

# Indigenous Knowledge and Livestock Economy among the Keiyo Community of Kenya, 1850-1895

**Kemboi Cherop<sup>1,\*</sup>**  | **Paulo K. Koech<sup>2,</sup>** 

<sup>1</sup>Department of Humanities, University of Eldoret P.O. Box 1125-30100 Eldoret, Kenya.

<sup>2</sup>Department of Social Studies, Jaramogi Oginga Odinga University of Science and Technology P.O. Box 210-40601, Bondo, Kenya.

\*Corresponding author

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## Abstract:

This paper examines the intricate relationship between indigenous knowledge and livestock economy of the Keiyo community of Kenya in the pre-colonial period. While there has been some research on the Keiyo and their pastoral practices, most of the studies are often generalized or integrated into the broader Keiyo agricultural studies. Consequently, Keiyo's adaptation to their ecology in livestock production has not been sufficiently analyzed, especially in terms of how they managed their livestock economy and natural resources sustainably. This study therefore, focuses on how the Keiyo leveraged their indigenous knowledge to effectively manage and sustain their livestock economy within their unique ecological setting. This exploration emphasizes the resilience and sustainability of Keiyo's traditional livestock economic practices amidst ecological challenges. Guided by Indigenous Knowledge Systems (IKS) theory, this study employed purposive and snowballing sampling techniques to select 26 key informants. Data was obtained from both primary and secondary sources, with primary data derived from field interviews and secondary data drawn from electronically stored materials on the internet, and written sources such as articles, theses, journals, books and Seminar papers. Using a historical research design, the study conducted a thematic analysis of the data. The study established that the Keiyo developed and applied sophisticated indigenous knowledge systems to manage their livestock economy and ecological resources sustainably for food production. This finding presents valuable insight into sustainable livestock economy that could inform modern approaches to natural resource management, especially within the context of climate change.

**Keywords:** Keiyo, Pre-colonial, Indigenous Knowledge, Livestock economy, Ecology, and Sustainability

## Introduction:

In Africa, particularly in sub-Saharan region and especially in Kenya, indigenous communities have consistently recognized the value of their local forms of knowledge (Sindiga, 1981; Gakuru, 2006). The importance and status of these indigenous knowledge systems and practices have

changed in the wake of global economic development, yet, limited effort have been done to fully leverage these systems in relation to livestock economy and developments. The Keiyo people, a pastoral community in Kenya's Rift Valley, like many other pre-colonial African societies,

depended heavily on indigenous knowledge and practices on livestock keeping as the cornerstone of their economy and social structures. The community had preference for livestock keeping over agriculture (Chesang, 1973). This occupation was complemented by other subsistence activities, such as crop cultivation, barter trading, hunting, and gathering (Chebet and Dietz, 2000). Davis (1962) explains this aspect by observing that more people in various regions of the world depend on exploiting pastoral resources than any other agricultural enterprise.

Moreover, in the Keiyo society, cattle, sheep, and goats served not only as sources of sustenance, providing milk, blood, and meat, but also key symbols of wealth, status, and social connection (Chesang, 1973). Social status and wealth were often measured by the number of livestock a person or family possessed (Tarus, 1994). Additionally, livestock held a central role in significant rituals and ceremonies, such as marriages, births, and funerals underscoring its cultural importance. Livestock also functioned as a form of exchange, traded with other essential goods such as grains, with neighbouring communities, the Tugen and Marakwet (Cherop, 2019).

Notably, the Keiyo people are known for their love and devotion to cows; a cow had a place of its own, a position next in importance to man's children (Cherop, 2024). Cow, also referred to as *tany* in the Keiyo language was the most valued animal (Tarus, 1994). From an early age, Keiyo children were taught the importance of livestock, including how to guard them against theft and how to raid other communities for additional livestock (Cherop, 2024). Children and those circumcised were made to play with yellow solanum berries as their livestock - 'goats', 'cows' or 'sheep' (Cherop, 2024). The Keiyo community named their cattle according to color, behavior, place of origin, and special markings, for instance, well fed and sleek haired (*sambu*), shy (*ngosos*), light grey (*arus*), dapple grey (*samoo*), black (*miso*), red-brown (*sityei*), and partially brown (*mukye*) (Koech, O.I, 2022). This was also reflected to some extent in livestock sayings like *abeshe tany*, proverbs, songs and

customs. Therefore, livestock held immense importance for the Keiyo people, serving as the foundation of their indigenous economy, culture, and social identity.

The discourse surrounding indigenous knowledge systems and practices has generated epic extensive debate globally for several years (Egeru, 2012). Indigenous knowledge is that knowledge accumulated over generations of living and adapting in a particular environment (UNEP, 2008). This knowledge has been instrumental in responding to environmental challenges such as floods, droughts, disease outbreaks, and pest infestations (Cherop, 2024). The phenomenological knowledge embedded in traditional societies is thus significant, as it equips communities to adapt to and cope with ecological challenges. However, despite its relevance, traditional knowledge systems have often been neglected in studies on Keiyo community especially in relation to livestock economy. Like any other indigenous communities worldwide who have lived in relative harmony with nature, the Keiyo people of Kenya have been unequivocally good custodians of their environment (Cherop, 2024). Over centuries, these people, inhabiting Elgeyo Marakwet, a semi-arid area in Rift Valley, have acquired extensive knowledge over generations regarding the functioning of their immediate environment, including adaption and utilization of their indigenous knowledge and practices to sustain their livestock economy.

Despite existence of some research conducted on the economic history of the Keiyo, in various themes, sub-themes and epochs, studies that focus specifically on their livestock economy are often generalized or integrated into broader agricultural analyses of the community (Tarus, 1994; Chebet and Dietz, 2000; Chan'gach, 2016; Cherop, 2024). These studies tends to overlook the indigenous adaptive strategies and practices that the Keiyo herders utilized to mitigate challenges related to ecological resources such as pasture and water scarcity.

Therefore, Keiyo's adaptation in livestock economy in the pre-colonial period has not been

sufficiently analyzed, especially in terms of how they leveraged their indigenous ecological knowledge and practices to effectively sustain their livestock economy. Thus, this study seeks to uncover the sustainability embedded in the Keiyo's livestock indigenous knowledge and practices. Understanding these practices can illuminate pathways for sustainable resource management in pastoral communities facing ecological crises.

### **Theoretical Framework:**

This study is grounded in Indigenous Knowledge Systems (IKS) theory (Smith, 1999). This theory underscores the value and relevance of indigenous knowledge in managing natural resources, sustaining livelihoods, and preserving cultural heritage. IKS theory challenges the dominant Western perspectives that often marginalize indigenous practices, instead recognizing these systems as inherently sophisticated and effective. Applying this theoretical framework to the Keiyo's livestock economy allowed deeper understanding of their traditional practices, such as communal land tenure system, diversified livestock keeping, cattle raiding practices, rotational grazing, seasonal migration of livestock, cultural taboos and conservation practices, animal husbandry and selective breeding, all of which were integral in sustaining livestock productivity.

### **Methodology:**

The study employed historical research design to examine the state of affairs as it existed (Creswell, 2014). This approach facilitated an organized presentation of data, enabling an in-depth analysis of how the Keiyo utilized their indigenous knowledge and practices to manage their livestock economy sustainably and adapt to their environment during the pre-colonial period.

The research was conducted in Keiyo, located in Kenya's former Rift valley province. According to the Kenya National Bureau of Statistics (KNBs) and the 2019 Kenya Population and Housing Census (KPHC), Keiyo had a population of 219,926, with most inhabitants dependent on livestock for their livelihood (KNBs, 2019). The study population included clan elders and livestock farmers.

Purposive sampling technique and snow balling was used to identify a representative sample from the Keiyo population. Through these methods, 26 key informants, individuals with extensive knowledge on the history of Keiyo's indigenous knowledge, ecological adaptation, sustainability and livestock economy, were selected and interviewed. This number was reached through data saturation (Miller, 2012; Donna, 2013).

The primary data were obtained through field interviews with elders and individuals well-versed in indigenous livestock practices and ecological knowledge. Secondary data were gathered from electronically stored materials on the internet, and written sources such as articles, theses, journals, books and seminar papers. The study used historical methodology in analyzing and interpreting the collected data. Out of this process, historical focus was established and the identified emerging trends together with generalization suggested by the data were determined and interpretation was done in the light of the objective of the study.

### **Results and Discussion:**

#### **Communal Land Tenure and Sustainable Resource Management:**

The Keiyo's communal land tenure system was foundational to their approach to natural resource management and livestock economy (Tarus, 1994). In contrast to private land ownership, communal tenure enabled collective responsibility over land and resources, fostering cooperation and shared access. Livestock was the main economic activity for many communities practicing communal land tenure (Chebet and Dietz, 2000). This land tenure system has been a cornerstone of land management for many indigenous communities, particularly in Africa, including in Kenya (Kizito, 1998; Waweru, 1998).

In Keiyo, under this system, land was collectively owned and managed by the community under clan system rather than by individuals (Tarus, 1994). Communal land tenure systems was governed by customary laws and practices, and elders regulated its use to prevent overexploitation and ensure

equitable resource distribution for food production (Cherop, 2019). The communal system was underpinned by principles of shared access, responsibility, and collective stewardship of land and natural resources, fostering a culture of conservation.

Grazing land was communally owned (Cherop, 2024). Grazing land within the homestead compound was known as *limo* (Tuitoek, O.I, 2022). This was an area within the compound where cattle were released to graze in the morning and in the evening as they wait to be milked (Kipkorir, 1973). There were pasturelands far away from the homesteads known as *Sergon* (Barar, O.I, 2022). Cattle belonging to *kokwet* (village) were also communally grazed in *Sergon*. This diversification of grazing points among the Keiyo was done to ensure that animals accessed fresh pastures, sufficient minerals, reduced grazing pressure on forage and improved foraging conditions near the homestead that was meant for animals producing milk. This promoted ecological conservation and livestock economy. The communal nature of grazing fields ensured that every member of the community had access to these crucial natural resources, hence, increased household food production and food security through livestock economy.

Communal land tenure systems also featured in Keiyo traditional rules and regulations that governed the use of land and natural resources (Chebet and Dietz, 2000). Land was used according to social agreements that regulated where and when certain areas could be grazed, allowing vegetation in each area to recover during non-grazing periods. For example, the Keiyo community regulated access to grazing lands, forested areas, wetlands and water sources, ensuring that there was no overexploitation of these resources (Koech, O.I., 2022). This approach to land conservation and management supported biodiversity conservation especially water and pasture, which in turn enhanced livestock economy.

In Keiyo, communal land tenure to livestock economies provided flexibility to herders. It allowed for mobility of livestock across the

different ecological zones of the Keiyo land, a practice that was essential for managing seasonal changes in grazing conditions (Cherop, 2024). In times of drought, herders moved their animals to areas with better water and pasture resources, the highland ecological zone, and along Kerio River (Kop Maiyo, O.I., 2022). This mobility ensured that livestock remained healthy and productive, reducing the risk of large-scale animal loss during periods of droughts, as land use patterns could be modified seasonally or in response to drought.

In addition, communal land tenure systems allowed sharing of grazing resources between families, clans and neighbors such as the Tugen, enabling the Keiyo to access large expanses of land necessary for livestock grazing. Livestock requires vast grazing areas to meet their nutritional needs, especially in regions with scarce vegetation (Waweru, 1998). By allowing collective access to these lands, the communal land tenure system ensured that herders have sufficient space for their livestock without overburdening specific areas (Sindiga, 1981).

The Keiyo communal land tenure system, therefore, demonstrates the value of indigenous knowledge in livestock economy through flexible approach rooted in collective responsibility and guided by customary laws in navigating the ecological diversity of Keiyo land. This highlights the depth of indigenous knowledge in enhancing sustainable livestock economy and environmental management among the keiyo of Kenya.

### **Diversified Livestock Keeping and Resilience Building:**

Livestock keeping has been a vital aspect of human survival, particularly for pastoral societies, including the Keiyo. It plays a significant role in global food security, rural livelihoods, and ecological management (Nangulu, 2009). Diversified livestock keeping, the practice of raising multiple species of animals within a single farming system, has long been a cornerstone of agro-pastoral systems worldwide. One of the primary advantages of diversified livestock keeping is its contribution to food security (Cherop,



2024). Ecological and indigenous knowledge plays a crucial role in determining which species of livestock are kept, how they are managed, and how they interact with the environment. Each species was chosen based on its unique adaptations to specific environmental conditions (Sindiga 1981; Egeru, 2012). Thus, to safeguard against ecological risks, the Keiyo practiced diversified livestock keeping.

Over centuries, the indigenous Keiyo pastoralists developed intricate knowledge systems to manage their environments and livestock in ways that conserve biodiversity and ensure the sustainable use of ecological resources such as land, vegetation, and water. One of the most effective strategies the community employed was maintaining a variety of livestock species adapted to different ecological zones of the Keiyo landscape. They kept indigenous cattle (*kipkaa*), sheep and goats for blood, meat, milk and other products (Cherop, 2024). This variety enhanced the nutritional intake of households and provided more consistent sources of food throughout the year. In the event of disease outbreaks and droughts, farmers who practiced diversified livestock keeping were less vulnerable to complete losses, thus, allowed them to hedge against uncertainties.

Additionally, the animals kept by the Keiyo were drought-tolerant species which required less water and fed on a wide range of vegetation (Chepkon'ga, O.I., 2022). This diversification spread risk and optimized available natural resource use, demonstrating an effective strategy for managing environmental challenges and ensuring sustainability of their livestock economy. Each animal species occupied a specific niche within the ecosystem, contributing to nutrient cycling and maintaining vegetation diversity (Sindiga, 1981). Cattle grazed on grasses, goats and sheep fed on shrubs and bushes (Koech, O.I., 2022). This prevented the overdominance of a single vegetation type and reduced the risk of overgrazing and land degradation. This diversified livestock keeping, rooted in Keiyo's indigenous knowledge, offered sustainable ecological conservation, where various types of vegetation were consumed at different

rates, allowing for natural regeneration of plant species.

Diversified livestock keeping also allowed farmers to exchange milk from cows and goats, meat from sheep for grains with neighbouring communities such as the Tugen, Marakwet, and the Pokot (Cherop, 2020). This created multiple food streams that enhanced household economic resilience. This diversification further reduced farmers' dependence on a single source of food and helped stabilize their food security in the face of environmental shocks. Furthermore, this diversification reduced the risk of catastrophic loss during droughts or disease outbreaks, as different species were impacted differently by environmental stresses such as drought. This indigenous knowledge and practice of livestock diversification created a buffer for Keiyo households, enabling them to maintain economic stability even when conditions were unfavourable for certain species.

### **Cattle Raiding as an Economic and Social Practice:**

Cattle raiding, a significant practice among pre-colonial African pastoral communities, served not only as a means of acquiring livestock but also as a strategic tool for enhancing livestock breeds with adaptive ecological characteristics (Nangulu, 2009). It involved the acquisition of cattle from neighbouring communities, typically driven by competition for resources, social status, and economic gain (Chebii, 2018). The significance of cattle in the Keiyo social and political system is well expressed in their social structures and institutions (Chesang, 1973).

Raiding activities was intertwined with cultural rites, including initiation and marriage ceremonies, and was governed by a set of ethical norms and taboos, which discouraged excessive or destructive raiding (Murkomen, 2015). While often associated with conflict, this practice among the Keiyo was a socially accepted mechanism for redistributing resources, rebuilding herds during times of scarcity, and an adaptive response to environmental

pressures, maintaining herd viability and ecological balance (Cherop, 2024).

Cattle raiding facilitated the introduction of new genetic lines into existing herds. Key informant interviews revealed that the process of raiding inherently involved natural selection of livestock that could endure the rigors of conflict and the challenges of new environments (Barar, O.I., 2022). This was achieved when cattle that did not exhibit desirable traits were often lost during raiding, leading to a herd with stronger adaptive characteristics. This process of natural selection resulted in a more robust herd, as weaker individuals were removed from the gene pool.

Herds that survived and thrived in the aftermath of raiding were typically those with traits suited to the prevailing environmental conditions (Chepkon'ga, O.I., 2022). These traits included improved endurance, resistance to diseases, and better adaptability to varying climates and forage availability (Cherop, 2024). Thus, the genetic diversity introduced in Keiyo livestock through raiding contributed to the development of adaptive and prevalence of resilient traits such as disease resistance, drought tolerance, and improved foraging efficiency crucial for improving livestock productivity and adaptability to environmental stressors.

In addition, cattle raiding often resulted in the integration of cattle from different herds and ecological regions, creating opportunities for crossbreeding (Tuitoek, O.I., 2022). The pre-colonial Keiyo community also leased or loaned their animals (*kemindo/kimanakta*) to relatives (*kaborin/tilya*) and their counterparts in the various ecological zones and friends living very far from each other (Chebet and Dietz, 2000; Cherop, 2024). This practice was not only meant to avoid livestock loss during dry periods or due to disease outbreak and raid, but also enabled cross breeding to get livestock with improved and more ecological adaptable attributes for milk and meat production (Koech, O.I, 2022).

This genetic mixing was instrumental in enhancing the overall adaptability and productivity of the

livestock. The offspring displayed faster growth rates and better overall health (Cherop, 2024). This indigenous knowledge of natural selection and crossbreeding is a testimony that the pre-colonial Keiyo herders tailored their livestock to better suit their environmental conditions and economic needs. Thus, cattle raiding contributed to the development of resilient and adaptive livestock breeds crucial for survival in variable and often harsh environments through mechanisms such as genetic diversity and natural selection breeding. This strengthened livestock resilience against ecological disasters.

### **Rotational Grazing of Livestock:**

Rotational grazing, a method involving systematic movement of livestock between different grazing areas, was a cornerstone of pre-colonial African agricultural systems (Nangulu, 2009). The Keiyo utilized rotational grazing to manage pastures and prevent overgrazing. Livestock were moved between different grazing areas such as Elgeyo escarpment, along Kerio river, and wetlands in the highland ecological zone based on the seasons (Cherop, 2024). This allowed vegetation to regenerate. This practice was crucial for maintaining soil fertility for pasture growth and preventing land degradation, demonstrating the Keiyo's adaptive response to environmental variability.

Livestock were rotated through various grazing fields within a limited area. This was through scheduled rotation, where grazing areas were used in a planned sequence, allowing time for recovery before the next grazing period (Cherop, 2024). The indigenous Keiyo community possessed profound ecological knowledge, which was reflected in their rotational grazing practices. These practices were based on observations of local environmental conditions and the behaviour of both livestock and vegetation. They used rotational grazing system where grazing areas were assigned a fallow period, allowing vegetation to regenerate (Nangulu, 2009). This management-controlled access to water sources and grazing lands to prevent overuse. Closely observed the growth patterns of grasses and the health of their herds. They used indicators such as the appearance of new grass shoots and the

condition of livestock to determine when to rotate grazing areas (Chebii, O.I., 2022).

Reserved grazing was also a crucial approach, not only for sustaining pasture resources but also for preventing ecological degradation. Harvested areas (*Rorotinwek/Roret*) were used for grazing immediately after millet and sorghum harvests, before being reverted to cultivation. During this period, livestock fed on crops residues and other materials unsuitable for human consumption as food and fiber (Chepkon'ga, O.I., 2022).

During the dry season livestock were grazed at *lagam* (Elgeyo escarpment), *soet* (wet lands), and wet season they grazed on *tiriita* (plains), *Biut ab Kapchi/limo* (Areas around homesteads) were used to graze livestock in the morning before they are taken to graze in other areas (Cherop, 2024). These reserved grazing areas were designated for seasonal use and were characterized by a specific composition of pasture resources. Thus, these practices allowed vegetation to recover and prevented land degradation. The integration of crop and livestock production systems enhanced diversity and ecological sustainability of both sectors while also providing opportunities to increase overall food production and food security (Cherop, 2024). In the Keiyo community, the practice of reserving harvested areas (*Rorotinwek*) for grazing not only promoted livestock economy but also served as an ecological management strategy. This approach acted as a security measure during difficult periods such as drought.

Livestock were herded by young men on communal grazing land and organized on a rotational basis (*eunek/eeruun*) either by members of the family or communally by members of *kokwet* (village) (Koech, O.I., 2022). This rotational herding system was implemented to save labour, conserve ecology and ensure continuous availability of pasture, hence sustained livestock production and food security. Furthermore, Keiyo's rotational system minimized the concentration of livestock in any single area, reducing the risk of disease outbreaks, contributing to herd health and improved livestock productivity.

Livestock were taken for salt lick (*Kapg'eny*) in May (*N'gei*) (Cherop, 2024). During this period, livestock keepers moved with their herds in search of a special type of salty clay (*ng'enda*) and saline water (*sukutek*), especially in the escarpment and Kerio valley ecological zones (Ruto, O.I., 2022). Chebet and Dietz (2000) aver that Kerio Valley ecological zone was rich in both saline water (*sukutek*) and saltlicks (*ng'enda*). As Rollinson observed;

...the eating of earth by cattle ...is widespread in Africa and the presence of salt licks...a cutting in the soil licked and eaten by herbivores with beneficial results has for generations been recognized by natives as an asset in grazing (Rollinson,1953).

Among the Keiyo, a cow exhibiting an increasing tendency to consume ashes, destroy trees by removing and eating their barks or devour anything they came across, and showed tendency of limping was a sign of weakened bones and salt or mineral deficiency (Barar, O.I., 2022). It was generally recognized that salt was essential for the health of these animals. Thus, in response, when such signs were noticed, the entire herd was taken to salt licks and saline water in either the Elgeyo escarpment or Kerio Valley ecological zone (Cherop, 2024). These animals remained for several days, licking minerals and drinking saline water while grazing in the surrounding area until it was observed that they had lost their appetite for these minerals. They were then returned back to their previous pastures (Tuitoek, O.I., 2022).

This practice underscores the Keiyo community's deep understanding of their ecology, which enabled them to optimize livestock production and maintain a consistent food supply in form of milk, blood, and meat. This rotational grazing, therefore, exemplified effective integration of indigenous knowledge with ecological conservation and management. It supported vegetation diversity, consistent forage availability, enhanced livestock health and productivity, thus, indigenous knowledge was crucial to the successful implementation of rotational grazing and livestock economy.

### Seasonal Migration of Livestock (Transhumance):

Transhumance, the seasonal movement of livestock between different grazing grounds, plays a critical role in balancing ecological conservation and sustaining the livestock economy, especially in regions dependent on pastoral systems (Waweru, 1998). In the pre-colonial period, the Keiyo of Kenya practiced transhumance as a fundamental aspect of their pastoral lifestyle (Tarus, 1994). This system was designed to optimize the use of available pastures while preventing overgrazing. The practice helped sustain a balance between human activities and natural resources, as herders often followed traditional grazing patterns that are aligned with the seasonal availability of water and pasture, reducing pressure on any single ecological area (Rigby, 1985).

During the wet season, when rainfall was abundant, the Keiyo moved their herds to Kerio valley ecological zone, where pastures were lush and water sources plentiful (Cherop, 2024). As the dry season approached and resources in the Kerio valley dwindled, they relocated to the Elgeyo escarpment, and highland ecological zones, where different vegetation types were more resilient to dry conditions. By moving livestock between grazing areas, transhumance prevents overgrazing in any single ecological zone, as it allowed grazing areas to recover during the off-season, maintained soil fertility and allowed a diverse range of grasses and shrubs to thrive (Tuitok, O.I., 2022). Thus, the cyclical movement ensured that no single area was overexploited, thus, sustained the productivity of the highland, escarpment and Kerio valley ecosystems.

Water management was another crucial aspect of Keiyo transhumance. During the dry season, the Keiyo migrated to areas with reliable water sources such as along River Kerio, Elgeyo escarpments, and swamps in the highland ecological zone (Cherop, 2024). This practice minimized the risk of overuse of water resources (Little and Leslie, 1999). In the wet season, they utilized rain-fed rivers in the Kerio valley ecological zone, ensuring that water points in the Elgeyo escarpment and highland

ecological zone were not depleted. This strategic movement helped sustain water availability for livestock economy.

Transhumance was also essential for maintaining the health and productivity of Keiyo livestock. By rotating between different grazing areas, the Keiyo ensured that their cattle had access to diverse and nutritious pastures (Cherop, 2024). This seasonal access to fresh forage improved the overall health of the herds, enhanced meat, blood and milk production, and ensured that the cattle remained strong and productive. The ability to maintain large, healthy herds was crucial for the Keiyo's subsistence and food security. This indigenous knowledge of transhumance is a testimony that the pre-colonial Keiyo community mastered their ecology and tailored their livestock economy to seasonal migration on the three ecological zones of the Keiyo. Thus, transhumance was not only adaptive but also inherently conservationist for sustainable livestock production.

### Conservation Practices and Cultural Taboos in Livestock Management:

Cultural taboos function as traditional prohibitions, deeply rooted in the belief systems of indigenous communities, serving as an informal regulatory mechanism for resource management (Kizito, 1998). Among the Keiyo community, taboos protected ecologically significant areas such as forests, mountains, and water sources, designating them as sacred and restricting human activities (Cherop, 2024). The community-imposed prohibitions on cutting of specific trees, for instance, those along riverbanks and streams, including *Sosia* (palms), trees bearing fruit such as *Mokoiwo* (sycamore), *Acacia totolis* (*sesyah*), and *Balanites aegyptiaca* (*tuyunwo*). These groves were also revered as spiritual spaces where practices related to livestock production were conducted (Kizito, 1998).

These trees provided essential food sources for both livestock and human beings during dry seasons (Cherop, 2024). For instance, *Acacia* pods, locally known as *sakaram*, were harvested in October and November, stored, and later used to feed cattle, sheep, and goats during periods of dry



spells. Moreover, *sakaram* served as a famine food for humans during times of extreme food scarcity (Tuitoek, O.I., 2022).

Additionally, it was considered taboo to cut or use "milk trees" or "trees of women" (those containing white latex) as firewood or for any other use (Kop Maiyo, O.I., 2022). Cutting these trees was believed to cause them to "cry milk," symbolizing disaster (Chepkon'ga, O.I., 2022). Cherop (2024) notes that such trees, like Simotwo (*Ficus natalensis*) and Mokoio (*Ficus sycamores*), grew taller than others on Keiyo land. Their stature represented abundance and prosperity among the Keiyo (Koech, O.I., 2022). *Mokoio* (sycamore), bearing particularly nutritious fruits not only for humans but also for livestock consumption, was held as the most sacred of trees by the Kalenjin (Tarus, 1994). As a result, such trees remained undisturbed due to cultural prohibitions.

Notably, felling of these trees was believed to invite disaster or cause streams, vital for livestock, to dry up (Cherop, 2024). Those guilty of such offenses faced strict penalties, often required as per the Keiyo customs to provide a black goat for sacrifice. The elders would smear the tree's "wound" with the goat's intestines as part of a blessing ritual; failure to perform this ritual was believed to bring misfortune upon the offender's family (Chepkonga, O.I., 2022).

Through these cultural taboos, the Keiyo community established a traditional framework for environmental sustainability critical to livestock production. By embedding indigenous conservation practices and taboos within their cultural framework, the Keiyo achieved environmental protection without the need for formal regulatory systems. This played a crucial role in ecological conservation and resilience of the livestock economy, supporting sustainability in the face of environmental challenges.

### **Animal Husbandry and Selective Breeding for Resilience:**

Animal husbandry and selective breeding practices among pastoral communities are intricately woven into their cultural fabric, livelihoods and ecological

knowledge (Kizito, 1998). These practices have evolved over centuries, enabling pastoral societies to thrive in a semi-arid environment where livestock is central to their economy, food security, and social status (Nangulu, 2009). The Keiyo's livestock economy was underpinned in their knowledge and practices of animal husbandry, particularly their selective breeding practices. Recognizing the challenges posed by their environment such as drought, disease, and varying climatic conditions, the Keiyo selectively bred livestock that were resilient, adaptable and productive.

The Keiyo maintained diverse herds that typically consisted of cattle, sheep, and goats (Chebet and Dietz, 2000). Cattle were the primary livestock, valued for their milk, meat, blood, and social status (Kandagor, 2005). Sheep and goats served as supplementary sources of meat and milk, as well as provided skins for cloth making and bedding. Additionally, the Keiyo constructed temporary enclosures, known as *kaptich* (bomas), made from thorny branches to protect their livestock from predators at night (Cherop, 2024). This practice helped safeguard livestock and served as a safe space for young and vulnerable animals. Thus, effective herd management.

The Keiyo practiced selective breeding based on observable traits that reflected the animals' health, productivity, adaptability to their environment, including drought-prone areas, variable rainfall, and frequent disease outbreaks (Kop Maiyo, O.I., 2022). They used traditional methods for breeding, which often involved choosing the best males and females of cattle, sheep, and goats breeds based on the desired traits. For instance, cattle were chosen for qualities like hardiness, disease resistance, ability to travel long distances, and productivity in terms of milk, meat, and blood, primary food sources for the Keiyo. Cattle that consistently produce high milk yields were highly valued, as milk is a vital source of nutrition for the Keiyo. Similarly, animals that demonstrated good weight gain and meat production were selected to ensure food security (Cherop, 2024).

Animals that did not meet the desired criteria for health or productivity were culled or removed from the herd through slaughtering for meat (Tuitoek, O.I., 2022). Decisions regarding culling were often communal, with elders and experienced herders providing guidance based on their observations and collective wisdom (Cherop, 2024). The Keiyo often rely on natural mating, selecting the best males to breed with chosen females based on their observable traits (Barar, O.I., 2022). This method helped preserve desirable genetic qualities within the herd. Thus, mating decisions were influenced by the animals' lineage, as certain bloodlines are known for their strength and productivity. This practice helped maintain a robust breeding stock and ensures that only the healthiest and most productive animals contribute to future generations.

Additionally, favourable physical attributes including a strong body frame, large size, and specific coat colours that are thought to provide heat resistance were considered (Chepkon'ga, O.I., 2022). Cattle with light-coloured coats were often preferred, as they were believed to be less affected by heat stress in the semi-arid Kerio valley, Keiyo. Notably, breeding animals were chosen based on lineage, as the Keiyo have a deep knowledge of their herds' ancestry and are likely to select from lineages known for good milk production, longevity, or resistance to specific diseases.

Furthermore, physical resilience, temperamental traits of animals was an important factor in the Keiyo's selective breeding (Barar, O.I., 2022). Livestock that demonstrate calmness and are easy to manage were often favoured, as they are more suited to the pastoralist lifestyle, which involved frequent movements across grazing ecological zones of Keiyo land. The Keiyo also selected animals that showed cooperative behaviour in herds, as these traits were essential in communal herding and reduced the risk of injuries during herding.

Selective breeding was also used to ensure livestock adapted to seasonal migrations, a fundamental aspect of the Keiyo's transhumant pastoralism (Cherop, 2024). The Keiyo favoured animals that can thrive on different vegetation

types and survive with limited water resources during dry seasons, thus, they majorly Kept Zebu cattle and traditional sheep and goats (Tarus, 1994). These animals were more suited to the Keiyo's ecological setup and traditional migratory lifestyle, which involved moving herds between wet and dry grazing zones in response to changing seasonal resources.

They also selected animals that are naturally resistant to local diseases (Tuitoek, O.I., 2022). This allowed herd resilience with minimal medical intervention. They also regularly assessed their livestock and removed animals that do not meet productivity or health standards, by slaughtering them. This practice helped prevent the spread of disease within the herd and ensured that resources are not wasted on underperforming animals. It also important to note that the Keiyo maintained a detailed oral history of their livestock, tracking the ancestry and performance of animals. This knowledge guided their breeding decisions, ensuring that animals from productive and resilient bloodlines are used for breeding (Koech, O.I., 2022).

Therefore, animal husbandry and selective breeding practices of the Keiyo exemplified a sustainable and adaptive ecological management approach to livestock economy by aligning their breeding and husbandry techniques with their extensive indigenous knowledge and practices. By prioritizing livestock traits, the Keiyo community gradually developed herds adapted to their environment. This form of animal husbandry demonstrates the Keiyo's early recognition of the benefits of genetic diversity and resilience within livestock populations. Selective breeding, therefore, was not merely an economic activity but a vital component of their indigenous ecological adaptation strategy for livestock sustainability, food production and food security.

### **Implication of the Study:**

The findings of this study offer valuable implications for contemporary livestock keeping, ecological management, and cultural preservations. The study underscores the potential for indigenous

knowledge and practices to inform policy on ecological management and sustainability. Policymakers could draw from the Keiyo's approach to develop frameworks that encourage communal stewardship, adaptive systems, and conservation-oriented livestock practices. Recognizing and integrating some of these indigenous strategies and practices into modern policy could lead to more ecologically resilient and sustainable systems in the face of increasing challenges such as climate change and land degradation.

### Conclusion:

The Keiyo community's indigenous knowledge and practices illustrate a highly adaptive, and ecologically mindful approach to livestock economy. Through communal land tenure system, diversified livestock keeping, cattle raiding, rotational grazing, conservation practices and cultural taboos, transhumance, and selective breeding, the Keiyo not only maintained a sustainable livestock economy but also mastered and protected their environment. These practices allowed them to navigate environmental uncertainties and maintain livelihoods for generations. Thus, this study offers valuable frameworks for balancing ecological stewardship with livestock economy to ensure sustainability and productivity.

### Recommendations:

This study advocates for the re-evaluation of indigenous knowledge systems, suggesting that they hold critical insights for sustainable livestock production and ecological management amidst climate change. To enhance resilience in livestock keeping, this study recommends training programs that incorporate indigenous practices like diversified livestock keeping and selective breeding with modern livestock practices, to help pastoralists adapt to climate-related challenges in semi-arid and arid regions.

This study also underscores the need for increased research and documentation of indigenous knowledge, with collaborative efforts between government bodies, academic institutions, and

local communities to preserve indigenous knowledge and practices. This documentation can serve as a valuable resource for future generations, offering insights to inform sustainable livestock keeping and natural resource management in the face of global climate change.

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