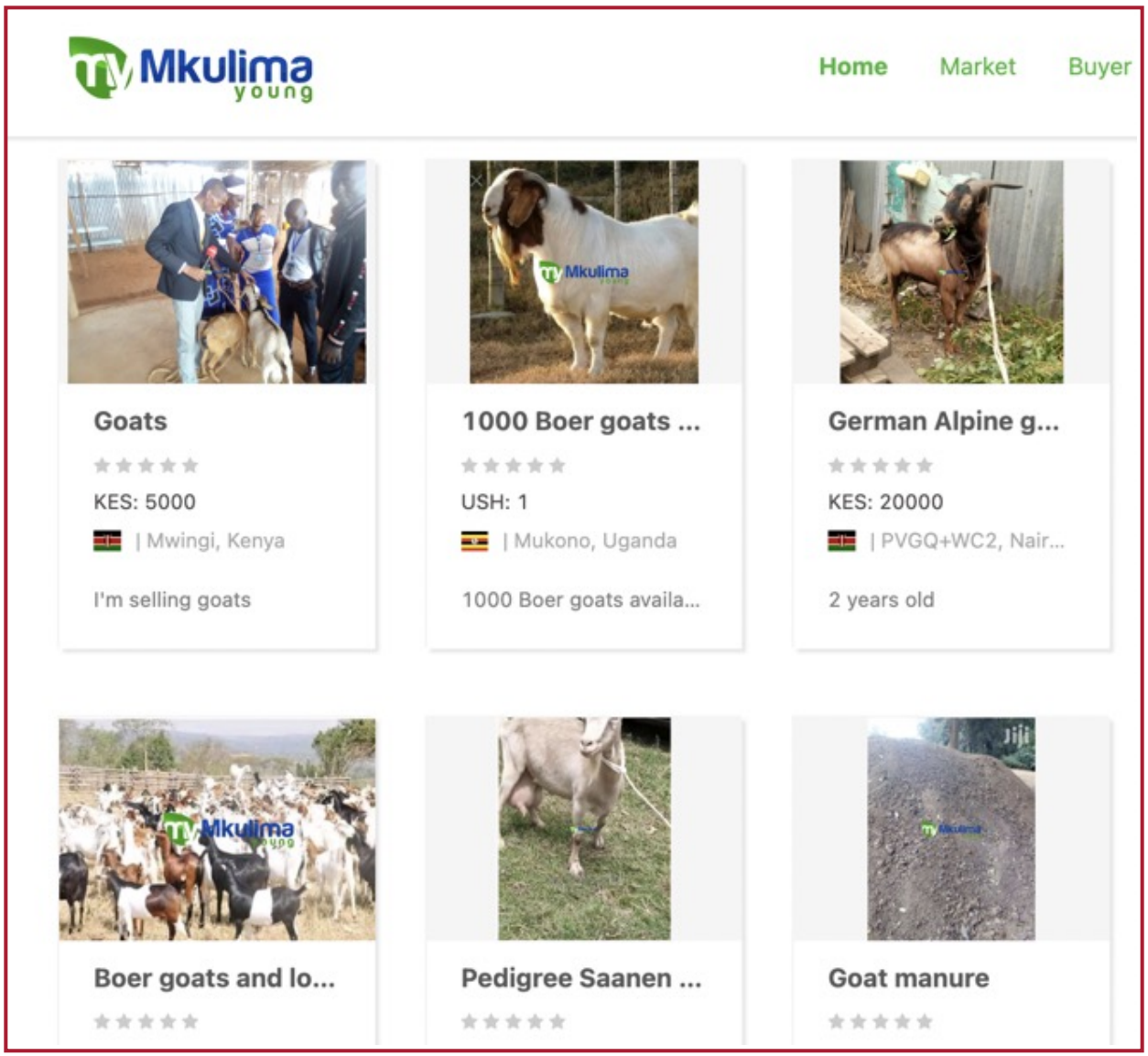
hands in a bid to assess quality and freshness.[62] Common zoonoses resulting from contact with diseased fish include mycobacterium, campylobacter, and salmonella.[63] There is a notable absence of veterinary and public health professionals at live animal markets, thus increasing the risk of disease spread.[64]

There are no live markets for pigs in Kenya, in part in an effort to control the spread of African swine fever, a disease that has devastated pork production in many parts of the world.[65] Instead, most pigs are bought from farm to farm either by traders or agents of the pig slaughterhouses.[66]

The current role and set up of markets in Kenya suggest there are no easy alternative methods of animal sales, except for a growing shift toward online sales. A case in point is the recent establishment of the Kitui digital goat auction. The digital market uses an app developed by Strathmore University and other partners. Its main goal is to make it easier for potential buyers to connect to sellers and thus increase sales.[67] There are other online livestock and wildlife markets using websites and social media platforms. These online markets are mainly for domestic pets, exotic fish, exotic birds, wildlife, and rabbits. But a growing number of farmers are also buying and selling livestock species using this medium. It is considered faster and more effective, with better biosecurity measures since animals sold in this platform are mainly sold from within the confines of the owners' homes without exposure to large amounts of other animals during transport and sale at market.[68] Online markets are especially helpful for pet vendors, dairy farmers, and exotic bird traders, who fear taking the animals to open air markets where they can contract diseases.

The primary online markets are OLX/Jiji (a free classified ads site in Kenya) and Mkulima Young, but there are also numerous livestock and pet-focused social media groups with a national reach including Facebook and WhatsApp groups. After communicating and negotiating online, payment is agreed upon, and the parties agree upon a physical venue at which to deliver and collect the animals.

62. *F. Rachuonyo, personal communication, November 27, 2020.*
63. Institutional Animal Care and Use Committee, "Zoonoses Associated with Fish," Washington State University, January 2021, https://iacuc.wsu.edu/zoonoses-associated-with-fish/.
64. S. Amirah, personal communication, November 28, 2020.
65. Florence Mutua, Johanna Lindahl, and Delia Randolph, "Possibilities of Establishing a Smallholder Pig Identification and Traceability System in Kenya," Tropical Animal Health and Production 52 (2020): 859–70, https://doi.org/10.1007/s11250-019-02077-9.
66. *Maurice Rangoma, "Pig Market in Kenya," Livestock Kenya, accessed October 10, 2023, https://www.livestockkenya.com/index.php/blog/pigs/182-pig-market-in-kenya.*
67. *Gilbert Koech, "Kitui Goat Auction Goes Digital," The Star, December 10, 2019, https://www.the-star.co.ke/counties/eastern/2019-12-10-kitui-goat-auction-goes-digital/.*
68. *"Kenya Shuts Livestock Markets Along Borders with Somalia, Tanzania," XinhuaNet, May 9, 2020, https://www.xinhuanet.com/english/2020-05/09/c_139043799.htm.*



Scale

Livestock markets are located in all 47 counties of Kenya, with counties such as Garissa and Kitui, with Migori hosting the largest market sale yards and Nairobi and Mombasa hosting the largest end-user livestock markets. Market sale yards are large spaces built out specifically to hold a larger number of livestock, with some having the capacity to hold over 10,000 livestock animals at a time. The newer sale yards have partitioned booths to better organize the livestock.[69] Currently, there are 68 livestock markets under the Kenya National Livestock Marketing Information System, which provides a unified system of information on prices of different livestock species traded in key livestock markets, 21 crocodile farms selling crocodile meat, 1 ostrich farm, 2 main poultry farms selling primarily chicken, and one dog market in Lubao, Kakamega County.[70] Dogs are usually sold for companionship and/or security,

69. David Nderitu, "Modern Livestock Market Offers a New Lifeline for Pastoralists in Laikipia North, Kenya," World Vision Kenya, September 18, 2021, https://www.wvi.org/stories/kenya/modern-livestock-market-offers-new-lifeline-pastoralists-laikipia-north-kenya.

70. Regarding crocodile meat, see: Gitonga Njeru, "Croc of Gold: Kenya's Booming Crocodile Farm Industry," BBC, September 1, 2016, https://www.bbc.com/news/business-37218790.

not meat, as dog meat is banned in Kenya.

There are many more medium to small markets across the country where livestock animals are sold periodically on specific days of the week. Along most major roads in the country, there are numerous markets dealing in poultry, dogs, ducks, geese, rabbits, pigeons, and fish. These markets have no clear operating system. Exotic birds are also sold at these sites.[71] There are also annual livestock auctions where animals, often goats, are sold in large numbers. The main auctions are Kameli in Baringo County, the Nakuru Easter goat auction in Nakuru County, and the Kitui digital goat auction in Kitui County.

There are over 25 fish markets located in the Lake Victoria basin, Lake Naivasha area, Lake Turkana, and coastal towns of Lamu, Mombasa, and Kilifi. There are minor fish vending centers mainly located near the River Sagana in Kirinyaga County, Naivasha town, and the urban centers bordering Tana River. Kenya has 197 fish landing sites on the Indian ocean and 307 on the inland water bodies.[72] Fish landing sites double as informal markets where traders purchase fish directly from the fishermen.

In addition to markets serving domestic buyers, Kenya is also a meat and live animal exporter, exporting US$14.52 million of live animals during 2021 and US$75.09 million of meat.[73] The export industry has been the subject of various development plans in the past decade, with significant swings from year to year ranging from as much as a 110% increase in 2013, a nearly 70% spike in 2017, and other years interspersed with very little or even negative growth, as in 2011–2012 and 2014–2015.[74] In some cases, this volatility is due to disease outbreaks such as foot and mouth disease and Rift Valley Fever.[75] [76] This export market exists regardless of whether or not domestic demand has been met. The top importers of Kenyan-produced meat come from the Middle East, including the United Arab Emirates, Saudi Arabia, Bahrain,, and Kuwait.[77] Meat is also exported to countries throughout Africa.[78]

Market Functions

Markets serve as centers for economic gain, support the livelihood of producers, and facilitate cultural interactions. Many people go to markets to socialize.[79] This includes, for example, the sharing of drinks and updates, discussing other current community affairs, and practicing traditional dances. Markets are also avenues for important information dissemination on matters such as public health, education, and security. Customers purchasing pets, exotic birds, and dairy cattle often prefer farm-site sales to market sales, so they can be better assured of getting a healthy animal for breeding or keeping.[80] Livestock markets play a crucial role in the value chain, without which, trading in livestock

71. *A. Parsimei, personal communication, 2020.*
72. *"10. Consumption Centres: Demand Characteristics and Development Requirements," FAO, accessed October 10, 2023, https://www.fao.org/3/41449E/41449E10.htm.*
73. United Nations COMTRADE Database on International Trade, https://comtrade.un.org/data.
74. *"Kenya: Meat Exports," Knoema, accessed October 10, 2023, https://knoema.com/atlas/Kenya/topics/Agriculture/Trade-Export-Value/Meat-exports.*
75. *Gerald Andae, "Livestock Diseases Slow Kenya's Meat Exports," Business Daily, February 3, 2020, https://www.businessdailyafrica.com/bd/economy/livestock-diseases-slow-kenya-s-meat-exports-2278948.*
76. Anthony Kitimo, "Kenya Resumes Export of Livestock to Oman After 16 Year-Ban," Zawya, January 3, 2022, https://www.zawya.com/en/economy/kenya-resumes-export-of-livestock-to-oman-after-16-year-ban-a3qbzaj6.
77. "The GCC is New Frontier For Export of Kenya's Meat and Meat Products," Business Daily, February 2, 2022, https://www.businessdailyafrica.com/bd/sponsored/gulf-new-frontier-for-export-of-kenya-meat-and-meat-products-3702744.
78. Kenya Meat Commission, accessed September 15, 2022, https://www.kenyameat.co.ke/index.php?option=com_content&view=article&id=58:export-market-&catid=37:market&Itemid=69.
79. *N. Oduor, personal communication, November 27, 2020.*
80. *C. Nyoro, personal communication, November 27, 2020.*

would be impractical, unreliable, and unevenly distribute profits. Markets also tend to arise depending upon demand and the location of the buyers. This explains the undocumented but reported presence of many roadside and informal markets. It is also clear that markets serve as a crucial point for wealth creation and transfer in the livestock value chain. A large percentage of the livestock raised in Kenya supplies domestic markets. After slaughter, the retail butcheries absorb most of the meat. Further, livestock markets create a market hub for other commodities. These markets make it easier for producers to determine prices and profitability. Without the market systems, the traders can more easily take advantage of the farmers. Markets thus serve as an opportunity for buyers and sellers to best employ their goods and cash. They are also part of local cultures, including serving as avenues to pass important information.

MARKET SUPPLY CHAINS

Trajectory and Process: Sourcing, Transport, and Sale

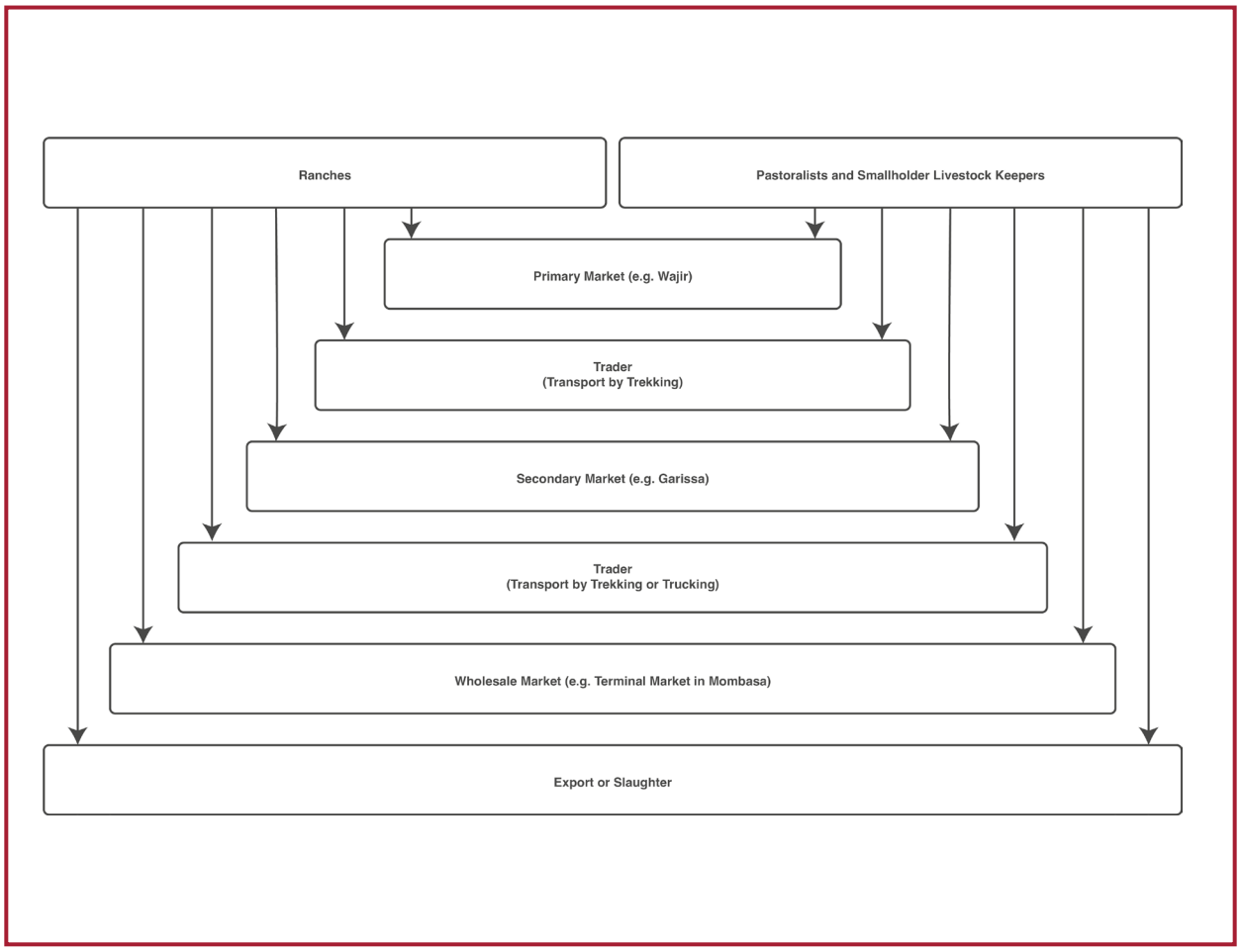
Pastoralists and small-scale farmers are the major source of livestock sold in Kenya. Free-range livestock rearing is the most common livestock production system. Most animals are brought to markets from villages and homesteads. Commonly, middlemen purchase the individual animals, accumulate a sizable herd, and later trade them at the market alongside individuals who also come with a few animals.[81] A similar practice is observed with other livestock, including fish, whereby brokers wait for fishermen at the shore landing sites to purchase fish and deliver them to the major markets for sale.[82]

The sequence and direction of the value chain is as follows: the farmer/owner as primary source sells to a broker/middleman/market intermediary, mainly on the roadside near a market or at home, and then afterwards the broker/middleman sells the animals to the major traders in the markets in bulk. The major traders transport the animals to buyers, which are the individuals and institutions who will slaughter the animal and sell the derived products or export the animal live. Animal products reach the consumer through the retail outlets, commonly known as butcheries.[83] Other products, such as skins and hides, are sold from slaughterhouses.

Farming in Kenya is still dominated by small-scale farms, though larger, medium-scale farms are beginning to emerge. These medium-scale farms have not proven to be structured differently or commercialized in any significant way, but rather, are mostly smaller farms who incrementally increased in size by buying or renting additional land.[84] Land is sometimes also jointly owned by a group where livestock is herded as a group but owned individually. This type of operation is referred to as a ranch in Kenya, and these groups are usually formed around kinship or common land rights.

81. *A. Kata, personal communication, November 28, 2020.*
82. *F. Rachuonyo, personal communication, November 27, 2020.*
83. *Kenya Markets Trust, 2019a.*
84. Niels Debonne et al., "Farm Scale as a Driver of Agricultural Development in the Kenyan Rift Valley," Agricultural Systems 186 (2021): 102943, https://doi.org/10.1016/j.agsy.2020.102943.

Value chain actors for live cattle:[85]



Animals are generally transported on hoof from the farmer or owner to the market. Once purchased by the major traders, most are transported by lorries or pick-up trucks to their ultimate destination, which are slaughterhouses where they are either slaughtered immediately or kept for a day or two in the open-air holding grounds before slaughter. Camels are generally transported on hoof due to the lack of reliable transport vehicles designed to transport them.

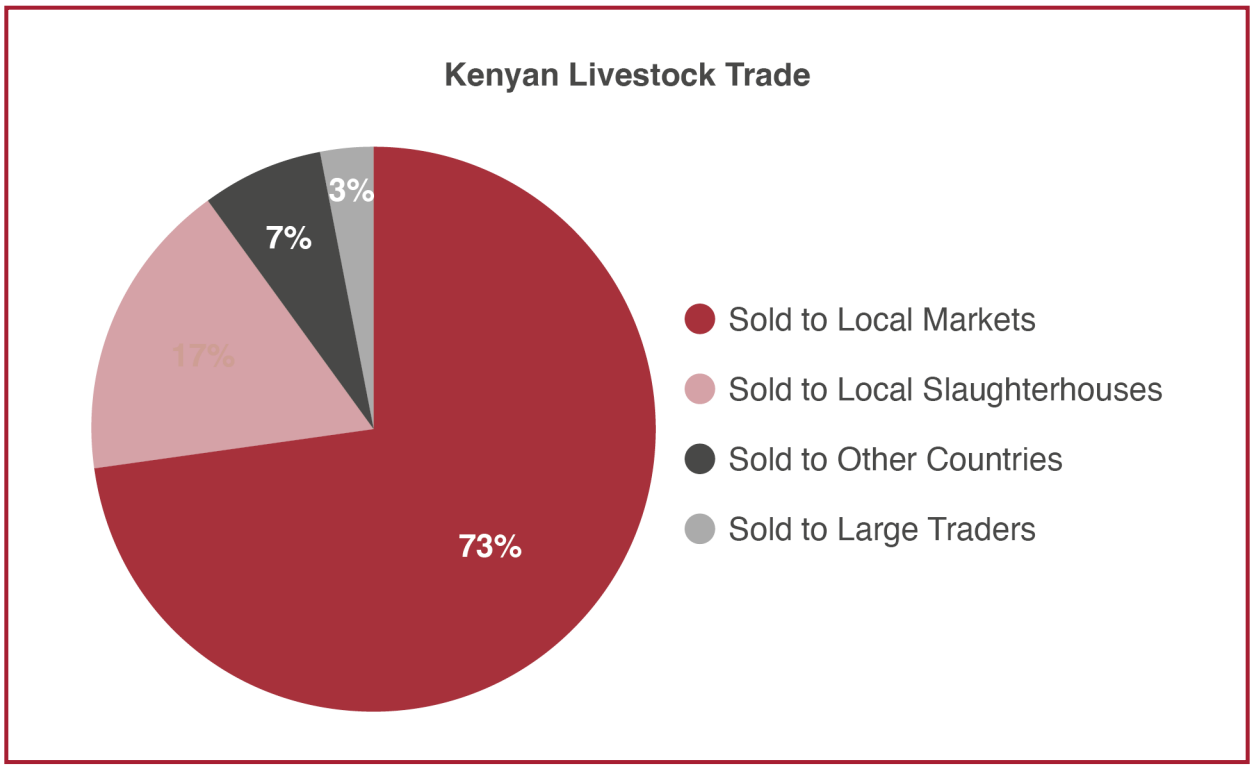
The bulk of domestic red meat demand is for unprocessed meat. Processed meat is more commonly used for the export market, which is a much smaller percentage of total production. In Kenya, the average annual per capita consumption of red meat is about 15.5 kg, roughly seven times lower than that in the United States, with an annual national production of about 600,000 metric tons. All meat types are consumed across different income groups; there are, for example, however, those in general lower income groups tend to consume common affordable species including fish such as omena (a small silver fish in the carp family) that thus establish a higher total fish market share than higher income groups.[86]

In terms of the live animal export market, animals are usually transported to ports where specialized ferries are arranged for transport to the destination country. They go primarily to Middle

85. S. Makokha and M. Witwer, Analysis of Incentives and Disincentives for Cattle in Kenya (Rome: FAO, 2013), https://www.fao.org/3/at557e/at557e.pdf.

Eastern nations. The export market has seen dramatic swings from year to year in the past decade, generally with a steady increase in trades within a limited group of trading partners. Kenya has yet to establish a more robust export trade in livestock. Currently, the Kenya Markets Trust, in collaboration with the Kenya Livestock Development Council, is developing strategies by which to expand the export market. By one analysis, 62% of Kenyan cattle exports went to Uganda, 34% to Mauritius, 3% to Burundi, and 1% to the United Republic of Tanzania.[87] Kenya exports meat to Somalia, Qatar, the UAE, and also to several other Middle Eastern nations.[88]

Research undertaken by the Kenya Markets Trust (now merged into Gatsby Africa) suggests that a large majority of Kenyan livestock is distributed in-country, often to brokers at markets who then sell the animals off to others. Livestock trade to other countries is quite low, in part due to long travel distances and trade restrictions.[89]



Stakeholders

There are different stakeholders in various categories of the value chain, including implementation and enforcement officials at the national and county government levels. Other stakeholders include the producers, who are mainly small-scale farmers and a few larger-scale farmers. The producers of livestock entering the market include these groups as well as wildlife farmers and pastoralists. Estimates suggest there are roughly 2 million total producers in Kenya.[90] Market-site actors

87. S. Makokha and M. Witwer, Analysis of Incentives and Disincentives for Cattle in Kenya (Rome: FAO, 2013), https://www.fao.org/3/at557e/at557e.pdf.
88. Elisabeth Farmer and James Mbwika, "End Market Analysis of Kenyan Livestock and Meat: A Desk Study," MarketLinks, April 10, 2012, https://www.marketlinks.org/resources/end-market-analysis-kenyan-livestock-and-meat-desk-study.
89. "Political Economy Analysis of the Livestock Sector, 2019 Report," Kenya Markets Trust, 2019, https://www.kenyamarkets.org/wp-content/uploads/2019/07/Political-Economy-Analysis-of-Kenyas-Livestock-Sector-Full-Report.pdf.
90. Yacob Aklilu, Livestock Marketing in Kenya and Ethiopia: A Review of Policies and Practice (Addis Ababa: Feinstein International Center, 2008). ; Kenya Livestock Producers Association, 2020.

include traders, middlemen, transporters. There are also slaughterhouses, slaughter slab owners, meat products vendors and retail butchers, and at the end of the chain, consumers. In addition to these stakeholders in the legal market, a parallel supply chain exists for the illegal trade. Precise figures for this illegal market and the number of actors are not known, but the prevalence of bushmeat for sale from poached wildlife and declines in certain wildlife populations, particularly large herbivores, suggest a well-established illegal trade which may be supported by similar roles– from hunter to middleman to seller.[91]

At the market, buyers fall into two main categories: large-scale/macro traders and small-scale/micro traders. The large scale mainly involves the middlemen who purchase livestock in large numbers for long-distance transportation to the terminal markets, mainly in Nairobi and Mombasa Counties. This group is the main driver of market prices. The micro categories are the subsistence traders who purchase one or two animals, either for domestic consumption or for local slaughterhouses. The small traders purchase the animals that the large-scale traders are not interested in or do not fit their set standard.[92] Relevant market authorities include county levy officers, a market chairman, and, periodically, an animal health officer. The main role of the animal health officer is to issue movement permits to traders for the livestock purchased in part to contain the spread of disease.

The middlemen, or brokers and market merchants, are estimated to number about 300,000 countrywide. They either purchase the livestock from the producers directly from their homes and farms, or acquire them at the markets. This group of middlemen significantly influences market prices, influencing the buyer/seller pricing balance that markets provide. The group includes transporters and has a share margin of 30%-40%.[93] In Kenya, transporters also account for up to 30% of the total cost margin for livestock delivered to the market. Thus, traders with their own transport system achieve higher profits.[94] Many traders transport their animals in generic trucks not specialized for animal transport, but some use more expensive specialized animal transport vehicles.

The slaughterhouse, slaughter slab owners, and butchers are in most cases the final players in this industry before the meat is sold to customers.[95] End customers will sometimes pay middlemen/brokers to source animal meat. While the exact number of slaughterhouses is unknown, it is estimated to be between 380 and 960 slaughterhouses and slabs located all over the country.[96] [97] There is no official data on the number of people directly working in this sector. This group makes up a margin share of 10%-20% from the livestock trade.[98] Of the meat sold from local slaughterhouses, 70% are sold to local butcheries. The remaining meat is sold directly to hotels or exported.[99]

91. *Joseph O. Ogutu, "Extreme Wildlife Declines and Concurrent Increase in Livestock Numbers in Kenya: What are the Causes?" PLoS ONE 11, no. 9 (2016): e0163249, doi: 10.1371/journal.pone.0163249.*

92. *M. Olum, personal communication, November 27, 2020.*

93. *M. Mwaniki, personal communication, November 29, 2020; N. Wanja, personal communication, November 29, 2020.*

94. *Yacob Aklilu, Livestock Marketing in Kenya and Ethiopia: A Review of Policies and Practice (Addis Ababa: Feinstein International Center, 2008).*

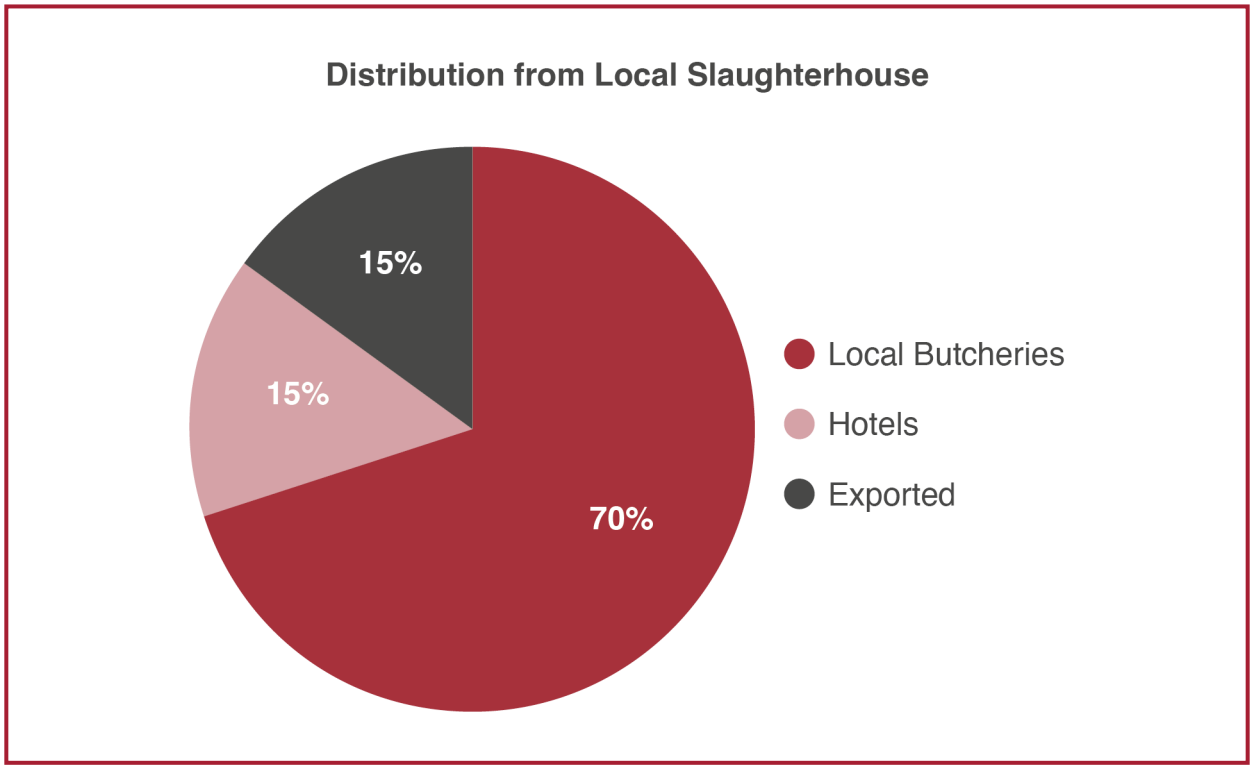
95. Pork joints are not sold at markets due to disease risk but areas where pigs are slaughtered, cooked, and even eaten in the same establishment are known to exist.

96. A slaughter slab is the smallest category of slaughterhouses and is defined by the Meat Control Act as "throughput not exceeding five bovines units or camels, eight donkeys units or horses or fifteen units of goats or sheep, or six unit of small pigs or two units of porkers or one unit of baconer pigs or three units of calves per day." Meat Control Act, CAP. 356 [L.N. 213/1973, L.N. 123/2007.], http://kenyalaw.org:8181/exist/kenyalex/sublegview.xql?subleg=CAP.%20356.

97. *F. Midikila, personal communication, November 29, 2020.*

98. *Yacob Aklilu, Livestock Marketing in Kenya and Ethiopia: A Review of Policies and Practice (Addis Ababa: Feinstein International Center, 2008). ; Elisabeth Farmer and James Mbwika, "End Market Analysis of Kenyan Livestock and Meat: A Desk Study," MarketLinks, April 10, 2012, https://www.marketlinks.org/resources/end-market-analysis-kenyan-livestock-and-meat-desk-study.*

99. "Political Economy Analysis of the Livestock Sector, 2019 Report," Kenya Markets Trust, 2019, https://www.kenyamarkets.org/wp-content/uploads/2019/07/Political-Economy-Analysis-of-Kenyas-Livestock-Sector-Full-Report.pdf.



A recent research report found that most small and medium butcher operations do not meet minimum sanitation and hygiene standards. For example, in the county of Nairobi, 82% of the butcheries surveyed did not wash their hands before handling meat. Other common concerns include handling meat concurrent with handling money and reusing cleaning materials.[100] All of these poor biosecurity practices create ripe environments for the spillover and spread of zoonotic diseases.

Another set of stakeholders is individuals acquiring live animals to develop their herd, build their capital resources, or to use animals for cultural purposes and social exchanges. There are also animal by-products traders. This group mainly deals with hides, skins, and other inedible animal byproducts. They also supply leather for export and local demands. Their profit margins depend upon the availability of livestock in the slaughterhouses.

Roadside vendors of live animals and processed animal products are another stakeholder group. This includes deep-fried fish merchants, which are common across the country, as well as poultry and live pet vendors who deal primarily in exotic birds, such as parrots, some of which are sourced from the wild. These roadside sellers may also supply chickens, ducks, geese, pigeons, and turkeys. Their profit margins vary depending upon the location of their business. Those near urban centers see a higher profit margin than those in rural areas. It is estimated that they make profits of between 20%-40% of the total commodity purchase price.[101]

In Kenya, the support for animal markets is founded in economic, cultural, and food security considerations. National and country governments support, regulate, and benefit from animal markets,

100. Sharon Chepkemoi et al., "Sanitation and Hygiene Meat Handling Practices in Small and Medium Enterprise Butcheries in Kenya - Case Study of Nairobi and Isiolo Counties," Internet Journal of Food Safety 17 (2015): 64–74, https://www.researchgate.net/publication/283344642_Sanitation_and_Hygiene_Meat_Handling_Practices_in_Small_and_Medium_Enterprise_butcheries_in_Kenya_-_Case_Study_of_Nairobi_and_Isiolo_Counties.

101. *M. Mwaniki, personal communication, November 29, 2020. For further analysis of source-to-terminal market transport costs and information relevant to potential profit margins, see S. Makokha and M. Witwer, Analysis of Incentives and Disincentives for Cattle in Kenya (Rome: FAO, 2013), https://www.fao.org/3/at557e/at557e.pdf. .*

performing tasks from disease surveillance to revenue collection to support services for food security. Multiple government entities are involved in these processes including the Ministry of Industry, Investment, and Trade, the Ministry of Livestock Development, Kenya Leather Development Council (KLDC), the Economic Processing Zone Authority, and the Kenya Livestock Marketing Council (KLMC). In addition, development organizations such as the Intergovernmental Authority on Development (IGAD, eight-country trade block in Africa), African Union InterAfrican Bureau for Animal Resources (AU-IBAR, includes 55 member states of the African Union), EU, and USAID are also involved in supporting Kenya's livestock industry and trade.

Detractors of animal markets are animal welfare organizations concerned about the implementation of animal welfare standards along the value chain of animal markets. Middlemen and brokers are both detractors and competitors, in that they cut off the farmers and producers from market clearing activities and transactions in order to exert their own control on price determination.

The Wildlife Trade

Although hunting and consumption of wildlife from the wild is illegal in Kenya outside of limited exceptions provided for in the Wildlife Conservation and Management Act of 2013, poaching and illegal markets thrive in the country. Elephants and black rhinoceros are two species that are common targets of illegal poaching, which has dramatically impacted their numbers over the last 50 years. Since the 1970s, the elephant population in Kenya has fallen from over 160,000 to approximately 30,000. The Black rhino population in the same time period has fallen from 100,000 to just 650. Research has shown similar declines in other exotic wild species including the cheetah, hyena, and zebra.[102] Elephant ivory, rhino horns, and big cat skins are the most sought after targets of illegal poaching because of the high prices they command.

Though wildlife hunting has been banned since 1977, the illegal trade has continued, egged on by high profits and problems with enforcement. Corruption within government, security lapses at border ports, and ever-more sophisticated poaching networks, analogous to those seen in other forms of organized crime, have each contributed to the illegal wildlife trade.[103] Endemic poverty has helped the kingpins of the illegal poaching networks to recruit, bribe, and threaten locals, as well as police, military personnel, and wildlife rangers, to coerce them into participating in and abetting illegal efforts. Furthermore, Kenya has become a key transit country for illegal wildlife sourced in other African countries and destined for other areas of the world, predominantly China and Hong Kong. Some experts in the field estimate that over 70% of smuggled ivory ends up in China.[104] The Wildlife Conservation and Management Act of 2013 increased penalties for illegally killing wildlife. However, the government's lack of resources to properly enforce the laws, ambiguities in the Act, high demand for wildlife products,

102. Sam Weru, Wildlife Protection and Trafficking Assessment in Kenya (Cambridge: TRAFFIC, 2016), https://www.traffic.org/site/assets/files/2410/kenya-wildlife-trafficking-report.pdf.

103. It is also very difficult and dangerous to enforce conservation laws when pitted against organized criminal groups using assault weapons and sometimes even helicopters. A study done by the World Wildlife Fund found that one in seven wildlife rangers surveyed across Asia and Central Africa have been seriously injured at work within the last year. Half of these incidents involved getting murdered on the site being protected. "New Survey Finds One in Seven Wildlife Rangers Have Been Seriously Injured in the Line of Duty Over the Past Year," World Wildlife Fund, July 31, 2018, https://www.worldwildlife.org/press-releases/new-survey-finds-one-in-seven-wildlife-rangers-have-been-seriously-injured-in-the-line-of-duty-over-the-past-year.

104. "Trafficking Poached Ivory," National Geographic, accessed August 17, 2022, https://education.nationalgeographic.org/resource/trafficking-poached-ivory.

particularly in Asian markets, and continued corruption has enabled the illegal poaching to continue.

Illegal wildlife hunting also happens at the local level for local reasons unassociated with sophisticated poaching networks or international trade. Research has suggested that many communities that abut national parks or natural roaming areas for wildlife do not receive benefits from conservation efforts yet at the same time they incur a disproportionate share of the costs of living with wildlife. As a result, conservation is sometimes ignored in these communities and wild buffalo, impala, gazelle, giraffe, and sometimes monkeys are killed for food.[105] There are also recent reports of a significant increase in bushmeat consumption in the wake of COVID-19 as a direct result of food shortages in rural communities.[106] As discussed above, some of this wildlife contraband is trafficked through the livestock value chains and disguised as beef, mutton, or poultry. However, the magnitude of this practice is largely unknown due to its illegality and lack of credible data.

Hunters, who are mostly from local communities, use dogs, rudimentary tools such as spears and machetes, and bows and arrows. Other studies of bushmeat poaching indicate that snares and traps are used within wildlife ecosystems.[107] Much of this is reinforced by reports from Kenya Wildlife Service (KWS) and Africa Network for Animal Welfare (ANAW) on their numerous de-snaring patrols.[108] One report indicated that 9,377 snares targeting big and small game were removed in 2021— indicating the wide-scale magnitude of the illegal trade.[109]

Risk Analysis

Human and animal health, security, and the economy in Kenya continue to be threatened by zoonotic disease. Farming systems, preferred at-risk livestock breeds, trading patterns, illegal hunting, and close interactions between people and animals along the value chain contribute to these risks. Anthrax, trypanosomiasis, rabies, brucellosis, and Rift Valley Fever have been shown to be the five top priority zoonotic diseases in Kenya.[110] However, these threats are dynamic. In Kenya, anthrax outbreaks have been reported in wildlife, livestock, and humans, creating real public health burdens and socioeconomic impacts including reduced livestock production due to mortality and significant loss of wildlife. Cattle density, amount of rainfall, and soil-clay content and temperature have been shown to be

105. *G. Ariya. and S. Momanyi, "Assessing Wildlife Consumption Awareness and the Attitudes of the Local Lambwe Valley Community Towards Ruma National Park, Kenya," Journal of Tourism & Hospitality 4, no. 3 (2015): 1000157, 4,* , https://www.longdom.org/open-access/assessing-wildlife-consumption-awareness-and-the-attitudes-of-the-locallambwe-valley-community-towards-ruma-national-park-kenya-2167-0269-1000157.pdf*, citing Agnes Kiss, ed., Living with Wildlife: Wildlife Resource Management with Local Participation in Africa (Washington DC: World Bank, 1990), https://documents1.worldbank.org/curated/en/247611468742847173/pdf/multi-page.pdf; P. Omondi, Wildlife–Human Conflict in Kenya: Integrating Wildlife Conservation with Human Needs in the Masai Mara Region, Unpublished PhD Thesis, McGill University, 1994, https://escholarship.mcgill.ca/concern/theses/08612q60f; Noah Sitati, Human–Elephant Conflict in the Masai Mara Dispersal Areas of the Transmara District, Unpublished PhD Thesis, University of Kent, 2003, https://www.researchgate.net/publication/34486304_Human-elephant_conflict_in_the_Masai_Mara_dispersal_areas_of_Transmara_District.*

106. Will Brown, "Covid Hunger: Kenyans Forced to Hunt Giraffe for Food," The Telegraph, August 27, 2020, https://www.telegraph.co.uk/global-health/climate-and-people/giraffe-covid-threat-kenya-hunger/.

107. *Bridget A. Sutton, "An Analysis of Illegal Bushmeat Availability in Local Restaurants Located in Voi, Kenya," Masters Thesis, Western Kentucky University, 2008, https://digitalcommons.wku.edu/cgi/viewcontent.cgi?article=1049&context=theses.*

108. *ANAW, "Curbing Wildlife & Environmental Crime," African Network for Animal Welfare, June 25, 2018, https://www.anaw.org/index.php/details/item/60-curbing-wildlife-environmental-crime; "Wildlife Security," Kenya Wildlife Service, accessed October 12, 2023, https://www.kws.go.ke/content/wildlife-security.*

109. *"Anti-Poaching," Sheldrick Wildlife Trust, accessed October 12, 2023, https://cutt.ly/ZhAHOST.*

110. Peninah Munyua et al., "Prioritization of Zoonotic Diseases in Kenya, 2015," PLoS ONE 11, no. 8 (2016): e0161576, https://doi.org/10.1371/journal.pone.0161576.

correlated with anthrax outbreaks.[111] Though avian influenza has not been deemed a top priority disease in Kenya and outbreaks have been minimal since 2009, the country is at risk of highly pathogenic avian influenza outbreaks due to its proximity to other high-risk countries and the migratory nature of infected waterfowl.[112] Quantifying the economic impact of more endemic zoonotic diseases such as rabies and anthrax is difficult, but the cost of the 2006–2007 outbreak of Rift Valley Fever in Kenya was better documented and estimated at US$32 million.[113]

Efforts to mitigate the continued spread of zoonotic disease are handicapped by a lack of appropriately trained personnel, disease reporting, and early warning systems. And like many other countries, Kenya has minimal integration of human and animal surveillance systems that further contributes to underreporting of disease events.[114]

There are three major points of risk along the legal livestock value chain. At the source, there is no health inspection or certification. There are also no existing regulations that enable legal enforcement of many of the important biosecurity practices at the farm level, including wearing protective clothing, providing foot baths, and observing feed and drug withdrawal periods.[115] Second, at the market, there are no health checks, disinfection, or isolation units. Animals interact with humans and with other animals of different species, geographical origins, and unknown disease status. This risk is even higher in markets in which stakeholders physically handle fish or other animals. Finally, at the slaughter sites and terminal markets, traders, retailers, and consumers move freely within the facilities, with limited precautionary measures taken. Biosafety measures at the small slaughterhouses and slaughter slabs are rarely observed due to lax enforcement, attributed to a lack of adequate staffing and logistical challenges such as limited transport of regulatory staff to the facilities. However, in export slaughterhouses, the biosafety measures are more strictly observed. Perhaps the most significant risks are associated with the bushmeat trade and illegal cross-border livestock trading, where information is limited on the source of the animals and animal products. Trading in stolen and sick animals domestically is also common.[116]

Still, there are signs of progress on the part of those seeking to impose better public health practices. For example, Kajiado County has been working to address these challenges since the outbreak of avian flu in 2007. Some of the measures put in place include employing veterinary officers at the markets specifically for disease surveillance, health checks of all animals gaining access to the markets, and collecting and compiling descriptive data. The County is developing a sale yard bill which proposes the formation of the sale-yard committee, through which the County Veterinary Services Director acts as the Secretary. The main role of the committee is the establishment and implementation of biosecurity measures to safeguard the livestock markets.[117]

111. Fredrick Tom Otieno et al., "Modeling the Spatial Distribution of Anthrax in Southern Kenya," PLoS Neglected Tropical Diseases 15, no. 3 (2021): e0009301, https://doi.org/10.1371/journal.pntd.0009301.

112. James Thurlow, "Assessing the Impact of an Avian Flu Impact in Kenya," HPAI Research Brief No. 20: Controlling Avian Flu and Protecting People's Livelihoods in Africa and Indonesia, 2009, https://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/125007/filename/125008.pdf.

113. Peninah Munyua et al., "Prioritization of Zoonotic Diseases in Kenya, 2015," PLoS ONE 11, no. 8 (2016): e0161576, https://doi.org/10.1371/journal.pone.0161576.

114. Ravikiran Keshavamurthy, Samuel M. Thumbi, and Lauren E. Charles, "Digital Biosurveillance for Zoonotic Disease Detection in Kenya," Pathogens 10, no 7 (2021): 783, https://doi.org/10.3390/pathogens10070783.

115. FAO, Africa Sustainable Livestock 2050: Biosecurity and Public Health Practices Along the Poultry Value Chain in Kenya: Evidence from Kiambu and Nairobi City Counties (Rome: FAO, 2022), https://doi.org/10.4060/cb8180en.

116. *Peter D. Little, Waktole Tiki, and Dejene Negassa Debu, "Formal or Informal, Legal or Illegal: The Ambiguous Nature of Cross-border Livestock Trade in the Horn of Africa," Journal of Borderland Studies 30, no.3 (2015): 405–21, https://doi.org/10.1080/08865655.2015.1068206.*

117. *N. Wanja, personal communication, November 29, 2020.*

REGULATORY APPROACH

Existing Wildlife Regulation

Any wildlife use—non-consumptive or consumptive—is licensed by the Cabinet Secretary in charge of wildlife, advised in consultation with the Kenya Wildlife Service (KWS), under the Wildlife, Conservation and Management Act. The licensing process is described in the Wildlife Conservation and Management Act of 2013 as follows: Section 79 of the Act provides the basis for licensing, where it says, "[e]xcept as, or to such extent as may be specifically provided in this act, no person or entity shall undertake any wildlife use activity otherwise than under and in accordance with the terms and conditions of license issued or permit granted under this act."[118]

Kenya was a pioneer in banning all forms of sport hunting through a blanket policy in 1975. This was done out of concern for (1) dwindling wildlife populations and (2) the need to protect all wildlife irrespective of their distribution— whether outside or inside of protected areas. However, over 90% of protected wildlife areas are unfenced, presenting significant management challenges. In the 1970s alone, Kenya lost more than a half of its elephant population, which further decreased from 167,000 to 25,000 in 20 years. Given this situation, the Kenyan government decided to prioritize conservation of wildlife *in situ* to protect species for present and future generations. Unlike neighboring countries such as Tanzania, which allows hunting and has a butchery system in place for wildlife, allowing supermarkets and other trade outlets to sell bushmeat legally, Kenya has several policies in place that aim to protect native species.[119] However, given that ecosystems are shared between Tanzania and Kenya and the two countries have porous borders, the migration of animals means that some may end up killed in Tanzania. Likewise, some animals from Tanzania may migrate to Kenya. There have been efforts to form agreements with the East African Community to regulate livestock movement, manage disease control in the region, and protect shared wildlife. The East Africa Community Treaty involving Kenya, Tanzania, and Uganda includes several provisions related to wildlife management.[120]

There have been strategies written by the Kenyan government for enhanced wildlife protection and conservation, including the National Wildlife Strategy 2030, drafted in 2018, and the Sessional Paper no. 1 of 2020 on Wildlife Policy.[121] [122] These documents prescribe a broad range of principles, measures, and actions to achieve a sustainable wildlife management in Kenya that enhances benefits and stakeholder engagement, including the private sector, government agencies, academic institutions, research institutions, civil society, community-based organizations, community wildlife associations, tourism and wildlife forums, and opinion leaders of local communities co-existing with wildlife.

118. *The Wildlife Conservation and Management Act (WCMA 2013), 1297.*

119. Mohamed Issa, "Bushmeat Now on Sale Legally in Tanzania," The East African, December 30, 2020, https://www.theeastafrican.co.ke/tea/news/east-africa/bushmeat-now-on-sale-legally-in-tanzania-3242732.

120. Article 107, which elaborates on livestock multiplication and distribution, Article 108, which addresses plants and animal disease control, Article 111, on environment issues and natural resources, Article 112, on the management of the environment; Article 114, on the management of natural resources, and Chapter 20, Articles 115 and 116, that address tourism and wildlife management in the region. East African Community, Treaty Establishing the East African Community, November 30, 1999, https://investmentpolicy.unctad.org/international-investment-agreements/treaty-files/2487/download.

121. Ministry of Tourism and Wildlife, National Wildlife Strategy 2030 (Nairobi: Republic of Kenya, 2018), https://ecotourismkenya.org/wp-content/uploads/ekdownloads/press_releases/NWS2030%20-%20FINAL%20JUNE%2012%2C%202018.pdf.

122. Ministry of Tourism and Wildlife, Sessional Paper No. 01 of 2020 on Wildlife Policy (Nairobi: Republic of Kenya, 2020), https://www.tourism.go.ke/wp-content/uploads/2021/07/WILDLIFE-POLICY-2020.pdf.

Existing Livestock Regulation

Livestock markets in Kenya are driven more by socioeconomic factors than regulatory factors.[123] There are no specific laws, policies, regulations, or rules for livestock markets but there is important related national legislation, such as the Meat Control Act, which defines the licensing, control, and regulation of slaughterhouses as well as the packing, storage, and transport of meat. Similarly, the Animal Disease Act attempts to control the spread of disease among animals by mandating quarantining and reporting of diseased animals. The Department of Veterinary Services under the authority of the Ministry of Livestock Development is responsible for enforcing these acts. But underfunding, understaffing, transport constraints, and limited office accommodations have continued to hinder the department's effectiveness in enforcing applicable standards.[124] The national government through the Ministry of Agriculture and Ministry of Livestock Development helps to promote and facilitate a positive and competitive environment that enhances food security in the country.[125]

The national government also has been responsible for setting up the infrastructure that enables counties to collect tax levies, giving counties most of the control of livestock markets. In addition, there are laws within counties enacted by local legislatures and subsidiary legislation in the form of bylaws that apply to the animal markets.[126] Some markets are set up by the discretion of the county based on demand. Other markets have evolved from a social need of communities and were subsequently recognized by the government. County governments interact directly and on a regular basis with markets in their localities and ensure cleanliness, adequate fencing, development of market infrastructure, and the collection of market taxes or levies. They operate under various laws, regulations, and bylaws that govern trade and animal health laws. The government officers in charge of some of those include county levy officers, a market chairman, and an animal health officer.

In sum, livestock markets, and indeed all markets, are set up and owned by the counties, whose main role is to facilitate trade and the collection of tax levies. The national government oversees market development, policy, guidelines, and capacity. Prior studies of known risk factors and pressure points have noted a lack of integrated and collaborative approaches to policy and institutional framework development between the Ministry of Livestock and local county councils.[127] This lack of integration and collaboration remains in many cases, as Kenya has multiple laws, rules, and regulations with inconsistent or conflicting provisions.

Analysis of Application

Different pieces of legislation, implemented by different government agencies, regulate various

123. *Arero Halkano, Factors Influencing Livestock Marketing in Marsabit Region: A Case of Merille Livestock Market, Masters Research Project, University of Nairobi, 2018, http://erepository.uonbi.ac.ke/bitstream/handle/11295/104271/Arero_Factors%20influencing%20livestock%20marketing%20in%20Marsabit%20region.pdf?sequence=1&isAllowed=y.*

124. "Kenya Veterinary Capabilities Summary," Kenya VetCAP R&D Study, https://www.k-state.edu/nabc/docs/vetcap_country_profiles/Kenya_VetCap_ExecSum_Report.pdf.

125. "Ministry Overview," Ministry of Agriculture & Livestock Development, accessed October 13, 2013, https://kilimo.go.ke/about-us/.

126. Elisabeth Farmer and James Mbwika, "End Market Analysis of Kenyan Livestock and Meat: A Desk Study," MarketLinks, April 10, 2012, https://www.marketlinks.org/resources/end-market-analysis-kenyan-livestock-and-meat-desk-study.; Kenya Markets Trust, 2019a.

127. Prabhu Kandachar and Minna Halme, "Farewell to Pyramids: How Can Business and Technology Help to Eradicate Poverty?" in Sustainability Challenges and Solutions at the Base of the Pyramid: Business, Technology and the Poor, edited by Prabhu Kandachar and Minna Halme (Abingdon-on-Thames: Routledge, 2008).

components of animal market value chains. The lack of a clear regulatory framework as well as overlapping mandates of the agencies have hampered the implementation and enforcement of such laws. The lack of a unified enforcement agency, poor facilitation and funding, limited human resource power, limited application of the law, and lack of clarity on the part of police regarding their role in enforcement have also contributed to a failure to effectively apply the laws.[128] For example, livestock transporters travel freely, with limited or no police inspection. This lack of resources and focus on enforcement may be a result of the fact that animals are considered a routine commodity and their regulation of somewhat limited importance.

Furthermore, much of the legislation was enacted long ago and is outdated. The penalties are often negligible or unclear. Therefore, violations of those provisions carry little risk and the laws provide no deterrent effect. Sometimes, it makes economic sense to violate them. The lack of clear and punitive penalties for offenders within the livestock value chain means that there is little regard or discipline observed in this trade. For example, in the Disease Control Act, it says: "Any person who is guilty of an offense under this Act shall be liable to imprisonment for a term not exceeding twelve months or to a fine not exceeding thirty thousand shillings or to both." But the lack of specific market-related offenses means it is hard to prosecute anyone under this Act.

Wildlife crimes carry more serious punishment. The consequences of violation range from simple fines, imprisonment, forfeiture, community service, and life imprisonment in the case of some of the wildlife violations relating to endangered species. However, effective prosecution in Kenya is constrained by an inadequate number of wildlife crime prosecutors as well as unclear laws. For example, the Wildlife Conservation and Management Act of 2013 articulates significant penalties for wildlife crimes, but it lacks specificity and does not articulate clearly what is considered a crime, which has created challenges in effectively charging potential violators. The vagueness has also led to conflicting decisions.[129]

There are, at present, no stand-alone regulations or policies on market operations in Kenya. Most laws and policies do not differentiate an on-site sale at a farm from a market, either large or small. Most regulations applied in the livestock market value chain are based on borrowed sections of other laws or policies. For example, the Disease Control Act is used selectively, where relevant, to regulate health checks of livestock in the market value chain. This Act was not meant specifically for markets and has no specific parameters for markets, but instead is a broad law that provides guidance on disease surveillance and control nationally and internationally. As a result, it is an imperfect instrument to address disease risks particular to animal markets. This is the same for all other policies and laws which apply broadly but do not contain provisions related to markets specifically.[130]

Corruption can also play a part in the poor implementation of the law, especially in relation to the

128. Muthoni U. Njiru, "Livestock Sector Legislative Reforms in Kenya," AgriLinks, December 4, 2019, https://agrilinks.org/post/livestock-subsector-legislative-reforms-kenya#:~:text=The%20SRA%20set%20out%20to,processing%20and%20the%20marketing%20of.

129. Sam Weru, Wildlife Protection and Trafficking Assessment in Kenya (Cambridge: TRAFFIC, 2016), https://www.traffic.org/site/assets/files/2410/kenya-wildlife-trafficking-report.pdf.

130. The Ministry of Health in partnership with the Ministry of Agriculture has drafted a food safety bill that is meant to address food safety issues for consumers. "Draft Food and Safety Control Coordination Bill, 2021," Ministry of Agriculture and Livestock Development, accessed October 13, 2023, https://kilimo.go.ke/wp-content/uploads/2022/02/Draft-Food-and-Feed-Safety-Cordination-Bill-2021.pdf.

wildlife trade, and it has become a problem common within government institutions.[131] [132] [133] [134] This risk is particularly acute where low-paid government officials are bribed by heads of poaching networks.[135] Corruption has also been cited in incidents where some market leaders allocate space to large-scale traders with influence, while small-scale traders are relegated to less prime slots. Traders and other players in animal markets sometimes also offer bribes where it is profitable and convenient to do so in order to avoid following laws and regulations.[136]

Some of this corruption is made possible by an apathetic attitude towards enforcement by certain officials, due in part to the fact that offenders generally are not prosecuted successfully and cannot easily be arrested. There are, effectively, very few repercussions for violations of these laws in their current state in some cases. Lack of confidence in the judiciary and allegations of bribery mean that the public and the enforcement officials lack confidence in the justice system, and thus may either overlook offenders or seek to profit personally from them by taking bribes.[137] These factors culminate in a system where there is inadequate national and county oversight of market infrastructure and health risks.

Furthermore, black markets and unofficial markets exist. Animal markets may operate outside the law when closed due to disease outbreak or public health concerns. The traders continue trading in non-designated places where regulators are not able to provide oversight or support services. This is also seen when quarantines are imposed in one county and, because of the porous borders, traders still move animals from quarantined areas to the markets at the borders in the neighboring county. These movements compromise disease control. In far and remote areas, informal markets also operate outside the law, where there is little or no official government presence and, therefore, limited enforcement. In these locations, the markets operate instead under local customs and practices.

One of the major challenges noted in the effective enforcement of regulation is the lack of an identification and traceability system for livestock in Kenya. This has resulted in the inability to effectively carry out disease surveillance and control. In 2017, Kenya launched an electronic surveillance and reporting system, the Kenya Livestock and Wildlife Syndromic Surveillance (KLWSS) system. The system has shown to be helpful in identifying cases of more prominently watched diseases such as Rift Valley Fever, but data collection has been generally limited, which reduces the effectiveness of prevention interventions.[138]

131. *Migai Akech, "Abuse of Power and Corruption in Kenya: Will the New Constitution Enhance Government Accountability?" Indiana Journal of Global Legal Studies 18, no. 1 (2011): 15.*

132. Sam Weru, Wildlife Protection and Trafficking Assessment in Kenya (Cambridge: TRAFFIC, 2016), https://www.traffic.org/site/assets/files/2410/kenya-wildlife-trafficking-report.pdf.

133. Severin Hauenstein et al., "African Elephant Poaching Rates Correlate With Local Poverty, National Corruption and Global Ivory Price," Nature Communications 10 (2019): 2242, https://doi.org/10.1038/s41467-019-09993-2.

134. Brendan McSherry and Jennifer N. Brass, The Political Economy of Pro-Poor Livestock Policy Reform in Kenya (Djibouti: IGAD LPI Working Paper No. 04 - 08, 2007), https://cgspace.cgiar.org/bitstream/handle/10568/24974/IGAD_LPI_WP_04-08.pdf?sequence=1.

135. Also, at the transport level of livestock, traders and other players along the value chain have often mentioned harassment by law enforcement officers, even when their documentation is valid. Kenya Markets Trust, Political Economy Analysis of the Livestock Sector: 2019 Report (Nairobi: Kenya Markets Trust, 2019), https://issuu.com/micnyams/docs/rk_big_report_finalnew.

136. According to the OECD, "[i]n 2016, a TRAFFIC report on wildlife trafficking in Kenya cited corruption as a significant issue, pointing to the suspension of a magistrate in 2015 over corruption allegations in the course of the prosecution of a major ivory trafficker." OECD, Strengthening Governance and Reducing Corruption Risks to Tackle Illegal Wildlife Trade: Lessons from East and Southern Africa (Paris: OECD Publishing, 2018), 31, https://doi.org/10.1787/9789264306509-en.

137. Migai Akech, "Abuse of Power and Corruption in Kenya: Will the New Constitution Enhance Government Accountability?" Indiana Journal of Global Legal Studies 18, no. 1 (2011): 15.

138. Erenius Nakadio, Samuel Kahariri, and Maurice Owiny, "Evaluation of the Kenya Livestock and Wildlife Syndromic System for Rift Valley Fever, Narok County, Kenya, 2018–2019," Research & Reviews: Journal of Veterinary Sciences 6, no. 1 (2022): https://www.rroij.com/open-access/evaluation-of-the-kenya-livestock-and-wildlife-syndromic-surveillance-system-for-rift-valley-fever-narok-county-kenya-20182019.php?aid=90563.

PROSPECTIVE REFORM

Factors Driving Future Policy Solutions

Effects of COVID-19

During the COVID-19 pandemic, the national government developed guidelines on safety measures to be undertaken in all markets to stop the spread of the disease. During the outbreak, the national government ordered all livestock markets closed to prevent crowding in markets, which would have increased human-to-human transmission. As a result, bushmeat consumption increased due to a lack of access to alternative foods. Because of the strong negative effect on livestock markets and sales in the horn of Africa, most pastoralists reported losses during this period.[139]

When the markets reopened in a phased manner, the trading continued largely as before but with new standard public health measures in place such as wearing masks, social distancing, and washing and sanitization of hands. There has also been a noted increase in the use of mobile phone payment methods for animal sales, mostly the Kenyan Mpesa payment platform, enabling one to avoid in person hand-to-hand transactions. This transition to electronic payments has had the added benefit of creating records of transactions. As of the time of writing, most market reforms initiated as a result of the COVID-19 pandemic have been focused on reducing human-to-human transmission and have not prompted an increased focus on zoonotic disease transmission and the risks involved in the trade in live animals.

Large-Scale Trends

The livestock market is driven by demand. The projected significant increase in the Kenyan population and demand for meat products noted in the opening section, alongside the reforms in the livestock sector, are expected to continue to increase the prices of animals and animal products.[140] This expected growth in the demand for beef, poultry meat, and milk may cause cattle and poultry farmers to increase production, putting more strain on environmental factors and by increasing the animal population, creating more opportunities for zoonotic disease emergence. These risks will be particularly acute if Kenya expands the list of emerging livestock to include new forms of wildlife which may act as potential disease reservoirs.[141]

According to Kenya Markets Trust, the average Kenyan consumes 15 kg of meat annually, with the country having a meat deficiency of 300,000 tons that must be imported from neighboring countries.[142] The study further indicates that per capita consumption of all types of meat is highest among the high and middle-income populations compared to low-income segments, but the total volume of meat consumed is highest among the low-income earners, who account for a larger population. The study

139. *Mercy Corps, COVID-19 and Livestock Market Systems: The Impact of COVID-19 on Livestock-based Economies in the Horn of Africa (Portland: Mercy Corps, 2020), https://www.celep.info/wp-content/uploads/2020/07/2020-MC-HoA-COVID-Impact-Livestock-Mrkts-Aug-2020.pdf.*

140. Susan MacMillan, "Kenyan Livestock Sector To Grow 'Exponentially'—Kenya National Bureau of Statistics," International Livestock Research Institute, July 31, 2019, https://www.ilri.org/news/kenyan-livestock-sector-grow-'exponentially'-kenya-national-bureau-statistics.

141. *Food and Agriculture Organization of the United Nations,, The Future of Livestock in Kenya: Opportunities and Challenges in the Face of Uncertainty (Rome: FAO, 2019), https://www.preventionweb.net/publication/future-livestock-kenya-opportunities-and-challenges-face-uncertainty.*

142. It should be noted that even with demand for meat exceeding supply in Kenya, the country still exports close to US$90M of animals and animal products. George Murage, "Kenya Yet to Meet Its Meat Demand," The Star, November 24, 2020, https://www.the-star.co.ke/business/kenya/2020-11-24-kenya-yet-to-meet-its-meat-demand/.

further pointed out that middle and high-income meat consumers are more concerned about health-related issues like chemical residues in meat products from drugs administered to animals, unhygienic handling of meat, meat from game animals, and uninspected stolen animals and carcasses. It also indicated that middle and upper income consumers prefer estate butcheries, rather than shopping for meat in malls and supermarkets. Estate butcheries are retail outlets that sell only meat products and are usually located within local neighborhoods, commonly known as estates. Butchers meanwhile cited their preference for animals slaughtered from the Maasai ecosystem, ranches, northern Tanzania, Uganda, and the rate feedlots in Kenya, as these better serve the needs of the middle-income segment and the *nyama choma* (roasted/grilled meat) market. Hospitals and academic institutions tend to prefer lean meat, which is largely sourced from all other pastoralists' markets in the country.[143]

Proposed Reforms

As the demand for meat increases in Kenya, if only as a result of continued population growth, livestock operations are destined to operate close to expanding populated areas, increasing human-animal interactions and the risk of zoonotic disease transmission. This threat is exacerbated when the risks associated with wildlife farming are added to the equation. As such, it is imperative that Kenya improve its implementation of a One Health approach which involves a multisectoral collaboration of the human, animal and environmental health sectors.

Kenya first committed to the One Health Approach in 2011 when it created the Zoonotic Disease Unit which shares a platform between the ministries responsible for human and animal health. This effort included collaboration between different entities and inclusion in a common surveillance system. But more is needed. Adding additional resources to implement more comprehensive control and prevention measures is a critical part of this improvement. Only with more resources and education of both national and local officials can One Health be implemented at both the national and county levels and achieve more effective prevention, surveillance, response and control of priority zoonotic diseases.[144] At present, there are currently just two full time staff on the payroll of the Zoonotic Disease Unit, which is inadequate for enabling effective collaboration between ministries in a country with a population of 53 million people.

In addition to a One Health approach, addressing operational changes to regulation in the industry is important. Creating a database of traders so that they can undergo health check certifications before being allowed to trade in primary or terminal markets may help mitigate the risk of disease. In addition, there is a need for a tracking system to document the source of all animals and animal products sold at markets and to reduce cases of illegal bushmeat and cross-border trade. Building on existing efforts to increase traceability in livestock supply chains would be similarly beneficial. While regulation on livestock identification and traceability is under development in Kenya, these policies need more development.[145]

Specific livestock market-related regulations also need to be developed for sourcing, holding,

143. FAO, Report to the Government of Kenya on Fisheries Development Possibilities (Rome: FAO, 1966), https://www.fao.org/3/41449E/41449E00.htm#TOC.

144. Ministry of Agriculture, Livestock, Fisheries and Co-operatives, and Ministry of Health, One Health Strategic Plan for the Prevention and Control of Zoonotic Diseases in Kenya (2021-2025) (Nairobi: Republic of Kenya Zoonotic Disease Unit, 2022), https://www.onehealthcommission.org/documents/filelibrary/resources/one_health_strategic_action_plans/OneHealthStrategicPlan_Kenya_202120_8756689A2C54E.pdf.

145. *Animal Welfare and Protection Bill, 2019.*

handling, transportation, and trading, with an emphasis on biosecurity measures across the entire value chain from source to consumer. Standards for markets should include clear entry and exit points, with disinfection stations at entry points to reduce the spread of pathogens. There is also a need to increase the staff and resources allocated towards livestock market and biosecurity regulation enforcement. Likewise, all parties, including police, livestock traders, and consumers, need more education on the importance of observing strict biosecurity measures and proactively reporting any incident that raises concerns. Education on its own may not be sufficient for a change in practice and behaviors, and incentives may need to be introduced to adequately motivate improved practices.

Additional research including epidemiological, ecological, socioeconomic, and cross-sectoral studies will need to be funded in order to better understand how an effective One Health strategy may be implemented. There is a need for further field-based studies to ascertain the various stakeholders' views on the economic value of the livestock and the zoonotic risk factors associated with the markets. Additional studies are also needed to further ascertain the status of the bushmeat trade, the illegal livestock trade, transport routes for each, and the measures that can be taken to curtail them. There is a general need for field-based studies of the socio-cultural behaviors and interactions between the producers, traders, and consumers in the market, as such studies are limited.[146]

CONCLUSION

Animal markets play a critical role in Kenya, a country with a growing population, many of whom suffer from food insecurity. Both livestock production, which accounts for 12% of Kenya's total GDP, and emerging wildlife farming since it was first made legal in 2013, offer important economic benefits. However, these industries, along with the illegal wildlife trade, also present significant risks. Regulation and oversight of these markets is inconsistent, while diseases such as Rift Valley fever, anthrax, rabies, brucellosis, trypanosomiasis, highly pathogenic influenza, and foot and mouth disease continue to spread in the country. Disease risk in Kenya is compounded by poor biosecurity measures at small farms and slaughtering facilities, limited health and food safety checks along the supply chain, human–animal interactions at high-traffic markets, poor communication between human and animal health sectors, and recent trends towards farming and eating of wild animals. Confusing, inconsistent, and sometimes antiquated legislation hinders the country's ability to effectively enforce the laws, as does a lack of resources and personnel. These regulatory challenges may continue amid pressure from rising populations of both humans and livestock.

146. *Muthoni U. Njiru, "Livestock Sector Legislative Reforms in Kenya," AgriLinks, December 4, 2019, https://agrilinks.org/post/livestock-subsector-legislative-reforms-kenya#:~:text=The%20SRA%20set%20out%20to,processing%20and%20the%20marketing%20of.*

IMAGES

Lake-side open air fish market on the shores of Lake Naivasha Kenya (Credit: ANAW @ 2020)

Livestock being ferried on a passenger bus from Kithyoko market, Machakos County, Kenya (Credit: ANAW @ 2020)

Chicken market in Kithyoko Market, Machakos County, Kenya (Credit: ANAW @ 2020)

Chicken being prepared for transportation on a passenger bus from Kithyoko Market, Machakos County, Kenya. (Credit: ANAW @ 2020)