

Poultry Value Chain Study



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Abbreviations

AKFEMA	Association of Kenya Feed Manufactures
APRP	Agricultural Productivity Research Project
ASAL	Arid and Semi-Arid Lands
ASDSP	Agriculture Sector Development Support Programme
BSF	Black Soldier Fly
CRLCSA	Climate Resilient, Low Carbon, Sustainable Agricultural
DOC	Day old Chicks
FAO	Food and Agriculture Organization
GDP	Gross domestic product
IC	Indigenous Chicken
IKC	Improved Kienyeji Chicken
KALRO	Kenya Agricultural and Livestock Research Organization
KAMAS	Kenya Agro-Weather & Market Advisories System
KAPP	Kenya Agricultural Productivity Project
KBS	Kenya Bureau of Standards
KCSAP	Kenya Climate Smart Agriculture Project
KEPOFA	Kenya Poultry Farmers Association
KLBA	Kenya Livestock Breeders' Association
KPBA	Kenya Poultry Breeders Association
LDP	Livestock Development Policy
LREB	Lake Region Economic Bloc
NARIGP	National Agricultural and Rural Inclusive Growth Project
NPDP	National Poultry Development Programme
PRSP	Poverty Reduction Strategy Papers
SIDA	Swedish International Development Cooperation Agency
SPADE	Smallholder Poultry Agribusiness Development
WHO	World Health Organization

1.0 Introduction

1.1. Background and objectives of the of the value chain study

The Poultry value chain analysis is a key deliverable of the Transforming Livelihoods through Climate Resilient, Low Carbon, Sustainable Agricultural Value Chains in the Lake Region Economic Bloc, Kenya (CRLCSA) Project. CRLCSA focuses on the Lake Victoria Region (LREB) for various reasons including that it exhibits moderate to high levels of vulnerability and houses a high number of people.

The poultry sector is a significant socioeconomic activity for rural and urban households particularly women and youth; it contributes to food and nutrition security as a source of quality protein (eggs and meat), provides a reliable source of income and savings and enhances households' resilience by diversifying their farm enterprises and income¹. Beyond its economic and nutritional importance, the socio-cultural and religious functions of rural poultry production for smallholder livelihoods are widely recognized across communities².

CRLCSA's main objective is to implement a deep transformation of agricultural production, processing and marketing towards low-carbon, climate resilient pathways with a focus on six value chains (dairy, poultry, coffee, tea, fruit tree and indigenous vegetables) with the aim to transfer both adaptation and mitigation technology at each value chain's production, harvesting, processing, and marketing stages.

The project builds on the private sector and the strength of the cooperative movement in Kenya and creates a mechanism for North-South and South-South technology transfer, leveraging the knowledge and expertise that exists in national and international farming networks. It is against this background that a value chain analysis on poultry with more focus on indigenous and improved indigenous chicken for eggs and meat was carried out to understand the status and identify gaps for development initiatives.

KALRO³ defines an Improved indigenous chicken as a superior crossbreed of different indigenous chicken ecotypes from the various selected Kenyan communities. The breeds are developed to serve a dual purpose (meat and eggs) and characterized by the ability to produce more eggs, mature faster and meet market weight faster. The features make them more appropriate for smallholder poultry farmers to easily scale up and commercialize production within a shorter time frame when compared to pure indigenous chicken (IC)s. Indigenous and improved indigenous chicken are popular in the rural African communities because of their tolerance to common poultry diseases and to fluctuations in both feed quality and availability, allowing for little or no input costs⁴.

1.1.1 Global, National and County overview of the value chain

Poultry farming is expected to be the fastest growing livestock sector. Advances in breeding have given rise to birds that are more adaptive, meet specialized purposes and are increasingly productive. In addition, development and innovations in feeds and feeding technologies, slaughter and processing technologies have increased food safety and production efficiency. These developments have revolutionized the poultry industry and the associated feed sector to scale up rapidly⁵. Poultry meat accounts for 41% of total meat consumption worldwide and about 40 percent of the global increase in demand for meat⁶.

¹ Ogali, I. N., Mungube, E. O., Lichoti, J. K., Ogugo, M. W., & Ommeh, S. C. (2018). A study of Newcastle disease virus in poultry from live bird markets and backyard flocks in Kenya. *Journal of Veterinary Medicine and Animal Health*, 10(8), 208-216.

² FAO (Food and Agriculture Organization). (2013). Poultry Development Review.

³ KARI. (2011). Kenya Agricultural Research Institute Annual Report. Nairobi

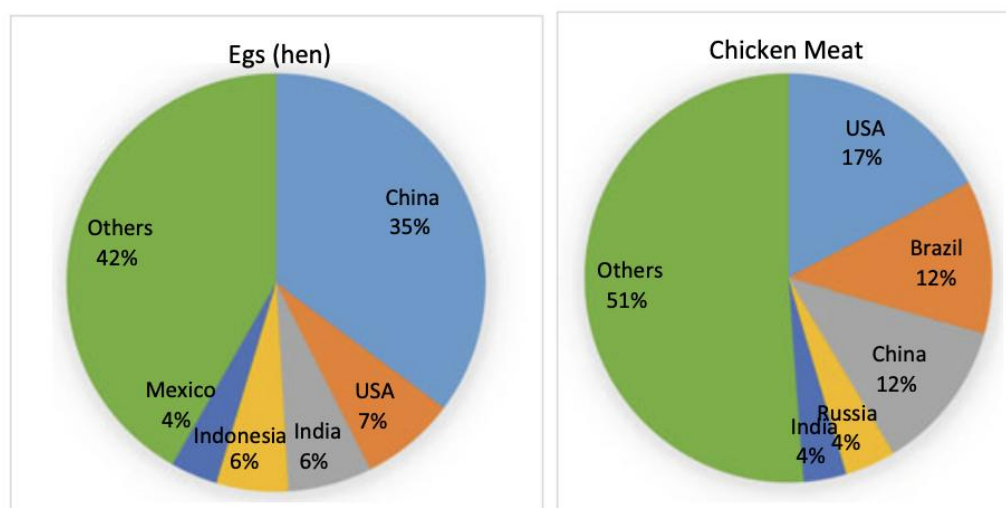
⁴ Melesse, A. 2014. Significance of scavenging chicken production in the rural community of Africa for enhanced food security. *World's Poult. Sci. J.* 70:593-606.

⁵ <https://www.fao.org/poultry-production-products/production/en/>

⁶ Bett, H. K., Musyoka, M. P., Peters, K., & Bokelman, W. (2012). Demand for meat in the rural and urban areas of Kenya. *A focus on the indigenous chicken, Economics Research International*, 11th July.

While global poultry sector has moved towards vertically integrated commercial broiler operation engaging with farmers in a contract mode, the level of integration varies across countries and individual firms. Robust urban demand has fueled the expansion of large integrator (farm to fork) models in developed countries. There is also a preference to set up operations closer to input supplies, as observed in Brazil, for instance. Informal domestic markets in the form of wet markets still dominate in developing countries. Brazil and the USA dominate in broiler export market while China is emerging as an active broiler exporter⁷.

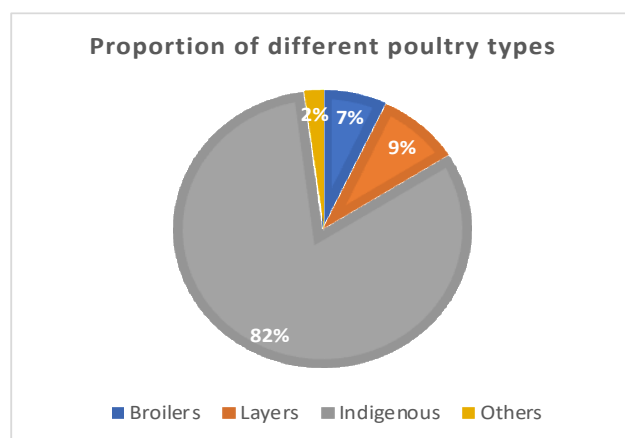
Figure 1 Top Eggs and Chicken Producing Countries



Source FAOSTAT (2018)

In Kenya, the poultry production increased from 44 million heads in 2016 to about 57 million heads in 2020⁸, and contributes around 8 percent of agricultural GDP⁹. The indigenous chicken form the

Figure 2 Proportion of different poultry types in Kenya



largest proportion of 82%, layers 9% and broilers 7%, while other poultry species which include guinea fowl, turkeys, ducks, and geese make up 2 %¹⁰. Poultry farming is mostly practiced on small-scale, and predominantly for domestic consumption. The value chain is characterized by dualism, comprising both smallholder and large-scale poultry producers. The former are the majority keeping small flocks of up to 30 birds¹¹. Notably, approximately 71% of eggs and poultry meat in Kenya are produced from indigenous poultry¹².

⁷ Gulati. G., Ganguly.K., and Wardhan. H. (2022). Agricultural Value Chains in India- Ensuring Competitiveness, Inclusiveness, Sustainability, Scalability, and Improved Finance. India Studies in Business and Economics

⁸ FAOSTAT. 2022. Available online at: <https://www.fao.org/faostat/en/#data/QCL> (accessed November 2022).

⁹ ASL2050 FAO (2017)

¹⁰ MOLFD, 2012

¹¹ Kingori, A. M., Wachira, A. M., & Tuitock, J. K. (2010). Indigenous chicken production in Kenya: a review. *International Journal of Poultry Science*, 9(4), 309-316.

¹² Nyaga, P. (2007). Poultry sector country review, FAO Animal health, and production Division.

The poultry production systems in Kenya include free-range; semi-intensive poultry system; and intensive commercial systems. The extensive systems are spread all over the country. The description of each system is presented below in table 1

Table 1. Poultry Production systems in Kenya

Production system	Description
Intensive production system	Broiler farming in Kenya is practiced in urban and peri-urban areas, such as around Nairobi and Kisumu. This system requires little space and exotic birds mainly sourced locally or imported from Uganda. Birds are kept in large hangars and fed compounded feed. This system is market oriented. It is estimated that over 3 million broiler chickens are raised in Kenya, in small, medium, and large farms. Flock sizes per cycle vary from 50–500 (small scale) through 500-10 000 (medium) to over 10 000 (large and integrated farms).
Semi intensive production system	Farmers keep flocks of 30 to 100 birds confined in simple structures. The birds are both indigenous and exotic, birds are provided with feed supplements. Farmers sell most of the birds, though some are self-consumed. Semi-intensive production system is practiced throughout the country. The exact number of semi-intensive farms is not known, though experts estimate they likely keep up to a third of all chickens in the country.
Extensive system (free range)	This is a low-input low-output system where birds are left to freely roam for feed. Farmers keep flock ranging from 5 to 30 local birds, often managed by women and children. It is a subsistence-oriented system, with little and opportunistic informal marketing. Although popular throughout the country, free ranging is predominant in western Kenya regions, some parts of lower eastern, north Rift areas and coastal areas

Source: ASL 2050 FAO¹³

Several County Governments across the country have prioritized investment in the improved indigenous chicken value chain because of its socioeconomic importance to the rural communities. This is demonstrated through diverse investments in projects such as the National Agricultural and Rural Inclusive Growth Project (NARIGP) and the Kenya Climate Smart Agriculture Project (KCSAP) both funded by National Government / World Bank and Agriculture Sector Development Support Programme Phase Two (ASDSP II) funded by National Government and Swedish International Development Cooperation Agency (SIDA). These projects all aim at increasing agricultural productivity and profitability of specific value chains including poultry.

1.1.2 Key county statistics on value chain performance

In the past two decades, the sector has undergone major structural changes due to the introduction of modern intensive production methods, genetic improvements, improved preventive disease control and biosecurity measures, increasing income and human population, and urbanization. These changes present tremendous opportunities for poultry producers, particularly smallholders, to improve their farm income and resilience. This study covers 5 counties namely, Bungoma, Kisumu, Trans Nzoia Vihiga and Nandi. The key production statistics at county level are highlighted below and thereafter general productivity trends in the region.

Bungoma

There are a total of 197,318 households who keep livestock in Bungoma County. Out of these, 161,433 households, or 82%, rear indigenous chickens. About 90% of the county's population is involved in this value chain, most at a small-scale level. There are a total of 1.2 million local chickens in the county, with a total value of about KShs 596 million¹⁴. Poultry is kept so widely in the county because it is easy to manage through free range production, its feeds are readily available, and it is a key product with a huge market across the county¹⁵. In efforts to improve the value chain, the county government has

¹³ Africa Sustainable Livestock (ASL) 2050 Livestock production systems spotlight Cattle and poultry sectors in Kenya. FAO. Nairobi

¹⁴ ASDSP. 2014. Bungoma County, Nairobi, Kenya

¹⁵ Kenya County Climate Risk Profile: Bungoma County

leased Chwele Chicken slaughterhouse to Shiffa Chicks (a private investor) for 20 years in a bid to revive the slaughterhouse. Shiffa sources indigenous chicken from small holder farmers, slaughter, packages and sells between Sh600 and Sh750 per chicken¹⁶. The County Government has also partnered with British government through the Sustainable Urban Economic Development programme, SUED to boost sectors of urban infrastructure and agriculture specifically hatchery and feed mill, among other integrated activities in the poultry value chain.

Kisumu

On average, 93% of the households in Kisumu County rear chicken, either under free range (traditional), semi-intensive (backyard), or commercial-intensive production systems. Though the free-range system is the predominant. In 2014, 78% of the poultry production in Kisumu County came from indigenous/local chicken. The county's annual poultry meat and egg production is estimated at 69,172 Kgs and 1,012,266 respectively¹⁷. Kisumu county has a Chicken slaughterhouse at Mamboleo in the outskirts of the city, which charges Kshs. 10/bird while the meat inspector is paid Kshs. 2 per bird.

Trans Nzoia

Rearing indigenous chickens is a low-capital enterprise that attracts many farmers. Indigenous chickens are reared by almost all the farming households in Trans Nzoia County that practice mixed cropping and livestock rearing. They are kept for both meat and egg production at subsistence and commercial levels. There are an estimated 693,730 birds in the county, producing about 208,119 kgs of meat. Around 90% of the population participates in the value chain¹⁸.

Vihiga

Indigenous chickens are reared by most households in Vihiga County. Over 80% of the county's population is involved in the different nodes along the value chain. Indigenous chickens have been associated with the culture of the indigenous communities residing in Vihiga County, which helps account for their popularity.

Nandi

Indigenous chickens are at the center of a popular household enterprise in Nandi County, where about 90% of the population keeps chickens. Most of these chicken farmers are small-scale producers, with each household holding an average of 10 chickens. Nandi County has about 700,000 birds of which 93% are indigenous chickens, 5% are laying chickens, and 2% are geese and turkeys (County Government of Nandi, 2018)¹⁹. The County Government of Nandi through ASDSP Programme has undertaken various poultry projects across the county which include development of viable option innovations to increase productivity of indigenous chicken value chain through utilization of high-capacity incubators, hatchers, and brooders. Two modern poultry incubators have been installed at Kaimosi Agricultural Training College (ATC) with capacities to process 2112 eggs each, in a single hatching and 4 brooding panels with capacities to brood 700 chicks each. The government through the National Agricultural and Rural Inclusive Growth Project (NARIGP) has facilitated farmers access improved indigenous breeds like Kenbro, Kuroiler, Kari, and Rainbow Roosters.

In poultry, productivity parameters comprise of body weights, final weight gain, clutch sizes, egg hatchability and increased number of chicks weaned per hen. A recent baseline report²⁰ on poultry in the region indicated productivity is dependent on survival rates from chicks to maturity which was estimated at 58% for indigenous chicken and 56% for improved indigenous chicken. Egg productivity among farmers in the North rift region (Nandi County) was 240 eggs per hen per cycle, higher compared

¹⁶ farmkenya/article/2001419169/chicken-abattoir-in-bungoma

¹⁷ Kisumu County Integrated Development Plan, 2013-2017

¹⁸ Kenya County Climate Risk Profile: Trans Nzoia County

¹⁹ Kenya County Climate Risk Profile: Nandi County

²⁰ Kenya Baseline Survey Report for Transformational Strategies for Farm Output Risk Mitigation (TRANSFORM) – Final Report, 2022.

to 117 eggs per hen per cycle recorded in Nyanza region (Kisumu County).²¹ This is much lower than 300 eggs produced by exotic chicken under tropical conditions. However, reducing the laying cycle by restricting prolific birds from brooding and incubating their own eggs can increase production.

1.1.3 Current state and structure of the value chain

Poultry value chain is generally characterized by lack of formal indigenous chicken marketing organizations. There are hardly production contracts between indigenous poultry producers and the buyers in the chain. However, there are trading relationships between the different intermediaries in the marketing of live birds. Trading relationships are mainly based on long-term repeated transactions. Some rural assemblers have informal arrangements with urban based traders that involve an agreement on the volume of birds to be delivered and an average price. Prices are often erratic and unpredictable. Supply is depended on producers' decision to sell which is dictated by the household need for cash and external shocks such as outbreak of diseases. Institutional arrangements that have been established to support the value chain actors include:

a) Farmers' associations

- **KEPOFA:** This is a non-political nonprofit organization which was established in 2002 to cater to the needs of all poultry farmers and formally registered in 2005. It has a membership of around 2000 farmers. It was supported by Kenya Agricultural Productivity Project (KAPP) to reach out and recruit members in 28 districts, develop a 5-year strategic plan (2008-2012) and put up a governance structure in place. Its roles are to facilitate dialogue and exchange of information and ideas among poultry farmers and other stakeholders in the industry on matters affecting poultry farming such as: price of poultry or poultry products, conduct of trade or businesses linked to poultry and poultry products, terms, and conditions of employment of labour in poultry farming, compensation for improvement and disturbances as well as the taxation regimes along the value chain. Besides it also aims at building capacity of poultry farmers to improve standards of poultry farming, increase poultry productivity, and promote a market-oriented poultry production systems.
- **Local Associations:** Farmers also belong to farmers associations at local level formed to help farmers with the production and marketing of poultry and poultry products. In Kisumu County, umbrella organizations include Kisumu County Poultry Enterprise Cooperative Society (KICOPE), Kisumu Poultry Traders Association (KIPOTRA and Muhoroni Farmers' Cooperative Poultry Society (MFCPS). These associations have regulations on membership and require members to pay an annual subscription of a certain amount. The main functions of the associations include²²:
 - Upgrading of production using the hybrid cockerels and breeds
 - Engaging in common procurement of farm inputs
 - Negotiating better prices for members
 - Capacity building for members through training activities
 - Training members on how to formulate their own poultry feed.
 - Facilitating access to management-related extension/ advisory service
 - Supporting the farmers' linkage to buyers and sellers

b) Kenya Poultry Breeders Association (KPBA)

²¹ Kenya Baseline Survey Report for Transformational Strategies for Farm Output Risk Mitigation (TRANSFORM) – Final Report, 2022.

²² Climate Risk Profile Kisumu County

This is a poultry breeders' association whose vision is to enhance sustainable growth of poultry farming and production, and to transform the sector into a modern and efficient industry. KPBA is the main platform for large and medium sized companies. The membership level of the association is 20 and it is open to people with a hatchery and breeder far. The association member benefit through knowledge sharing, exchange of quality inputs, either through sale or other arrangements.

c) **The Association of Kenya Feeds Manufacturers (AKEFEMA)**

This is the first registered association which brings together all the feed millers in Kenya. It was initiated in 2003 and became an official umbrella body that speaks on behalf of the feed millers in 2004. The Association of Kenya Feeds Manufacturers was formed in response to a changed policy environment and in realization that feed manufacturers have a role to play in quality input production, distribution, and client capacity building. It is also recognized that strong association of feed manufacturers would be useful for lobbying with the Kenyan government, in particularly on taxation issues, ensuring industry self-regulation and to provide information on input use.

d) **Kenya Agricultural Research Institute (KARI-Naivasha)**

This is a KALRO station with a national mandate for research in livestock issues and all aspects of indigenous chicken breeding, feeding and management. The station also trains in poultry management for farmers and extension workers. The station has facilities that include a hatchery for commercial and research work and a semi-automated slaughter plant and cold room for training services.

1.2. Methodology

1.2.1 Mixed methods approach.

The study analyzed the status of the value chain in production, distribution and marketing, value addition; identified the existing gaps and areas of interventions. Desk research was the main method used in generating data that is credible. The results of the desk research were thereafter validated and complimented through primary data collection using Focus Group Discussions, field observations and Key Informant Interviews. The data collection tools for the field work are annexed to this report.

1.2.2 Desk Research

This involved review of available secondary data to provide preliminary information feeding into the study objective, as well as inform key actors to be interviewed. A compendium of literature reviewed including various project documents, County Integrated Development Plans, Climate Risk Assessment Frameworks, national policies and strategies on sustainable food and nutrition security, Economic Survey Reports and others are contained in the references section of this report. The gaps identified during the literature were addressed through the primary data collection with the relevant respondent categories.

1.2.3 Key Informant Interviews

Key Informant Interviews (KIIs) were conducted to obtain and collect information from various chain actors in the counties; specifically, Trans Nzoia, Nandi, and Kisumu. The interviews were administered face-to-face to targeted input suppliers, traders, financial service providers, business development service providers, county government officers in the departments of livestock and trade and development agencies supporting initiatives in the value chain.

1.2.4 Focus Group Discussion

To obtain a richer and in-depth information, data was collected through Focus Group Discussions (FGD) with 10-12 participants who included men, women and youth involved in producing, distribution and marketing as well as value addition of indigenous chicken. Participants in the FGDs included cooperatives members and producer groups from three counties: namely Nandi, Trans Nzoia, and Kisumu.

1.2.5 Data collection, tools, and processing and analyses

Quantitative data obtained from desk review was analyzed using Microsoft Excel. The analysis involved descriptive statistics with outputs presented in tables and charts. Qualitative data was analyzed using thematic and content analysis and presented in prose form. Using the analysis, a comprehensive report was delivered based on a set outline.

1.3 History of Value Chain

1.3.1 Brief history of the sector/ commodity

Kenyans have been keeping chicken for subsistence use for many years under “extensive systems,” a term used to describe a practice where birds are largely free ranging and dependent on scavenging. In the past two decades, the sector has undergone major structural changes due to the introduction of modern intensive production methods where the birds are fully confined either in houses or in cages, genetic improvements towards high yield meat and layer breeds, improved preventive disease control and biosecurity measures, increasing income and human population, and urbanization. These changes present tremendous opportunities for poultry producers, particularly smallholders, to improve their farm income and resilience.

1.3.2 Previous development activities

Since the introduction of poultry in Kenya, investment and development of support services aimed at improving the value chain were introduced by the National government, however, they were characterized by a lack of technical expertise in poultry extension and insufficient funding. The National Poultry Development Programme (1976 to 1994), aimed to increase the production and consumption of poultry meat and eggs among many low-income households. This was partly done through the cockerel and pullet exchange program. However, the program encountered several challenges, low offspring fertility, and obstacles from traditional practices that hampered adoption rates of the improved methods and breed. In addition, the introduced breed was not adaptable. This program demonstrated the importance of an institutional participatory approach and a focus on the entire poultry value chain²³.

Despite these flaws, the program gradually increased the availability of poultry extension services, trained extension agents, and conducted research. A National Livestock Development Policy (LDP) was formed in 1980 to address some of the difficulties encountered in the NPDP. The policy suggested, among other things, the creation of a national poultry credit program and the establishment of advisory body for poultry. However, this policy lacked a plan for how to implement the interventions²⁴. In October 2005 the Kenyan government established a multi-sectoral National Avian Influenza Task Force to deliberate and advise on how to deal with the threat of avian influenza. The National Action Plan was drawn up according to the FAO and WHO guideline. It covered both animal and human aspects of prevention, measures to counter the disease should it occur and necessary emergency preparedness measures²⁵.

KALRO through the the Arid and Semi-arid lands Agricultural Productivity Research Project (ASAL APRP) (2012-2017) funded by the Government of Kenya and the European Union developed two improved indigenous (kienyeji) chicken breed lines (IKC) with high egg production and enhanced growth rates. The two IKC breed lines have been registered with the Kenya Livestock Breeders' Association (KLBA). These two breed lines are now being disseminated and popular amongst farmers because they produce more eggs, heavier birds, and are more disease resistant than local breeds. However, a big constraint in the adoption of the improved indigenous chicken is the high cost of commercial feeds. Furthermore, low hatchability of eggs at farm level has been identified as a constraint. Farmers also want a bird that can go broody to leverage on cost of accessing fertile eggs of improved lines.

Notably, poultry and poultry products are identified as an important source of food security and wealth creation in the Vision 2030 and various macroeconomic policy blueprints, such as the Poverty Reduction Strategy Papers (PRSPs), Economic Recovery Strategy for Wealth and Employment Creation 2003-2007, and Vision 2030, have also highlighted the need for poultry development

²³ National poultry development programme [Kenya] - Plan of operations of phase 4 - 1/7/1988 to 1/7/1991 [1988]

²⁴ National livestock development policy [of Kenya]. [1980]

²⁵ One health strategic plan for the prevention and control of zoonotic diseases in Kenya

initiatives. However, these blueprints are broad in scope and do not address poultry development adequately or directly, necessitating a comprehensive poultry policy.

Nonetheless, the ongoing National Agricultural and Rural Inclusive Growth Project (NARIGP) and the Kenya Climate Smart Agriculture Project (KCSAP) both funded by National Government / World Bank are addressing the challenges faced by smallholder farmers in the improved indigenous chicken value chain by impacting knowledge and skills on climate smart resilience technologies, innovations, and management practices. The delivery is through private extension service providers.

Other development partners investing the value chain include Heifer International Kenya through the Hatching Hope project launched in 2020. it aims to improve the livelihoods of 40,000 households (180,000 people) in western Kenya by strengthening their production skills and business knowledge, building the capabilities and capacity of farmer groups, which will enable them to become profitable market actors as they are connected to sustainable markets.

The Smallholder Poultry Agribusiness Development (SPADE) 2011 to 2016 initiative supported Technoserve aimed to sustainably improve the livelihoods of 12,000 smallholder poultry producers of indigenous chicken. SPADE operated in the Western and Nyanza regions and comprised three primary activities: sustainably improving smallholder farmer poultry production; expanding access to financial services for smallholder poultry farmers; and improving poultry market access for smallholder poultry farmers. The total beneficiaries at the end of the project were of 5,168 of which 66% women²⁶.

1.3.3 Current state and structure of the value chain

Kenya like the other East-African countries, has mainly two poultry markets. The market for the indigenous / improved indigenous chicken for both meat and eggs and the other for broilers and layers for meat and egg respectively. In both instances, market is characterized by lack of formal marketing structures, except for a few of farmers who get out grower contracts from large producers such as Kenchic and to a certain extent those contracted by SMES in poultry production such as Chiffa Chicks, a private investor in Bungoma county who has recruited more than 3,000 poultry farmers into contractual agreement with aim to increase supply of indigenous chicken to slaughterhouse²⁷.

However, there are trading relationships between the different intermediaries in the marketing of live birds. Trading relationships are mainly based on long-term repeated transactions. Some rural assemblers have informal arrangements with urban based traders that involve an agreement on the volume of birds to be delivered and an average price. The assemblers and rural traders may bulk and transport birds to major town but may themselves not sell in these markets because of collusion by brokers that bars trader from outside from trading in urban markets. The collusion by brokers enables them to control the buying and selling prices of indigenous chickens in these markets, they are therefore able to offer/set almost same buying and selling prices for live birds²⁸. Prices are often erratic and unpredictable. Supply is depended on producers' decision to sell which is dictated by the household need for cash and external shocks such as outbreak of diseases. During food scarcity and disease outbreak circumstances supply of live birds exceed demand thus leading to depressed prices. For the same demand and supply reasons, the prices are usually stable during normal times and highest during festive seasons. Other determinant of market prices includes weight or size and health of the birds.

Farmers who sell eggs and slaughtered birds to institutions such as hospitals, restaurants, supermarkets, and schools normally have prior orders and deliver directly without the mediation of brokers. Small scale farmers use public service vehicles to transport eggs from the farm to the market while larger farmers use own vehicles. Prices of eggs rarely fluctuate²⁹.

²⁶<https://www.technoserve.org/wp-content/uploads/2019/10/TechnoServe-2018-Impact-Data.pdf>

²⁷ farmkenya/article/2001419169/chicken-abattoir-in-bungoma

²⁸ Okello, Julius J., et al. "Value chain analysis of the Kenyan poultry industry: The case of Kiambu, Kilifi, Vihiga, and Nakuru Districts." *HPAI Africa/Indonesia Team Working Paper* (2010).

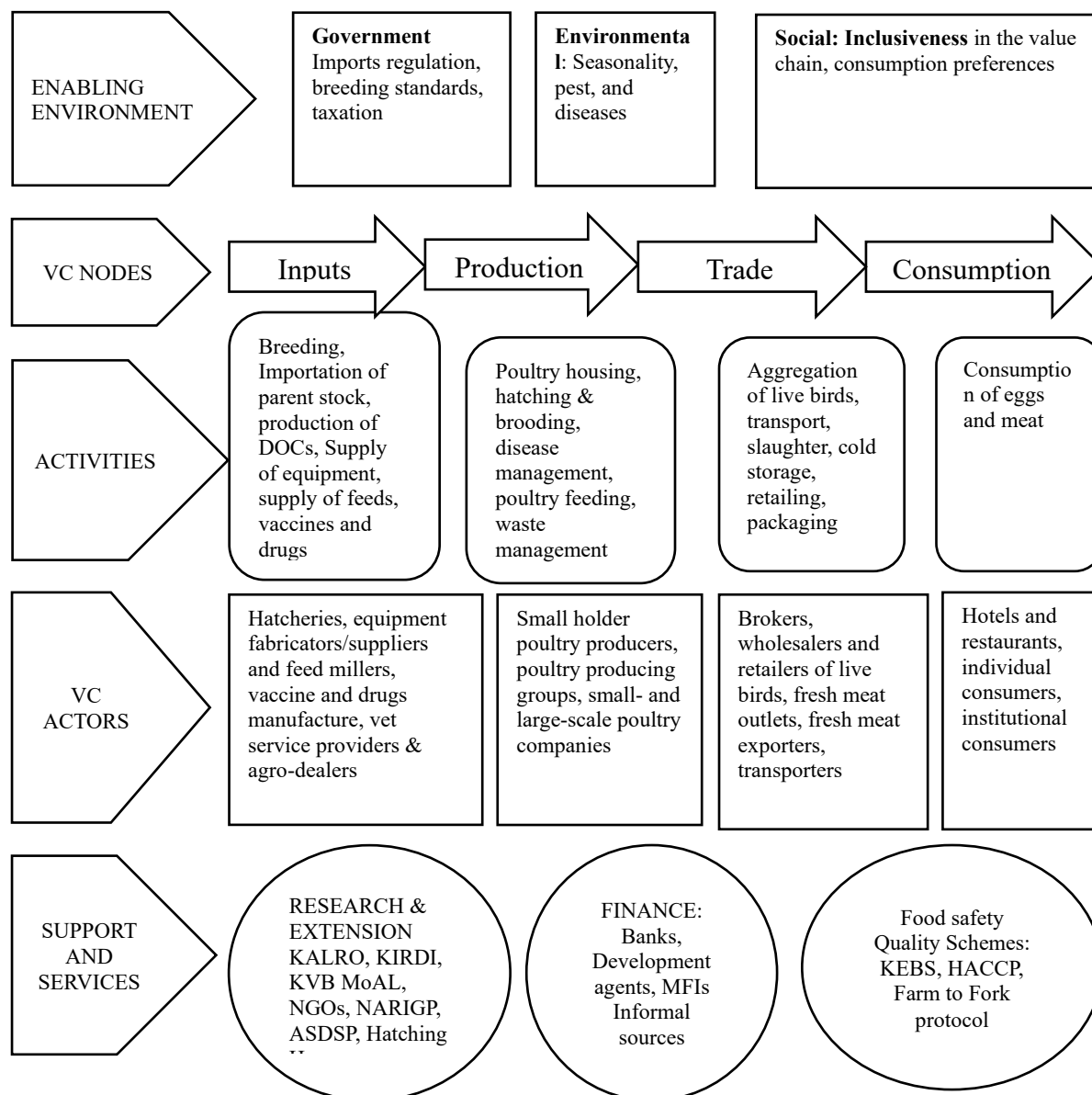
²⁹ Magothe, T. M., et al. "Indigenous chicken production in Kenya: I. Current status." *World's Poultry Science Journal* 68.1 (2012): 119-132.

2.0 Functional Analysis

Functional analysis interrogates series of activities from sourcing of breeding stock and day-old chicks (DOCs), supply of feeds, vaccines and drugs, trade of live birds, chicks, eggs and meat and consumption. The analysis further looks at the actors involved at each node of the value chain; activities performed as well as the support services.

2.1 Value Chain Map

Figure 3 Poultry Value chain map



The main value chain actors involved in poultry value chain from breeding to consumption are outlined in the table 2 below.

Table 2. Activities / Roles of Value Chain actors

Value chain Actors	Value chain actor	Activities / Role played
Inputs	Hatcheries	<ul style="list-style-type: none"> • Importing parent stock (DOCs or hatching eggs) • Hatching and distribution of DOCs
	Equipment fabricators/suppliers	<ul style="list-style-type: none"> • Importing incubators or fabricating locally
	Vaccines and drugs manufacture	<ul style="list-style-type: none"> • Manufacture and supply of vaccines and drugs to agro-dealers/farmers
	Feed millers	<ul style="list-style-type: none"> • Manufacturing of poultry feeds • Supply of feed ingredients
	Agro-dealers	<ul style="list-style-type: none"> • Stocking and provision of drugs, vaccines, feeds, and equipment to farmers • Source of technical information to farmers
Production	Individual producers	<ul style="list-style-type: none"> • Housing of poultry • Feeding through feeds production and supplementation • Disease control and management
	Producer groups	<ul style="list-style-type: none"> • Aggregation of eggs and live birds • Collective procurement of inputs (feeds, vaccines, and drugs)
	Small scale producer companies	<ul style="list-style-type: none"> • Contracting out grower farmers • Provision of inputs to out grower farmers
Trade	Brokers	<ul style="list-style-type: none"> • Source of market information to farmers • Aggregation of live birds and eggs • Link between buyers and farmers* • Transportation the birds/eggs • Paying market fees
	Whole sellers	<ul style="list-style-type: none"> • Source of market information to farmers • Aggregation of live birds and eggs • Transportation
	Retailers	<ul style="list-style-type: none"> • Source of information to farmers • Value addition e.g., slaughter, cold storage, packaging
	Exporters	<ul style="list-style-type: none"> • Source of information to farmers • Value addition e.g., slaughter, cold storage, packaging, branding
	Slaughters	<ul style="list-style-type: none"> • Slaughtering • Scalding • Defeathering • Packaging • labelling
Consumption	Hotels and restaurants	<ul style="list-style-type: none"> • Value addition e.g., slaughter, cooking
	Institutional consumers	<ul style="list-style-type: none"> • Consumption
	Individual consumers	<ul style="list-style-type: none"> • Consumption

2.2 End-market Analysis

In this section the study analyses market structure, existing and potential market demand, market actors and their roles along the value chain

2.2.1 Demand

Kenya's annual poultry meat production is 88 million metric tons, valued at KES 48.6 billion. The current poultry consumption is 76,135 MT based on a per capita consumption of 2.58 kg³⁰, this is low compared to the WHO-recommended per capita consumption of 12 kg. As per the recommended consumption per capita, the projected poultry meat consumption by 2030 is expected to reach 797,995MT. its anticipated that the amount of meat to meet this demand shall be produced by 371,998,098 broilers producing 557,997 MT and 1,487,992,392 indigenous chicken producing 239,398 MT³¹ of meat annually.

Like chicken meat, Kenyans consume fewer eggs than the average person around the world. The average annual consumption of eggs per person around the world is 200; however, Kenya only consumes 40 eggs per person annually³². Favorably, Kenyan consumers show strong preferences for indigenous chicken eggs and are prepared to pay 41.53% more than they would for other kinds of eggs³³. The increase in consumer preferences for Indigenous Chicken (IC) eggs is attributed to the fact that they have both nutritional and health associated benefits.

2.2.2 Market structure

Production of Broilers

Smallholder broiler farmers mostly produce them under contract with buyers because of the high cost of feeding the birds beyond their market age. Broilers are mainly sold as live birds or dressed carcasses and therefore unlike in the indigenous chicken, there are no cases where producers sell directly to consumers. Farmers sell their broilers through several market outlets. These include other rural and urban brokers, retailers and hotels and processors.

Established firms that engage farmers on contract agreements include Kenchic and Farmer's Choice who buy live birds from farmers and produce a range of poultry products; dressed chickens, chicken pieces (e.g., legs, thighs, and breast), sausages and burgers. These products are sold to retailers (supermarkets) and restaurant under formal contracts Broiler chicken brokers sell to majorly to urban hotels, restaurants, supermarkets, distributor agents, butcheries, and other caterers (95%). A few large-scale farms sell their dressed broilers to supermarket outlets. This is illustrated in the figure below.

³⁰ <https://www.helgilibrary.com/indicators/poultry-meat-consumption-per-capita/kenya/>

³¹ <https://www.kenyamarkets.org/from-poultry-to-pigs-know-the-meat-to-invest-in-for-good-profits/>

³² Windhorst, H. W., Grabkowsky, B., & Wilke, A. (2013). Atlas of the Global Egg Industry, 1–36.

³³ Ndenga, C., Kabuage, L. W., & Bett, E. K. (2018). Economic Analysis of Consumer Demand for Indigenous Chicken Eggs in Kenya. *Economic Analysis*, 9(17).

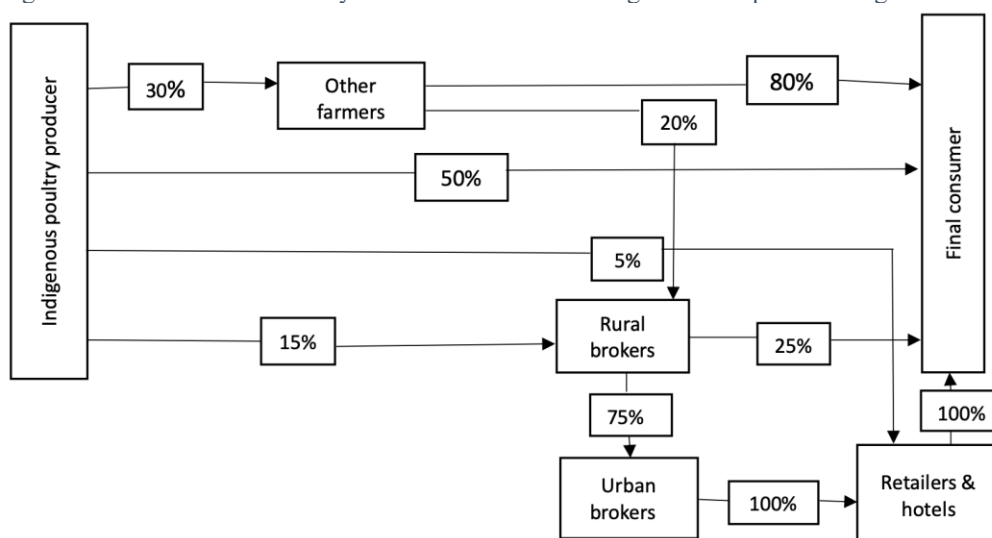
Figure 4 Volume share handle by different channels of broiler chicken value chain



Indigenous poultry meat and eggs are mainly marketed through direct and retail selling systems. In a value chain analysis of the Kenyan poultry industry conducted in 2010 in Vihiga county among other counties (Kiambu, Kilifi and Nakuru), the market structure of indigenous chicken mapped included rural brokers who buy chicken and eggs from farmers at farm gate or from small weekly markets held locally and assemble them for subsequent sale to brokers in larger urban markets.

This formed 15% of the total birds and eggs traded. The consumer purchased the products either in their raw form (live bird or a piece of raw meat) or processed (piece of cooked meat) from retailers or hotels. 30% of the birds are sold at the farm gate to fellow farmers in their neighbourhood for rearing, these farmers later sell 20% to rural brokers and 80% to final consumers. Rural indigenous chicken producers sell 50% directly to final consumers. The figure below outlines the volume share handle by different channels of indigenous chicken value chain.

Figure 5 Volume share handle by different channels of indigenous / improved indigenous chicken value chain



While farmers value the role played by traders, they feel that the traders/brokers drive hard bargains and there is little room for negotiation; in that regard, farmers have formed associations that support producer buyer negotiations and increase their bargaining power.

2.2.3 Drivers

Population growth and urbanization

Surge in population has put great pressure on food production including demand for animal protein. Chicken presents a sustainable solution to access affordable animal proteins.³⁴ Currently beef and chicken meat retail at Kshs 500 and 400 respectively in the supermarkets in Nairobi

Increased purchasing power

As Kenya transforms to middle level income, food consumption patterns are shifting from meeting basic dietary needs to a keener interest in health, convenient and superior value foods^{35,36}. This is characterized by a shift from cereal consumption to a diet higher in animal protein, resulting in rising demand for white meat perceived as healthier choice by an expanding and steadily affluent urban and peri-urban population³⁷. Poultry meat and eggs fit into this expectation and presents an opportunity for poultry production and value addition.

Cultural beliefs

Kenya has diverse population made up of numerous ethnic groups with various religious, traditions and philosophical beliefs which influences food consumption patterns. e.g., Hinduism and Islam, prohibit consumption of beef and pork respectively. In western part of Kenya, chicken is often slaughtered to mark traditional and notable events. These beliefs contribute to high demand for chicken.

Health consciousness

Need to maintain healthier lifestyles has brought dietary transformation that has shapes consumers' perception on chicken meat as a healthy alternative to red meats.

2.3 Analysis of Value Chain Elements -Value Chain Nodes, Actors & Activities.

The poultry value chain in Kenya comprises a variety of players, including producers, traders, processors, transporters, and retailers. They are discussed in detail below.

2.3.1 Value Chain Actors

2.3.1.1 Production, collection/aggregation, processing, wholesaling, and retailing

Inputs supply

a) Hatcheries

They are the first actor in poultry production, hatcheries source the parent stock locally or internationally and use them to produce DOCs. The common breeds of improved indigenous chickens produced in registered hatcheries in Kenya are Sasso, Kenbro, and KALRO Naivasha improved kienyeji³⁸. KALRO Naivasha indigenous chicken breed has become very popular among farmers, the supply of day-old chicks has been low forcing farmers to wait for a long time for day old chicks. Some

³⁴ Christopher N. Kamau, Lucy W. Kabuage & Eric K. Bett | (2018) Impact of improved indigenous chicken breeds on productivity. The case of smallholder farmers in Makueni and Kakamega counties, Kenya, Cogent Food & Agriculture, 4:1, 1477232, DOI: 10.1080/23311932.2018.1477231

³⁶ Omondi, S. O. (2022). Poultry value chain in two medium-sized cities in Kenya; insights from cluster theory. *Frontiers in Veterinary Science*, 249.

³⁷ Omondi, S. O. (2022). Poultry value chain in two medium-sized cities in Kenya; insights from cluster theory. *Frontiers in Veterinary Science*, 249.

³⁸ https://ishamba.com/documents/56/iShamba_farming_guideline_Indigenous_Chicken.

of the farmers prefer 4-week-old chicks but currently KALRO does not have the capacity to rear the chicks to 4 weeks. The hatcheries have numerous biosecurity measures in place. These relate to the handling of dead birds, waste and the movement of live DOC. Chicks that are rejected due to deformation are gassed, crushed, and dumped into secured disposal pits. Other waste (poultry droppings) is sold as manure or used by the hatchery farm.

Most of the hatcheries have sales agents who reach out to distance farmers. The agents are often veterinary drug stores (popularly known as agro-vet shops). They aggregate orders from farmers and double up as collection points. Some hatcheries, such as Kenchic, have formal contracts with the sales agent that specifies the storage and handling procedures, among other conditions³⁹. The advantage of sourcing from such outlets is the certainty and quality of breed being purchased unlike when one buys from an independent agent whose parent stock may not be easily traced.

Besides Kenchic which is the biggest market leader of the poultry industry in East and Central Africa with large breeder farms, hatcheries, broiler farms, processing plants and butcheries in Uganda, Tanzania and Zambia others are Sigma supplies, which specializes in supply of one-day-old chicks table eggs, animal feed, processed meat and poultry equipment. Besides they have a modern chicken slaughterhouse that can handle 1,500 chickens each hour. Muguku Farm, Kenbrid and Brade gate are the other medium-scale broilers and layers breeders in Kenya. The hatcheries specialized in improved indigenous chicken include Kuku Chick Limited, NextGen Poultry Farm and KALRO Naivasha. In 2021/2018 KALRO Naivasha availed 182,000 chicks and 291 breeding cocks to farmers for IC flock upgrading and 1,198 trays of fertile eggs provided to farmers for hatching. The chicks were distributed in a total of 40 out of the 47 counties in the country⁴⁰.

The number of DOC produced annually by four main hatcheries in the country (Kenchic, Sigma, Kenbrid, and Muguku) are broken down in the table below:

Table 3 DOC produced annually by four main hatcheries

Hatchery	Layer	Broiler	Total
Kenchic (Based in Industrial Area, Kajiado, Kisumu, Athi River)	2,900,000	10,100,000	13,000,000
Sigma (Based in Nairobi)	300,000	700,000	1,000,000
Kenbird (Based in Naivasha)	780,000	312,000	1,092,000
Muguku (Based in Kikuyu)	384,000	768,000	1,152,000
Total	4,364,000	11,880,000	16,244,000

Other hatcheries are Western Kenya Hatcheries based in Webuye; Bixa based in North Coast, Mombasa; and Lake Chick Hatcheries in Kisumu City. The hatcheries have medium-scale hygiene standards. Apart from these, others that operate at local level on small scale and the type and quality of the breeds cannot be ascertained. They concentrate on word of mouth and social media marketing like Facebook for sales

b) Feed millers

Numerous feed millers supply poultry farmers in different regions. The most common brands among farmers include Unga Millers Ltd, Pembe Feeds Ltd and Dola Feeds. The small and medium scale millers located in the Nyanza, Western and North Rift region is annexed (Annex 1). The major (large scale) millers have distributors while the small and medium millers sell directly to farmers and even deliver feed to the farm. The delivery of feed directly to the farm benefits farmers by reducing the costs usually charged by intermediaries for their services. The types of feed delivered by various millers include pellets, chick mash, grower mash, layer mash, broiler starter, broiler finisher, bone meal, fish

³⁹ Onono, Joshua Orungo, et al. "Identification of production challenges and benefits using value chain mapping of egg food systems in Nairobi, Kenya." *Agricultural systems* 159 (2018): 1-8.

⁴⁰ Kenya Agricultural and Livestock Research Organization Annual report 2017-2018

meal and coconut seed cake⁴¹. Apart from commercial millers, some large-scale farmers and hatcheries formulate and mill their own feed. However, this is not common with indigenous chicken.

Notably, the government regulation in force requires that all commercial millers obtain a milling permit and the feeds produced to meet the Kenya Bureau of Standards (KBS) quality requirements⁴². Equally the Association of Kenya Feed Manufacturers (AKFEMA) brings together all feed millers for co-ordination of efforts meant to improve on a continuous basis the business of feed milling in Kenya towards delivery of quality feedstuffs and related services for the benefit of both the investors and their customers. This includes the principal mandate of achieving self-regulation in the industry.

Some challenges faced regarding the supply chain of animal feeds include manufacturing not using / supplying clean high-quality feed free from contamination, poor storage and transportation facilities and practices, poor stock management due to over stocking resulting into expiry of feeds, and some retailers mixing feeds with other unrecommended concentrates to maximize profits⁴³.

c) Agro-dealers

Agro-dealers are the last link to the farmer in the distribution of seed and other agricultural inputs. Many smallholder farmers not only source products from their local agricultural input dealers (agro-dealers) but rely on them for technical advice about which products to use and how to use them. Feed millers, vaccines and drug manufactures deliver their products to the Agro-dealers, mostly known as agro-vet shops, from which farmers buy directly and receive veterinary services. For instance, they administer vaccines as part of their service package. This package is especially attractive to small-scale farmers who cannot afford to buy a complete dose. Some of the agro-vet shops also provide vaccination on credit to farmers and farmer organizations who pay off after selling eggs or mature chicken. However, this kind of package is offered only to customers with long-term relationship with the agro dealers. Agro dealers do undertake bio security practices on products stocked; these include using feed bags only once, keeping free-ranged chicken away from stores, and not allowing customers to touch or handle opened bags of feeds they are buying. The Agro dealers also provide regular feedback to the millers regarding demand supply conditions and consumer preferences. The feedback is usually in terms of customer complaints and satisfaction about feed.

Previous agriculture projects have facilitated setting up of County Agro-dealer associations. The associations provide a good entry point in addressing challenges farmer access in getting agro inputs because they provide a link between the farmers and the distributors / manufacturers. As of July 2018, Bungoma, Busia, Kakamega, Siaya, and Vihiga counties had registered County Agro-dealer associations while Homa Bay, Kisii, and Kisumu were finalizing the registration process. The County Agro-dealer associations contacts at annexed (Annex 2).

Production

a) Small holder producers

These comprise of farmers who source their stock from their own birds, from local live bird markets, from neighbours and, sometimes, receive them as gifts. The birds are mostly indigenous chicken, though there are few cases of improved indigenous breed variety. The production system is characterized by birds scavenging for feed around the farmers' homes and sometimes the farmers give them leftover food. In some cases, the birds are provided with maize, cassava, sweet potatoes, and even commercial feed, depending on the economic ability of the farmer. Sale is usually at the farm gate or at the local markets. At primary markets the birds are aggregated and then transported to major urban markets,

⁴¹ Okello, Julius J., et al. "Value chain analysis of the Kenyan poultry industry: The case of Kiambu, Kilifi, Vihiga, and Nakuru Districts." *HPAI Africa/Indonesia Team Working Paper* (2010).

⁴² <https://www.kenyamarkets.org/from-poultry-to-pigs-know-the-meat-to-invest-in-for-good-profits/>

⁴³ Kenya Market Trust Report (2020) Mapping animal feed manufacturers and ingredient suppliers in Kenya

which is their destination⁴⁴. Examples of cooperatives focusing on poultry as a key value chain in the region are tabulated below.

Figure 6 Cooperatives focusing on poultry as a key value chain in the LREB region

County	Cooperative name	Membership	Active members	Energy source	Access Information On Climate	Main Buyers of their products	Registration year
Busia	Busia poultry farmers	226	226	Electricity	Yes	Local Market	2020
Homabay	Abba Multipurpose	23	23	Electricity	No	Local Market, Near Market ie Kisii	2021
	Rangwe Poultry	225	40	Electricity	No	Self Help Groups, Local Market	2017
	Gembe East Farmers	125	60	Solar Kerosine	Yes	Local Market	2011
	Suba North Poultry Producers	133	66	Electricity	No	Local Market(Ogongo) , Near Market (Mbita, Homabay)	2020
	Ledfo Farmers	87	87	Electricity Firewood Char	No	Local Market, Supermarket, Hotels	1999
Kakamega	Kijiji farmers	57	28	Electricity	Yes	Local Farmers	2020
Kisii	Etago poultry fcs	598	400	Electricity Solar	Yes	Hotels Within The Subcounty	2022
Kisumu	Victoria Kuku	27	24	Electricity Firewood Solar	Yes	Local Market, Hotels, Off-Takers, Hospitals, Schools, Individuals, Outside Catering Services	1964
	Lower Nyakach Women Traders Savings and Credit	600	400	Electricity Firewood Char	Yes	Local Market, Schools, Hospitals	2020
	KICOPE	1450	600	Electricity Charcoal LPG	Yes	Chicken Basket, Local Consumers	2021
Migori	Suna East Farmers	235	100	Electricity Charcoal	No	Members And The Community	2013
Nandi	Kocheng'ei Nandi Poultry	351	202	Electricity Kerosine	Yes	Cooperative	2020
Siaya						Local Market Hotels And Restaurant Schools Ceremonies	2020
	Gem Poultry Farmers	224	34	Electricity	No		
	Alego Usonga Farmers	500	100	Solar	Yes	Rift Valley Product, Local Market	2019
	Siaya Chicken Value Chain	171	171	Electricity	Yes	Local Market Institutions Restaurants And Hotels	2013
		350	200	Electricity	No	Hotels, Schools	2014
Vihiga	Chicken Value Chain Vihiga County	500	300	Electricity	No	Local Market	2016

Source: Author's compilation and Agriterra data

Figure 7 Cooperatives focusing on poultry amongst other Value chains

County	Cooperative name	Membership	Active members	Energy source	Access Information On Climate	Main Buyers of their products	Registration year
Bomet	Kaptebengwet	34	34	Solar	Yes	Brokers	2021
	Chebaraa Irrigation	200	200	Solar	Yes	Local Buyers	2020
	Kiptulwa Dairies And Poultry	368	368	Electricity	Yes	Brookside	2012
	Soromandaa Savings And Credit	2500	2500	Electricity	Yes	Mustard Seed Dairies	2021
Bungoma	Kimama	3534	2484	Solar	Yes	Kenyacof	2010
Busia	Buloma Agro	70	60	Electricity Solar	Yes	Local Market And Institutions	2020
Homabay	Matunda Value Chain	40	30	Electricity Charcoal	Yes	Local Market, Local Schools.	2020
	Hosrand Dairy	290	160	Electricity Firewood	Yes	Local Marketers.	2018
Kisii	Magena	10717	1500	Electricity Solar LPG	Yes	Gusii Coffee Millers, Tropical Farm Management	2011
Kisumu	Seke	87	25	Electricity Charcoal Solar	Yes	Locals, Hotels	2013
	Disi Multipurpose	200	30	Electricity Firewood LPG	Yes	Local Market	1997
	South West Kano	1000	150	Electricity Firewood Char	Yes	Local Market, Customers From Uganda	2009
Migori	Karungu Central	122	122	Electricity	No	Schools In The Community	2022
	Pamoja Suna East	411	310	Electricity	Yes	Local Market	2021
Nandi	Lelecho Marketing	8000	3000	Electricity Firewood Solar	Yes	Nandi Dairy Cooperative Union	2017
Siaya	Bugura	56	56	Solar	Yes	Kenya Breweries, Local Market, Transu, Ullima, Agri Bora	2020
Vihiga	Luanda Subcounty Dairy	41	20	Electricity	Yes	Local Market And Functions	2021
	Mbumbere Dairy	74	25	Electricity	Yes	Community Members, Hotels	2017
	Family Transformation	173	33	Electricity	Yes	Zukini Supermarket, Mace Food Eldoret	2020
	Gambogi Equator	68	45	Electricity Solar	Yes	Local Market, Kajulu Dairy, Equator Hotel	2018

Source: Author's compilation and Agriterra data

b) Small scale commercial producers

⁴⁴ FAO. 2022. *Africa Sustainable Livestock 2050: Business models along the poultry value chain in Kenya – Evidence from Kiambu and Nairobi City Counties*. Rome. <https://doi.org/10.4060/cb8190en>

These comprise of poultry farms keeping between 300 to 3000 birds for commercial purposes⁴⁵. They source DOCs, feed as well as drugs from local hatcheries, feed companies and “agrovets”. Marketing of eggs and birds is often done on individual basis and preferences.

c) Large commercial producers

They comprise of farms that import poultry breeding stock (parent birds or fertilized eggs) from Mauritius, Holland, Egypt, India, and South Africa. They then sell day-old chicks to local smallholder and commercial farmers while exporting some to neighbouring countries, mainly to Uganda, Tanzania, and Ethiopia. Where the smallholder farmers are contracted by large commercial farms, they are provided with day-old chicks and feed while the farmer provides labour and management, the flock is bought back less cost of input upon maturity. Large commercial producers then sell some of the mature birds to meat processors, who either sell them locally in secondary and tertiary markets or export them under licensed brands like Halal Chicken⁴⁶.

d) Traders

Traders in the poultry value chain act as intermediaries between the farmers and the end consumer. They include rural assemblers/aggregators, rural retailers, rural wholesalers, urban retailers, urban wholesalers, and urban retailers. The intermediaries can be grouped into two categories depending on the type of product they specialize in i.e., live-bird traders and egg traders. Most of these intermediaries are specialized in their functions in the chain, either in the handling of eggs only or live and dressed birds only. Live-bird intermediaries deal in live exotic and/or indigenous poultry but sometimes handle dressed birds, depending on the client’s preference. Majority of the intermediaries that handled eggs do not handle dressed chicken. Intermediaries mainly serve farmers who are unable to transport their live birds or eggs to the market due to high transport costs, who need urgent cash and cannot wait for a market day, or who lack information on where to sell or who to sell to. High transaction costs have indeed been attributed to the choice by many farmers to trade at the farm-gate rather than walk their produce to the market⁴⁷.

The number of intermediaries between the farmer to consumer in the value chains differs depending on the market and County. The typical number ranged between one and four, indicating that some markets and regions are highly fragmented and hence entail high transaction costs⁴⁸. The intermediaries include:

i) Rural assemblers

They collect live birds or eggs from farmers at the farm-gate and bulk them before transporting to the market. Most of these rural assemblers pay for the birds or the eggs on the spot thus taking ownership whereas others collected the birds or eggs on credit and remit the money after sale. Where credit is involved, the arrangement or agreement on price and time of payment is verbal. They trade around 10-20 birds or crates of eggs and sell them generally by hawking the birds/eggs to hotels in the rural towns or door to door in residential estates in urban centers⁴⁹.

ii) Rural retailers

Rural retailers purchase live birds or egg either directly from farmers who walk their birds or eggs to the market, or from rural assemblers. These transactions are made on a cash basis. Most of these rural

⁴⁵ Otieno D. and Ogutu S. 2019. Consumer willingness to pay for chicken welfare attributes in Kenya. *Journal of International Food & Agribusiness Marketing*, 1-24. DOI: 10.1080/08974438.2019.1673275

⁴⁶ Okello, J. J., Gitonga, Z., Mutune, J., Okello, R. M., Afande, M., & Rich, K. M. (2010). Value chain analysis of the Kenyan poultry industry: The case of Kiambu, Kilifi, Vihiga, and Nakuru Districts. *HPAI Africa/Indonesia Team Working Paper*.

⁴⁷ Okello, Julius J., et al. "Value chain analysis of the Kenyan poultry industry: The case of Kiambu, Kilifi, Vihiga, and Nakuru Districts." *HPAI Africa/Indonesia Team Working Paper* (2010).

⁴⁸ Bebe O.G. and Owuor G. 2008. Maximizing market value of indigenous chicken in rural and urban markets in western Kenya. Unpublished report. Egerton University, Njoro.

⁴⁹ Ibid, 25

retailers have no business relationships with the farmers they buy from. However, some have had repeated transactions with certain rural assemblers that have led to the development of trust. Rural retailers sell their live birds mainly to rural restaurants and individual consumers. The sale of eggs and live birds to final consumers, however, is mostly on a cash basis.

iii) Rural wholesalers

They purchase live birds from other traders and assemble them in bulk before selling to the next actor in large consignments only. Some rural wholesalers have business relationships with the traders they buy from that have been mainly forged through repeated transactions. Some rural wholesalers act as typical brokers in the sense that they assist distant traders to market the traders' consignment without taking ownership / possession of the birds. In the case of eggs, rural wholesalers assemble large volumes of eggs by buying from rural assemblers and selling them to urban-based brokers.

iv) Urban wholesalers

They are in major markets and towns and are supplied by rural assemblers and transporters who buy large consignments from rural wholesalers or directly from medium and large-scale farms. Most urban wholesalers have business relationships with their suppliers forged through repeated transactions over many years. Such urban wholesalers therefore receive regular consignments from their suppliers and usually can specify the volumes they want. The weight of the birds is the major quality parameter used but some traders check the physical condition (such as the alertness) of the bird. The sale of chickens can be on cash or credit basis depending on the length of the relationship. The relationship, however, remains informal and the agreements made are not formalized into written contracts.

v) Urban retailers

They include supermarkets and shops in major towns. They sell both dressed chicken and table eggs. They source their bird from established farms which raise the birds on contracted terms. Table eggs, on the other hand, are purchased from urban-based brokers who in turn source them directly from rural/urban wholesalers and/or rural assemblers.

e) Transporters

Transporters play an important role in the movement of poultry from various production points to final consumers. The producers, brokers, and small-scale retailers are all involved in one way or the other in transporting the birds from farm or intermediate markets to the end market. Some use specialized pick-up trucks designed for poultry transportation with an upper and lower carrier that can accommodate approximately 500 birds. Some farmers and brokers use their own ordinary pick-up vehicles. However, since there is no specialized packing of live chickens, it is common to find birds bundled together either on strings or baskets and are transported on different means of public transport available such as motorcycles, lorries, buses or mini-buses together with passengers.

There are numerous government regulations that govern the transportation of poultry. Transporters of processed birds are required to obtain a certificate of transport issued by the veterinary officer to the owner of the carcass. Additionally, all transporters of live poultry/birds are required to obtain a transport/movement permit. However, these regulations are hardly adhered to due to limited capacity of the concerned government ministries.

f) Poultry processing (slaughter)

The large-scale poultry enterprises involved in processing chicken especially broilers such as Kenchic, Farmers Choice and Quality meat packers have modern facilities that meet food safety and hygiene standards. The major products of poultry processing include whole chickens (capons), chicken pieces (i.e., thighs, drumsticks, etc.), sausages and burgers. Capons are sold to retail shops and outlets such as hotels, restaurants, supermarkets, and chicken retail outlets.

A few other counties mentioned under the section on infrastructure (2.5.1.5) have basic slaughter slabs i.e., Bungoma, Kisumu and Thika as well as a few advanced cooperatives. However, most of the chicken sold to the mass market is slaughtered in the household and business premises backyards and adhere to minimal food safety and hygiene standards.

2.3.1.2 Technologies used in each node- advantages/ disadvantages-

Technologies in the value chain have been developed through research and development. They comprise of tools, equipment, genetic materials, breeds, farming practices, laboratory techniques and models which are beneficial to the farmer⁵⁰. They include:

a) Improved breeds (improved indigenous chicken)

They are breeds that have been developed in response to low productivity of indigenous chicken for both meat and egg. They are dual-purpose birds with a higher growth rate and can scavenge for part of their feeds. The table 4 below presents the improved indigenous breeds in Kenya and their unique characteristics.

Table 4. Common improved indigenous chicken and attributes

Breed	Some of the key breed attributes
KALRO Breed (Improved Kienyeji)	Developed by the Kenya Agricultural and Livestock Research Organization (KALRO). It's also known as kienyeji chicken, less than 10% of the flock broods, the hens produce 200-230 eggs per bird, eggs are size 50-60 g, and the cocks attain 2 kg within 4 months. The breed is resistant to diseases and parasites and is better suited for local climatic conditions. These traits of the breed are key in responding to increased demand for chicken meat.
Kenbro	It can achieve a live weight of 1.5kg in seven weeks. It's ideal for live market sale and as a layer with regulated body weights, this bird will come into point of lay at 22-24 weeks and produce 200 eggs/hen per annum. It's produced by Kenchic
Sasso	This is a dual-purpose slow growing breed produced by Western seed company in Kenya. It can produce 150-200 eggs/hen per year depending on management system. It is mostly sold for meat.
Kuroiler	The Kuroiler chicken is a dual-purpose hybrid breed developed in India. It is a dual-purpose hybrid breed. They are economical breed and can live eating the kitchen and agricultural waste. Kuroiler hens can produce around 150 eggs per year by consuming agricultural and kitchen waste, Kuroiler chickens need to feed continuously, and they are fast growing chicken breed. The hens are not broody.
Rainbow rooster	Rainbow rooster is a fast-growing Indian chicken breed. It is multicolored cross breed, suitable for backyard rearing and organic chicken production. It lays more eggs than the indigenous chicken.

b) Improved feeding equipment

It is estimated that up to 20% of feeds is wasted during feeding. Better feeding equipment have been developed and adopted by farmers to reduce feed wastage and losses among poultry farmers. Naivasha Long Feed Trough is recommended to farmers; it is made of galvanized flat iron sheets (8" x 4") and timber, has smoothened round stick handle that spins to discourage bird parching to minimize chicken feed wastage. The feed trough is easy to fabricate and can be used for a longer duration. This is a technology that is available for future up scaling in different counties.



Naivasha Long Feed Trough

⁵⁰ <https://www.kcsap.go.ke/sites/default/files/manual/INDIGENOUS-CHICKEN-1.pdf>

c) Hay box brooder

This is a brooding technology that is used by small scale farmers in rural areas who face a challenge in chick brooding due to lack of power. It is a simple fabrication of timber, hay, and wire mesh available in different dimensions based on number of chicks. It addresses the mortality related losses during brooding stage, reduce chick predation and provide warmth during the night. The technology has been promoted through demonstrations, agricultural shows and exhibitions, farmer field schools and farmer to farmer extension⁵¹.

There is also the Smart Brooder, an innovation supporting brooding process. It's an environmental control device with temperature and humidity sensors that regulate brooding spaces resulting in optimal living conditions for chicks. With the help of the sensors, the device records data and stores it on a chip. The information gathered helps to determine and automatically adjusts the heating requirements for chickens. Additionally, Smart Brooder, sends SMS updates to farmers mobile phones⁵².

d) Alternative sources of animal - Black soldier flies (BSF)

Feeding of chicken is faced by high cost of protein thus a need for alternative and cheap source, which when incorporated into feeds can greatly reduce the cost of production and enhance a faster growth rate and increased productivity. ICIPE and KALRO have partnered in the process of promoting Black soldier flies, an environment friendly insect whose larvae is used as an alternative feed and source of high-quality protein for chicken. 100 g of insects' eggs can produce 2 kg of BSF larvae within 96 hours. They have high quality protein (up to 44%) and 38% fat⁵³. This has been adopted by some farmers and feed manufactures. InsectiPro Kenya is produces BSF on a commercial scale.

e) Thermostable New Castle Disease vaccines

Diseases continue to be a major challenge in poultry rearing. The Thermostable New Castle Disease vaccines addresses the gap in low level of vaccination coverage in remote areas due to lack of refrigeration services. The thermostable vaccine remains viable for up to one year when stored at 4 °C and 8 weeks when stored at room temperature (up to 28 °C). It remains potent for two days after reconstitution⁵⁴.

f) KALRO-Indigenous chicken Mobile application

These are mobile applications that works under the android operating system. They provide summary details on feeding, vaccination, housing, breeding, and selection, economics, and other general information on chicken production. This bridges the gap in low level of access to information on chicken farming and related services. Over 10,000 users have already downloaded the app⁵⁵.

g) Portable egg incubators.

Increasingly, smallholder farmers and farmer groups are accessing these portable incubators with a capacity range of 48, 56, 128 and 300 eggs. Some of the incubators can be powered by both solar and electricity. Some of the suppliers in the country include Ecochicks, Superhatch, Incubators Kenya amongst others.

⁵¹ Climate smart agricultural technologies, innovations, and management practices for indigenous chicken value chain

⁵² <https://arinifu.com/smart-brooder-features/>

⁵³ Black Soldier Flies: Inexpensive and Sustainable Source for Animal Feed

⁵⁴ Lindahl, Johanna F., et al. "Do vaccination interventions have effects? A study on how poultry vaccination interventions change smallholder farmer knowledge, attitudes, and practice in villages in Kenya and Tanzania." *Tropical animal health and production* 51.1 (2019): 213-220.

⁵⁵ <https://www.kcsap.go.ke/sites/default/files/manual/INDIGENOUS-CHICKEN-1.pdf>

2.4 Support services in the extended value chain

2.4.1 Suppliers of physical inputs

a) Parent stock for Day Old Chicks

Parent stock for broiler and layers Day Old Chicks

Kenchic and Sigma feeds are among the few large hatcheries that supply broiler and layers DOCs across the country. They sell off springs from parent flocks imported from abroad based on their excellent performance, disease resistance and adaptability to the local environment. This companies include

Parent stock for indigenous / improved indigenous chicken

At the smallholder level, farmers source of chicks for flock multiplication varies with breed and region. In North Rift region which comprise of Nandi and Trans Nzoia Counties, producers of improved Kienyeji chicken often hatched from own flocks (69%) while a smaller proportion purchase from local hatcheries⁵⁶. While in Nyanza region which includes Kisumu County, only 25% of farmers hatch from own flock the rest source from local hatcheries including KALRO Naivasha.

Notably, there are also local farmers who breed and sell fertilized eggs to those with hatching equipment or invest in their hatching equipment; and there are also farmers get day old chicks brood for 4 weeks and sell the off to other farmers to rear for home consumption or market.

The average market rates for the different ages of chicks across the country are presented below in table 5

Table 5. The average market rates for improved indigenous chicken

Age of Chicken	Average price
3 days old chick	Kshs 120
1 week old chick	Kshs 140
2-week-old chick	Kshs 170
3-week-old chick	Kshs 200
1 month old chick	Kshs 250
2-month-old chick	Kshs 400
Mature Hens	Kshs 800
Mature Cocks	Kshs 1200

Source: compilation by author from FGDs

b) Feeds

Poultry feed contributes 60-70 percent of total production costs with energy and proteins as the main components that constitute poultry feeds. Therefore, most farmers pay close attention not only to the availability but also to the quality and the proper usage of poultry feeds.

Most of the feed producers and raw material suppliers are concentrated in and around Nairobi city. According to a study carried out by Kenya Market Trust (2017), there are about 307 registered animal feed manufacturers (41% focusing on poultry). The registered feed manufacturers provide about 60 percent of the local demand, while the unregistered small-scale manufacturers, home/community-based formulators and importers account for the difference. Majority of these manufacturers are small scale operators; those manufacturing less than 1000 MT per month form about 90 percent, 7 percent form those producing 1000 to 5000 MT per month while those manufacturing over 5000 MT per month form 2-3 percent. The main constraint in availing quality animal feed is attributed to poor quality of raw

⁵⁶ Kenya Baseline Survey Report for Transformational Strategies for Farm Output Risk Mitigation (TRANSFORM), 2022

materials, and sometimes, poor manufacturing procedures / practices, especially when it comes to quality control/assurance.

Farmers keeping layers and broilers solely source feed from established and registered feed manufactures such as Unga feeds, Sigma Feeds, Jubilee Feeds Industries Ltd, Pioneer Feeds, Chania Feeds, Isinya Feeds Limited amongst others. This to ensure they provide quality feed to maximize on production and productivity.

Due to the high cost of feeds, smallholder farmers are increasingly looking for ways of developing home-made rations for their flock using ingredients purchased from retail points to complement feed bough from registered manufacturers. The on-farm feed formulations are supported by increasingly better understanding of chicken nutrition requirements, feed mixing process and increased access to feed formulation information.

c) Veterinarian Drugs

They include antibiotics, acaricides, de-wormers, antiseptics, multi vitamins and vaccines. Farmers source them from agro vet shops, manufacturing company distributors or from private animal health service providers. Vaccination programs are at times sponsored under subsidy by non-governmental organizations and government projects in the Ministry of Agriculture Livestock and Fisheries e.g., KCSAP and NARIGP projects; however, programs are often launched in smaller areas and with limited duration⁵⁷.

Most vaccines are often produced for commercial large-scale poultry, with vials containing several doses for a minimum of 200 birds. This disadvantages smallholder farmers⁵⁸. However rural farmers have adopted collective action strategies whereby vaccination vial is procured and distributed to many different households at almost same time. In addition, the difficulties in maintaining cold chains for vaccines cause further logistic problems, but the development of thermotolerant vaccines addresses this challenge⁵⁹.

2.4.2 Support services provided to actors along the VC

ASDSP II E-Commerce platform

ASDSP II E-Commerce -<https://asdspmarketinfo.kilimo.go.ke/> is an online shop for value chain actors to market their products at free of charge. Indigenous chicken is amongst the products on the platform. It was developed by ASDSP II to enhance market for farmers within the value chains the project and county are investing in.

Kenya Agro-Weather & Market Advisories System (KAMAS).

The Ministry of Agriculture Livestock and Fisheries through the KCSAP project and with the support of the world bank has set-up Kenya Agro-Weather & Market Advisories System (KAMAS)⁶⁰. It was aimed at assisting farmers in various value chains, to access up to date climate, agronomic and market information so as minimize negative impact of climate and market information asymmetry.

⁵⁷ Oladiran, O. G., & Kabir, J. (2015). Evaluation of poultry processing practices related public health laws and diseases of chickens at slaughter: A pilot study in Kaduna state. *Sokoto Journal of Veterinary Sciences*, 13(1), 38-47.

⁵⁸ Lindahl, J. F., Young, J., Wyatt, A., Young, M., Alders, R., Bagnol, B., & Grace, D. (2019). Do vaccination interventions have effects? A study on how poultry vaccination interventions change smallholder farmer knowledge, attitudes, and practice in villages in Kenya and Tanzania. *Tropical animal health and production*, 51(1), 213-220.

⁵⁹ Wambura, P. N., Kapaga, A. M. and Hyera, J.M. M.K., 2000. Experimental trials with a thermostable Newcastle disease virus (strain I2) in commercial and village chickens in Tanzania Preventive Veterinary Medicine

⁶⁰ <https://kamas.co.ke/>

Financial Services

While there are no specific poultry financial services across the county, in the counties of Kisumu, Siaya, Homabay and Migori, the Hatching Hope Kenya project has leveraged funding from Cargill, Heifer Impact Capital and two local banks totaling \$1.36 million to support poultry farmers and other value chain actors to scale their operations. Two revolving funds focusing on different parts of the supply chain have been established. They provide loans for smallholder farmers to scale up their flocks, improve infrastructure and access veterinary services and feed; MSMEs also get loans to scale up their operations.

A separate investment of \$450,000 from Heifer Impact Capital is aimed at financing the construction of a poultry processing plant that will be co-owned by local farmers and Chicken Basket; a social enterprise working with women and youth in poultry production in Kisumu region. It provides farmers with chicks, feed, and medication, as well as processing and guaranteed markets for their poultry products⁶¹.

Training and extension

The Ministry of Agriculture is mandated to carry out farmer trainings and provide extension services; however, they are grossly under resourced; and extension officer to farmer ratio are higher than the 1:400 as recommended by FAO. For example, Nandi County Extension staff to Farmer ratio stands at ratio of 1: 638⁶². In Vihiga County there is extension officer per ward with about 7,000 farmers. To bridge the gap in extension services ICT technology has been deployed to provide e-extension services in several counties including Bungoma, while Kisumu has a County Agricultural toll-free call center and Vihiga county has built capacity of Community Facilitators for the Field Farmer Schools (FFS) who educate farmers on the best farming practices.

2.5. Societal environment

2.5.1 Societal environment- institutions setting the "rules of the game"

2.5.1.1 National Policies and Regulations

Despite the huge role poultry farming plays in the Kenyan economy and a major source of livelihood for many Kenyans, both small scale and large scale, there is no single statute that provides for poultry farming in Kenya as a standalone. Originally, it was provided for under the Crop Production and Livestock Act, but the said statute was repealed by the Crops Act in 2013 when the Act came into force. However, the Crop Act does not expressly cover or cater for poultry farming in Kenya. This then leaves regulation of poultry farming by national policies, strategies, and national institutions with the mandate of implementation the aforementioned. There are, however, bills in parliament that are yet to be made laws: Poultry Development Bill 2012, Animal Health Bill, and Veterinary Public Health Bill. The bills have been drafted based on guiding principles that seek to regulate and promote safe and healthy poultry farming in Kenya in accordance with international standards.

Nonetheless, there are general policies and regulations within the Ministry of Agriculture, Livestock and Fisheries at the national level that guide the operations of the value chain. The key ones are detailed below in table 6.

⁶¹ <https://www.hatchinghopeglobal.com/story/hatching-hope-kenya-generates-new-opportunities-for-poultry>

⁶² Nandi County Integrated Development Plan 2018-2022

Table 6 Policies and regulations

Policy / Regulations	Details	Implications
National Poultry Policy 2009	Create mechanisms that ensure poultry production is increased and sustained through improving the following: nutrition, feeding, breeding of local poultry, poultry disease control and biosafety and better marketing infrastructure.	<ul style="list-style-type: none"> - Enhance poultry production and productivity - Facilitate timely detection, diagnosis, treatment, and control of poultry diseases. - Promote competitiveness of the poultry industry locally, regionally, and internationally - Promote value addition and marketing of poultry and poultry products.
Poultry Development Bill 2012	Provides an institutional framework to guide the development of the poultry industry, and for the control of the importation and exportation of poultry and poultry products.	<ul style="list-style-type: none"> - Gives the responsibility of promoting awareness about the health benefits of poultry rearing and consumption to the government. - Encourages government to partner with civil society groups to provide training, sensitization, and awareness programs on the health benefits of poultry rearing and consumption. - Emphasizes on the need to have good husbandry practices and gives the government the mandate to promote and encourage both existing and upcoming hatcheries to come up with appropriate breeds that support enhancement of conservation of the genetic pool.
Meat Control Act (Cap. 356).	The Act aims to enforce standards in the meat industry by regulating slaughterhouses and the importation and exportation of meat products.	<ul style="list-style-type: none"> - Sets meat products standards which apply throughout the entire value chain. - Regulates licensing and control of slaughterhouses, on meat transportation and the regulation on the export or import of meat.
VAT Act 2012 and the subsequent amendment in 2013	VAT-exemption of compounded feeds	<ul style="list-style-type: none"> - Enhances access to poultry feeds through reduced feeds cost
The Veterinary Surgeons Act Cap 366	Makes provision for the registration of Veterinary Surgeons and for other matters incidental to and connected with the practice of veterinary surgery	<ul style="list-style-type: none"> - Accreditation of practitioners
Pharmacy and Poisons Act Cap 244	An ordinance to make better provisions for the control of the profession of veterinary and the trade in vaccines, drugs, and poisons	<ul style="list-style-type: none"> - Constraint to the delivery of veterinary services by only allowing veterinarians to possess drugs for purposes of treatment but not as stockists.

2.5.1.2 Mandates at County Governments and Applicable Taxes, Fees, Licenses

Key departments at the County Government.

The Livestock, Veterinary and Trade are the three key departments at the county that support value chain. With reference to this value chain, the livestock Departments are mandated to promote commercialization and industrialization of livestock production through facilitation and offering of regulatory services. The Department of Veterinary Services are mandated to prevent, treat, and control diseases and regulate the movement of poultry and poultry products. However, the staff are few and this has given rise to animal health private extension services providers. The department of Trade which is occasionally coupled with Cooperative activities investments more on facilitating access to agricultural credit, promote value addition and commercialize marketing of agricultural produce through competitive pricing.

Applicable taxes, fees, licenses, and charges payable at county level

All the counties have finance bills that provide guidance on fees for livestock and veterinary services amongst others. They rates reviewed annually. Examples for the counties of Vihiga, Bungoma and Trans Nzoia are presented in table 7 below.

Table 7 Applicable taxes, fees, licenses at County level

Item Description	Rates and Units of Measure	Vihiga	Bungoma	Trans Nzoia	Kisumu
Live Chicken	Kshs Per day	30	30	50	N/A
Dressed Chicken	Kshs Per day	30		30	N/A
Tray of eggs	Kshs Per day	20	30	10	30

Notably its only Kisumu that charges Kshs 5 for poultry meat inspection, and has specific stalls for sale of chick where they charge Kshs 400 per month, hence no daily charges

2.5.1.3. Business environment

Most small-scale farmers offload their chicken through the brokers thus creating a vibrant informal system; except for the few involved in out-grower contracts, which is mostly for broilers with large enterprises such as Kenchic and Isinya. Thus, the traders and middlemen are in control of the value chain and together with limited information flow, remain exploitative to the producers. There is a lot of non-disclosures among these actors especially on price and weights. For instance, in situations where some buyers take away live birds from farmers for slaughter and processing in their own facilities, farmers are unsure of the weights given since this information is provided later. This leaves an uncoordinated market system, largely controlled by brokers while producers are forced to sell their products due to lack of sustainable and profitable outlets.

2.5.1.4. Organizations and cooperation of the value chain with government and donor projects

The apex poultry bodies such as KEPOFA has not been as effective to drive the interest of the sector nationally, hence initiatives have been left to isolated poultry development projects at county and regional level. The large renown project promoting poultry in the country are Hatching hope Kenya implemented by Heifer international with funding from Cargill and NARIGP and KCSAP projects which are initiatives co-funded by National government with and World Bank. All these projects focus on improved indigenous chicken.

KALRO Naivasha a government institution has been instrumental in developing and availing the breed to these projects. In Kisumu, Bungoma, Nandi, Trans Nzoia and Vihiga where Indigenous Chicken has been prioritized as livelihood transformative value chains in the county do have Indigenous Chicken Platforms with strategic plans. The processes were funded by SIDA through the ASDSP II project

2.5.1.5 The current state of county infrastructural elements and effects on the VC operation

The relevant infrastructure along the value chain includes hatcheries, access roads, market sheds slaughter slabs and processing facilities.

Slaughter slabs and processing facilities

Due to high demand for poultry products in Nairobi, most slaughter slabs and processing facilities are found within its environs i.e., Thika, Burma and Karikor Markets in Nairobi. All are located within the county government premises. However, for most of the counties in Western, Nyanza and Rift valley

region there are no slaughter slabs for chicken and majority of the smallholder farmers and traders slaughter the birds at home if they are to be delivered dressed.

That notwithstanding, large poultry farms have their own slaughter facilities and some counties e.g., Nandi has constructed a poultry slaughterhouse at Kapsabet, under NARIGP, this was intended to ensure poultry producers have reliable and steady demand; however, it has not operationalized. Bungoma County has also put up a processing facility operated under a public private partnership. Kisumu county has a functional slaughter slab. There are other poultry private slaughterhouses, mostly put up by associations such as Kisumu Poultry Traders Association (KIPOTRA) which cater for smallholder farmers. They are engaged in chicken processing activities (De feathering, slaughtering) and marketing. Establishing more slaughter slabs and processing facilities is essential in making the sector more lucrative⁶³.

Market sheds

Most traders operate from makeshift shades at the county government marketplace. They hire rooms to keep the left-over birds at night or carry them home. Unlike the other counties, Kisumu has specially constructed sheds for chicken going for Kshs 400 per month.

2.5.1.6 The socio-cultural elements impacting the value chain performance

Chicken serves an important socio-cultural and religious functions in rural communities. Poultry production for smallholder livelihoods are widely recognized across communities. Production is majorly done by women and youth; this is attributed to the cultural consideration that small livestock are for women and youth. Producers are organized into CIGs consisting of 15-28 farmers which majorly focus on production, larger producer membership are structured into producer organizations (POs) and cooperatives which increase competitiveness through value addition and collective action. In Nandi County, Kochengei PO and the Victoria Kuku Cooperative are among the established organizations that have ventured in value addition into fried chicken and farmer support through training.

Kenya has diverse population made up of numerous ethnic groups with various religious and philosophical beliefs, so food consumption varies from one religion to another. Since beef and pork are prohibited by Hinduism and Islam, respectively, and poultry is accepted by both religions, these beliefs make poultry meat highly consumed due to its religious acceptance amongst the meat commodities.

2.5.2 Natural environment

2.5.2.1 Poultry value chain link to dependence on water, biodiversity, and climate.

Dependence on water

Water is the most important nutrient for the overall health and performance of poultry. It plays an essential role in every aspect of metabolism and is critical to the regulation of the bird's body temperature, food digestion, and waste elimination. Water intake goes up with feed intake, and broilers increase water consumption approximately by seven per cent for each degree increase in temperature (Fairchild and Ritz, 2012)⁶⁴. Birds consume approximately 1.6 to 2.0 times as much water as feed (on a Kg per Kg basis); both feed and water consumption steadily increase as a flock ages. During its lifetime, a 2.27Kgs- broiler will consume about 8.16 litres of water, compared to approximately 4.53 kgs of feed⁶⁵. For an economical batch of 1,000 broilers that mature in 3.5 months would use about 8,160 litres.

⁶³ DFID. 2019. *Poultry Sector Study*. Department for International Development. Available at:

<http://www.bdsknowledge.org/dyn/bds/docs/960/DFID%20Poultry%20Sector%20Study%20180419.pdf>

⁶⁴ Fairchild, B.D. and C.W. Ritz. 2012. Poultry drinking water primer. Bull. 1301. Cooperative Extension, University of Georgia, Athens.

⁶⁵ Lacy, M. 2002. Broiler management. Pages 829-868 in: Commercial Chicken Meat and Egg Production (D. B. Bell and W.D. Weaver, Eds.). Kluwer Academic Pub. Norwell, MA.

Biodiversity

Poultry biodiversity represents a key factor to improve poultry resilience and promote sustainable and low input farming systems. While high-performance strains (HPS) such as broiler and layers continue to address the increasing demand of poultry and poultry products, the preservation of poultry biodiversity has become a key objective in all developed countries. This has led to improvement of local breeds to balance between the possible benefits (good health and welfare, resistance and resilience to heat stress, lower dietary requirements, reduced veterinary cares) and other unfavorable aspects (low performance, low meat yield)⁶⁶. Crossbreeding is the main tool used in poultry, which normally involves a cross between HPS and local breeds, with the aim of combining the production capacity of the former with the latter adaptability to natural environment.

Link to Climate

Increased temperatures trigger the incidence of Newcastle disease and infectious bursal disease (Gumboro disease), leading to declines in production and/or stock loss. Heavy rainfall causes significant damages to poultry housing structures and storage facilities, bringing about fowl typhoid, and coccidiosis, which increase the demand for and expenditures on vaccination and treatment⁶⁷. To unpredictable weather changes indigenous chicken farmers are also using innovations such as sawdust and solar lighting to warm their birds. In addition, they also rely on modern incubators to increase chick hatchability rates and are mostly rearing improved local chickens from the KALRO, which grow and mature faster.

2.5.2.2 The impact of the value chain operations in terms of competitive advantages and or weaknesses.

Competitive advantage

The shift from backyard to commercial poultry operations has dramatically increased the number of birds a farmer can manage. Factors contributing to shift and growth can be attributed to smallholder farmers absorbing innovations in technology i.e., small scale portable hatching and brooding equipment, institutions availing DOCs at competitive prices across the country, and increasing consumer markets. Introduction of improved indigenous chicken that are hardy and can be reared at an affordable cost when compared to the broilers and layers has also enhanced smallholder farmers competitiveness in the value chain.

Farmers in formal contractual relation with hatcheries specifically for broilers access day-old-chicks (DOCs), feed, veterinary services, and vaccines from the contractor, who also takes charge of the final marketing of the output either in wet markets or for further processing and distribution. Thus, these poultry growers benefit from considerable price assurance and risk mitigation.

Weaknesses

Previous studies alluded to the fact that most farmers do not observe the waiting period of selling poultry products after drugs administration. This implies that those who use excessive antibiotics for disease prevention and growth promotion and refrain from adhering to the withdrawal period before the produce is sold or consumed, may cause antibiotic resistance among consumers of these products.

Sale of poor-quality / adulterated low-quality poultry feed is rampant in the sector This is because of the rising number of animal feed companies in the country, some with doubtful operation licenses. Companies usually attract customers by initially selling good quality feed. However, once a substantial

⁶⁶ Fiorilla et al 2022. Poultry Biodiversity for Alternative Farming Systems Development. *The 2nd ICESAI 2021*

⁶⁷ Kenya County Climate Risk Profile: Kisumu County

market base has been established, feed quality deteriorates, leaving farmers at a risk of incurring losses because of delayed maturity in birds and low productivity.

Despite the existence of a regulation on transportation of livestock, most poultry farmers and traders transport live birds in public service vehicles without movement permits. Others use motorbikes and bicycles, which is prohibited. Previous studies⁶⁸ have also alluded to more than three quarters of the farmers including hotels and restaurants in the rural and pre-urban areas slaughter their chickens without inspection.

⁶⁸ Omondi SO (2022) Poultry Value Chain in Two Medium-Sized Cities in Kenya; Insights from Cluster Theory. *Front. Vet. Sci.* 9:601299. doi: 10.3389/fvets.2022.601299

3.0 Sustainability Assessment

3.1 Economic Analysis

3.1.1 Profitability - Gross Margin Analyses

The recent baseline study on poultry carried out in some of the counties in LREB region established households had average of about 30 and 90 indigenous and improved indigenous chicken respectively. The gross margin for improved indigenous chicken was at 34% compared to a -14% for indigenous chicken. The level of profitability is attributed to more diverse feeding regimes for improved indigenous chicken with a wide range of feeds and improved breed with a high feed conversion ratio (FCR). The loss making in indigenous chicken was attributed to frequent mortalities inefficiency due to the diseconomies of scale. The table 8 below compares profitability between indigenous and improved indigenous birds.

Table 8 Gross margins for indigenous and improved indigenous chicken

Region	Description	indigenous Average 30 birds	Improved indigenous Average 90 birds
North Rift (Includes Nandi, Trans Nzoia Counties)	NET SALES	16,950	130,674
	Cost of feeds	6,925	36,267
	Labour costs	5,700	17,008
	Poultry Treatment	1,288	3,091
	Additional costs	10,000	23,089
	Total Direct Costs	23,913	79,455
	Gross margin	-6,963	51,219
	GM (%)	-41%	39%
Nyanza (Includes Kisumu County)	NET SALES	16,154	139,931
	Cost of feeds	8,190	63,151
	Labour costs	4,167	17,141
	Poultry Treatment	1,312	2,284
	Additional costs	3,742	5,949
	Total Direct Costs	17,411	88,526
	Gross margin	-1,257	51,405
	GM (%)	-8%	37%
Total Averages for the region	NET SALES	16,172	138,018
	Cost of feeds	7,973	61,736
	Labour costs	4,550	17,073
	Poultry Treatment	1,311	2,394
	Additional costs	4,150	9,712
	Total Direct Costs	17,984	90,915
	Gross margin	-1,812	47,103
	GM (%)	-11%	34%

3.1.2 Employment (what is the current and potential direct and indirect job opportunities

Poultry farming has tremendous potential for expansion and subsequently employment generation. It provides employment to those who are engaged in the production of eggs and chicken meat, hatchery operators, feed dealers, building materials, egg cases and trucks, processors of eggs and poultry products and all dealers engaged in the marketing of eggs and poultry meat from the time they leave producer's premises until they are in hands of consumers.

Due to direct and enormous involvement of youth and women in poultry value chain activities, the value chain presents empowerment opportunities for the rural unemployed population⁶⁹; for instance, in Trans Nzoia County, around 90% of the population participates in the value chain⁷⁰, while in Kisumu County up to 80% of people involved in the value chain are women and youth.⁷¹ Activities along the value chain majorly managed by women and youth include on-farm production, transportation and slaughtering of poultry products.

Notable, in the rural parts of Nyanza and Western Kenya, women groups often start by investing in poultry enterprises and later diversify to other non-off farm enterprises thus creating more opportunities for employment⁷². Additionally, chicken is a suitable agricultural occupation that required minimal land, this favors women and youth who lack land tenure. It also presents opportunity for rural counties with high population densities such as Vihiga with a population density of 1,047 persons per square kilometer and thus limited opportunities for other farming activities ⁷³.

3.1.3 Value addition - current and potential opportunities

Value addition in poultry is driven by the need to offer more convenience to the customer. Besides slaughtering and selling the full birds, the emerging chicken value add especially for broilers include selling chicken parts including gizzards, drumsticks, necks, thighs, wings, and breasts. They are packed and sold as either fresh or frozen cut-ups. Marinated chicken parts have increasingly become popular. Most customers especially the chefs from restaurants like marinated chicken to serve their customers. Other value-added products include chicken sausages, burgers and boneless chicken which is popular among the middle class. In Kenya, Halal certified poultry and products are sold by Farmers Choice and Quality Meat Packers (QMP) Kenya.

However, there is limited value addition for chicken from small scale farmers nor is there much value addition done for indigenous and improved indigenous chicken. They are often slaughter and sold directly to the consumers, and restaurants where the chicken is cut into pieces and cooked (fried, boiled, roasted) depending on customers preference or the full chicken is packed in polythene and sold through supermarkets and butcheries. There are no certification standards in the indigenous chicken market⁷⁴. Besides the smallholders' products are characterized by poor packaging, lack / minimal branding, and product diversification as well limited market segmentation. With an increasing demand and consumption of poultry meat, the poultry industry presents investments opportunities for further value addition. though meeting food safety standards is a precondition for the further growth and development of the poultry meat sector to benefit the smallholders.

Other opportunities yet to be explored at a commercial scale in the country include packaging chicken by products such as feet and head and sell as pet food and drying chicken feathers. Which is a source of good fiber that can be used to make pillows and cushions.

⁶⁹ Guèye, E.F. (2002) "The Role of Family Poultry in Poverty Alleviation, Food Security, and the Promotion of Gender Equality in Rural Africa

⁷⁰ Kenya County Climate Risk Profile: Trans Nzoia County

⁷¹ Climate Risk Profile Kisumu County

⁷² Guèye, E.F. (2000a) The role of family poultry in poverty alleviation, food security and the promotion of gender equality in rural Africa. Outlook Agriculture journal

⁷³ The State of Kenya Population 2020.

⁷⁴ Kenya County Climate Risk Profile: Trans Nzoia County

3.1.4 Effects on national economy

In Kenya, poultry farming contributes to income, food security, and nutrition of many households, particularly in rural and peri-urban areas, and accounts for about 30% of the national agricultural GDP and about 7.8% of the total GDP⁷⁵. Based on the 2019 household census, 57 percent of the farming households in Kenya keep poultry⁷⁶. The sector plays a major role in improving the livelihoods of smallholder farmers and is attractive to most households, as it requires low start-up and maintenance capital. Poultry farming provides various opportunities to all members of the household particularly women, youth, and the elderly. Due to the fast-paced growth cycle, poultry can deliver quick income opportunities for households across diverse environmental landscapes. Moreover, chicken meat and eggs are an excellent source of nutritional benefits and can rapidly help improve daily diet⁷⁷. Poultry also provides non-marketed economic benefits, such as manure for use on-farm or organic fertilizer.

3.1.5 National competitiveness of poultry

Indigenous chicken production is largely done by the small-scale farmers and the private sector with government offering regulatory services. However, the current marketing system is faced by various challenges that hinder competitiveness in the value chain. Lack of reliable market information, inadequate product differentiation, seasonality of poultry products, fluctuations in prices, and poor infrastructure to support marketing of poultry products are among the challenges that make the enterprise less attractive. In addition, middlemen exploit poultry producers by offering low and fluctuating prices not based on defined product standards. The poor market prices result in poor market access by the producers. The overall poultry marketing is constrained by poor transport facilities, bio-safety issues, and lack of slaughter and storage facilities.

3.1.6 International competitiveness.

While large scale broiler and layers enterprises are venturing into exporting DOCs, the smallholder chicken producers have difficulties meeting high demands for food safety, traceability, and compliance, because of high production, coordination, transaction, and marketing costs⁷⁸. Minimizing these costs is a prerequisite for competitive positioning at the regional and international markets. Additionally smallholders' ability to maintain their competitiveness in these types of markets is dictated by their ability to establish market trust and reputation along the marketing and distribution channels. This has been barred by inconsistencies in production trends, quality, and volumes.

3.1.7 Value for end-consumers --contribution to nutritional and food security.

Poultry products are rich in protein and a good source of phosphorus and other minerals, including B-complex vitamins. It contains less fat than most cuts of beef and pork. Poultry meat is low in harmful trans fats, but high in beneficial monounsaturated fats⁷⁹. Eggs too are a good source of high biological-value protein and easily digestible⁸⁰. Eating more poultry meat and eggs can substantially benefit such people, especially pregnant women, children, and the elderly living in areas in low-income regions with inadequate diets. There is growing evidence that poultry meat can make a significant difference in fighting child malnutrition.

3.2 Social Analysis

3.2.1 Inclusiveness – income and employment distribution / vulnerability

Chickens in rural Kenyan households are primarily owned by women. Women spend more time engaged in daily activities around poultry production than men. Their ability to keep a given number of birds

⁷⁵ Kenya National Bureau of Statistics, 2014

⁷⁶ Government of Kenya, 2020

⁷⁷ Heifer International under the HHK, 2020

⁷⁸ Adriaan Vernooij, Mackenzie N. Masaki, Daphne Meijer-Willems, 2018. Regionalization in poultry development in Eastern Africa. Wageningen Livestock Research, Report 1121

⁷⁹ <https://www.fao.org/poultry-production-products/products-processing/poultry-in-human-nutrition/en/>

⁸⁰ Puglisi MJ, Fernandez ML. The Health Benefits of Egg Protein. *Nutrients*. 2022 Jul 15;14(14):2904.

depend on their financial ability, and this situation implies great flexibility in terms of production levels. Women are very highly engaged in on-farm production activities such as feeding and cleaning⁸¹. Youth and women are also very involved in the output market because rural market operations are commonly on small scale. On the other hand, men are primarily responsible for construction of sheds for chickens although children and women may help. Decisions regarding type of poultry raised and type of feed used are mainly made by women⁸². A limitation in women and youth involvement in the value chain is manifested in their limited likelihood to adopt the innovations that require capital investment and land ownership⁸³; (e.g., allocation of land to produce alternative feeds for poultry). This is potentially due to women and youth having limited access to resources such as land and finances.

3.2.2 Gender equality - level of women's economic involvement, decision-making and leadership.

Participation of women in the indigenous chicken value chain is predominantly in production. This involves sourcing of breeds, feeding, cleaning, sourcing of cash for daily enterprise needs, selling of chicken to small traders at farm gate, local markets, and aggregation of chicken for collective selling to traders. Women also participate in decision making on use of revenue from sale of chicken. Notably women involvement in trading activities is limited by time constraint, unfriendly transport means such as use of motorbikes and social constraints that limit people with whom women can interact with⁸⁴.

3.2.3 Food and nutrition security – Poultry value chain contribution

Majority of the Kenyan population resides in the rural areas which are characterized by low income, food insecurity and high levels of poverty. Indigenous chicken rearing plays a significant role in food and nutritional security of resource-poor households. Chicken meat and eggs provide a readily available, high-quality source of proteins, vitamins and micronutrients which are particularly essential for children, pregnant women, and nursing mothers. Eggs are some of the richest sources of nutrients needed for the growth and maintenance of the human body. They contain an abundance of proteins, fat, carbohydrates, and minerals. The protein fraction of egg is highly digestible and is of high quality, having a biological value of 94%, being the highest of any food. This is because egg protein contains all the essential amino acids required to maintain life and promote growth and health. As a result, egg's protein has become the standard against which other proteins are compared. Eggs also supply various vitamins (for example vitamins D3, B6 and B12) and can be stored for a long period under normal conditions. They are second only to fish liver oils as a natural source of vitamin D⁸⁵.

A household is considered food secure when it has access to food needed for a healthy life for all its members (adequate in terms of quality, quantity, safety, and cultural acceptability) and when it is not at risk of losing such access⁸⁶. Additionally, chicken provides a means to reduce food losses at the household, available leftovers not consumed by humans are utilized by birds and converted to high-quality and cheap animal protein. It has been shown that with only three mature hens, a household is nutritionally secure within one year⁸⁷. In times of droughts and related calamities, chicken eggs become a dependable source of animal protein. During important occasions (holidays, banquets, and ceremonies), IC are heavily consumed by households in both rural and urban areas⁸⁸.

⁸¹ Kenya County Climate Risk Profile: Vihiga County

⁸² Garsow, Ariel, et al. "A review of the roles of men, women, and youth in ensuring food safety in the smallholder poultry value chain in Kenya." *Frontiers in Sustainable Food Systems*: 603.

⁸³ Ochieng, J. (2012). Determinants of adoption of management interventions in indigenous chicken production in Kenya. *Afr. J. Agric. Resour. Econ.* 7, 39–50. doi: 10.22004/ag.econ.156977

⁸⁴ Kirim, Lilian, et al. *Improving Participation in Agricultural Commodity Markets: Assessing Growth Opportunities for Women in the Indigenous Chicken Value Chain in Bomet and Mwala Districts*. Tegemeo Institute, 2013.

⁸⁵ Melesse, A. (2014). Significance of scavenging chicken production in the rural community of Africa for enhanced food security. *World's Poultry Science Journal*, 70(3), 593-606.

⁸⁶ Sonaiya, E.B. (2007) Family poultry, food security and the impact of HPAL.

⁸⁷ Kaudia, T.J. and Kitanyi, A.J. (2002) Commercializing rearing of village chicken in Kenya, in: GUÉYE, E.F. (Ed)

⁸⁸ Magothe, T. M., et al. "Indigenous chicken production in Kenya: I. Current status." *World's Poultry Science Journal* 68.1 (2012): 119-132.

3.2.4 Decent employment - job safety and security, attractiveness

The poultry enterprises create employment at all the value chain nodes. At the production level, broiler and layer enterprises have the highest chances paying fair income and guaranteed secure form of employment and safe working conditions compared to the Improve / Indigenous chicken. In medium and large broiler enterprise, full time workers are employed to provide feeds, cleaning of waters and drinkers and other routine husbandry practices. Casual workers are brought in when there are major activities like offloading feeds, slaughtering, and cleaning the houses after a production cycle. Among the commercial producers of Improve / Indigenous Chicken, labour is not quite intensive and on average two casuals are engaged for 2 days in a week with a daily wage of Kshs 300⁸⁹. For the small-scale Improve / Indigenous Chicken producers, household members including male, female and children provide the needed labour for production and marketing of birds and eggs. Business opportunities are also created for youth who ferry feeds from agro vet stores to the farms and transportation of live chicken from the farms to markets. The traders often employ casual workers, mainly youths to perform certain tasks in the businesses. Most of these are however occasional casuals. Some of the tasks done are as shown in table 9 below.

Table 9 Tasks performed by casual workers in the live bird trade

Type of task	Casuals (one off)	Casuals (daily)
Visiting farms/other markets to buy supplies	0%	13%
Slaughtering	25%	13%
Feeding and watering	8%	13%
Delivery to customers	25%	25%
Receiving and making payments	8%	0%
Loading and offloading	17%	13%
Promotion/marketing	8%	13%
Counting stock	8%	13%

Source: FAO (2018) Sustainable Food Value Chain Assessment in Kiambu County Kenya

Meat traders employ people in the businesses most of whom are the youth employed daily to help source poultry from farms and other markets for, slaughtering and delivery to customers, promotions, loading and off-loading and counting stock.

⁸⁹ FAO (2018) Sustainable Food Value Chain Assessment in Kiambu County Kenya

3.3 Environmental Analysis (Ecological Footprint)

3.3.1 Climate change impact on the value chain

Extreme climate conditions mainly manifested through temperature and rainfall affect performance of various nodes of chicken value chain. Increase in temperature rises incidence of diseases such as Newcastle and infectious bursal disease (Gumboro disease) leading to declines in production and/or stock loss. The subsequent demand for vaccines and drugs to curb the diseases increases the cost of production. The effort of maintaining a healthy flock amidst increased temperatures calls for more feeding and water intake to achieve quality meat and eggs to avoid losses.

Uncertainty in the timing of rainfall onset and inadequate rainfall amounts affects growing season leading to feed scarcity, which in turn elevates prices of feed ingredients, this result in nutritional deficiencies, which could lead to heightened incidence of poultry disease, delayed weight gain and reduced egg productivity, low egg hatch rates and ineffective vaccination regimes caused by low vaccine availability. Regular chick-rearing supplies especially feeds are adversely affected. Breakage and spoilage of the eggs occur during transportation due to moisture stress. Farmers additionally incur losses due to depressed egg numbers delivered to markets. All these effects result to moderate-to-major impacts on the value chain⁹⁰.

In the low-lying plains of Nyando and the Kano plains in Kisumu County, heavy rainfall cause significant damages in the poultry farming. Flood incidences in the region lead to damage of poultry housing structures and storage facilities, bringing about fowl typhoid, and coccidiosis, which increase the demand for and expenditures on vaccination and treatment. Extreme rainfall in rural parts of Nyanza and North rift also worsen road conditions resulting to disrupted transport and marketing activities, access to support services such as extension and access to inputs which are procured long distance from the farms⁹¹.

Indigenous chicken farmers have employed several adaptive measures to cope with climatic variability. They use improved incubators such as solar incubators to boost hatchability rates. During chicken feed shortages, farmers allow their birds to scavenge through free-range management systems. Farmers also use local herbal concoctions to protect their birds against diseases when the efficacy of vaccines is compromised. They have bought coolers to transport vaccines and carry out vaccinations themselves. To minimize bird deaths and egg breakages during transport, they have also embraced the use of improved cages and crates. Farmers have further learned to formulate their own feeds to lower the costs of commercial feeds. In addition, they have formed and joined producer organizations to help them with services such as input acquisition, the bulking of birds, information, transportation, and marketing their birds and products. Collective action through producer organizations has helped farmers navigate climatic hazards.

The potential Climate hazards, impacts, and climate-resilient practices along the Poultry value chain have been presented in table 10 below.

⁹⁰ Kenya County Climate Risk Profile: Trans Nzoia County

⁹¹ Climate Risk Profile Kisumu County

Table 10 Climate hazards, impacts, and climate-resilient practices along the Poultry value chain

Value Chain Step	Climate Hazard	Climate Impacts	Implemented Practices	Adaptation Recommendations
Input supply	Heavy rainfall and floods	Increased demand and prices, and reduced access to agricultural input; damage to input storage infrastructure, feed spoilage	Climate-proofed local poultry houses (brick walls, iron sheets). Sun drying of feed	Train farmers on building climate-proofed poultry and input storage facilities using local resources (e.g., timber, stone). Diversification of feed
	Extreme heat	Reduced vigour of breeding poultry; increased prices and reduced access to agricultural inputs (feed sources, water requirements, vaccines due to storage constraints)	Climate-proofed local poultry houses (brick walls, iron sheets); vaccines storage in thermos flasks	Insulation of infrastructure through iron sheet to regulate temperature. Diversification of feed.
	Drought	Increased costs of inputs, feed shortages	procure water, apply water-harvesting techniques, purchase and/or store supplementary feed. use of local crop residue and food waste as feed	Diversification of feed and fodder crops, training on homemade feed and supplements
Production	Heavy rainfall	Decreased breeding activities; increased animal mortality and feed spoilage; increased pest and water-borne disease attacks (e.g., fowl typhoid); increased demand for extension services; contamination of chicken enclosures	Use local feeds (crop after harvest remains, kitchen waste); use of local resources to clean poultry water; vaccinating flock	Promote work hygiene and sanitation practices, disinfecting feeding/water equipment; increase access to early warning systems and agricultural advisory; build climate-proofed poultry houses
	Extreme heat	Decreased breeding activities; increased pest and disease attacks (mites) in poultry houses; malnutrition and weight loss; increased vaccination needs; need for larger spaces for poultry houses; increased flock mortality	Increased hygiene and sanitation practices in poultry houses; use of local feeds (kitchen waste); reduced flock movements; use of tanks for water harvesting use of thermostable vaccines	Increase production of poultry feeds (e.g., sunflowers, soybean, millet); promote insect feed supplements and synchronized hatching to facilitate farm operations
	Drought	increased risk of diseases (e.g., Newcastle), parasites (e.g., flies and mites). Decline in production (eggs and meat)	Use of homemade enclosures	improve access to hatcheries and chicken enclosure
Post-breeding	Heavy rainfall	Delays in collecting eggs and transporting products to collection facilities; lower quantity of eggs available; increased egg spoilage due	Use of wire cages and baskets to transport chicken; limit poultry transportation by applying household slaughter; destocking activities	Organize farmer cooperatives to render transport means more accessible and affordable; establish local collection

		to moisture and dirt; power shortages to cold storage facilities		points; increase access to cages and boxes for markets
	Extreme heat	Increased food spoilage, reduced egg and meat quantity and quality; increased storage and refrigeration, energy, and transportation costs	Use of egg trays and proper egg positioning; use of local materials (e.g., reeds) to increase ventilation during storage and transportation; use of ice cubes for storage.	Use of ventilated cages for transportation and storage to promote air circulation; improve communal storage to reduce transport costs and to standardize processing systems; train farmers on optimum temperatures for storage
	Drought	Lower grading of the eggs, reduced eggs' shelf-life, and quality	Poor handling and storage facilities	Value addition practices such as eggs grading, packaging, boiling, chicken de-feathering, boiling, salting, packaging.
Distribution, markets	Heavy rainfall	Limits to access markets due to impairment to roads and delayed delivery; increased costs and reduced prices set by farmers; increased transportation costs	Chicken sale in open air local markets; agreements on prices between farmers and cooperatives	Build/repair infrastructure and roads; promote innovative marketing channels (e.g., e-platforms, supermarkets; tourist hotels, schools); create farmer associations for collective farmer negotiations
	Extreme heat	Increased final products' prices, reduced demand for poultry	Use local marketing channels and connections with farmer cooperatives to sell products; promote value adding activities (e.g., chicken roasting)	Promote electronic marketing, contracted marketing, promote value adding activities such as sale of differentiated chicken parts
	Drought	poorer product quantity and quality, lower trade, increasing prices	Receive market information from the marketing department within the agribusiness and the media; local product sale	facilitate collective marketing, contract farming, improve market information systems linked to climate information

Source: CRLCSA Climate Impact Potential Assessment (2022)

3.3.2 Water footprint - volume of water consumed & water-saving efforts

Water consumed

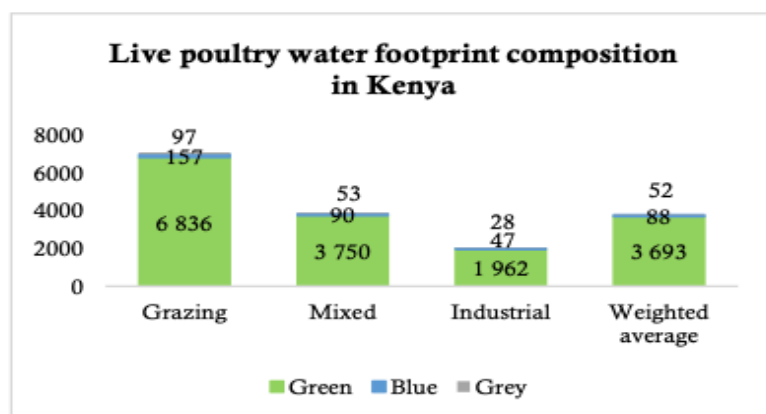
The environmental impact of poultry production depends on farm size, production systems, diet composition of birds, type of infrastructure and bio-security levels. From the farm to the consumers table, water is required throughout the various steps of chicken production. There are several ways that water is used throughout the chicken production process.

- To water crops (namely corn and soybeans) for chicken feed
- For the chickens to drink on the farm
- To cool the birds via evaporative cooling cells during warmer temperatures
- To clean and sanitize equipment at the processing plant

The average water footprint in poultry system is 3,693 m³ per ton of live birds. Free range systems have the highest water footprint (about 7,000 m³ per ton) while industrial or intensive systems have the lowest one (about 2 000 m³ per ton). This consists of direct consumption via drinking and service water as well as indirect consumption through the water used for feed production.

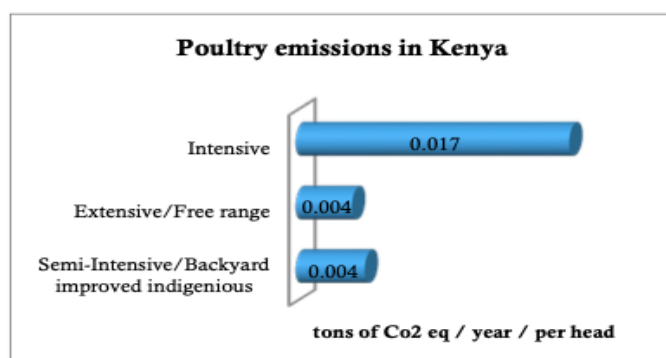
The poultry sector in Kenya uses mainly green water, which represents rainwater and accounts for most of the consumption. Figure 8 presents as well blue and grey water pollution. Grey water accounts the water pollution. Water pollution might be due (e.g.) to faecal contamination of water. Poultry production also contributes to greenhouse gas emissions. Emissions in intensive systems are higher on a per animal basis (Fig. 9).

Figure 8 Live poultry water footprint (green, blue, and grey)



Source: Mekonnen and Hoekstra, 2010

Figure 9 Total GHG emissions per head in CO₂ equivalent



Source: GLEAM

Because poultry have lower greenhouse gas emissions due to their lower enteric methane production rates than ruminant livestock species, many consider poultry to have an environmental advantage compared to many other animal protein sources.

Water-saving efforts

In intensive poultry farming systems where broiler chickens live and grow, are equipped with computer systems that measure and monitor water usage on the farm. Farmers diligently watch for any abnormal water use patterns to help identify any problems such as water leaks, which saves water. In most modern chicken farms use “nipple” watering systems is used as a water-saving tool. Nipple watering systems are pin activated water dispensers; when the birds press the pin, water is released. This helps limit any water being spilled on the poultry litter, or floor, and it only dispenses water when the birds want to drink. Intensive poultry farming systems are also equipped with cooling systems that consist of cool cell pads, which evaporate water, at one end of the house and large tunnel exhaust fans at the other end. This not only keeps the chickens cool, but also recycles water on the farm.

3.3.3 Poultry VC operations effect or support biodiversity and ecosystems

The prominent system for indigenous production involves keeping of local chicken varieties. This promotes conservation of native breeds which is an important component of poultry biodiversity. The production system is characterized by free range and organic feeding which has less chances of causing deforestation, greenhouse gasses emissions, and pollution of land and water. Moreover, the local breeds are adapted to less controlled environment, have high foraging aptitude, have active immune response, and more thermotolerant⁹².

Improvement of the local birds involves crossbreeding between high-performance strains and the local birds, with the aim of combining the production capacity of the former with the latter adaptability to natural environment, this improves fitness characteristics and adaptability⁹³. Breed improvement results to shorter production cycle and strong genetic selection thus increase production performance. This represents an advantage in improved resource utilization, improved genetic variability and reduced vulnerability of birds to environmental stress.

3.3.4 Toxicity/ pollution - VC operations contribution / address environmental pollution

Chickens produce lower carbon dioxide, methane, and nitrous oxide emissions, one bird in intensive system emits 17 kg of CO₂ eq. per year versus while under extensive system, emission is estimated at 4 kg for a bird. In extensive systems, manure management contributes most to GHG emissions⁹⁴. Chicken value chain is a less significant driver of human invasion into natural habitat or of overgrazing, have lower impacts on the water cycle, and cause less destruction of natural habitats. Poultry's major impacts on land degradation result from the production of their grain-intensive feed. Chicken production also poses a threat to avian biodiversity, as chickens are susceptible to viruses and act as vectors of disease transmission to avian wildlife. Chicken manure is widely viewed as a valuable fertilizer in developing countries, although transportation costs limit manure sales in local markets and the high nitrogen-phosphorous ratio can impact certain soils and water⁹⁵.

Efficient poultry farm management in terms of safe handling of dead birds and farm waste are necessary to prevent environmental hazards including water contamination, among others. During disease outbreaks, it becomes critical to ensure safe disposal of dead and infected birds without which the environment can be adversely affected.

⁹² Fiorilla, Edoardo, et al. "Poultry biodiversity for alternative farming systems development, 2022.

⁹³ FAO, “The Second Reports of the State of the World’s Animal Genetic Resources for Food and Agriculture” (2015)

⁹⁴ Africa Sustainable Livestock 2050

⁹⁵ Anderson, L., Reynolds, T., & Lipson, J. (2019). Environmental Implications of Livestock Series: Chickens. *Gates Open Res*, 3(1316), 1316.

3.4 SWOT Analysis

Strengths to build on

- Availability of production technologies relevant to small holder producers e.g., Breeds that are fast growing and adaptive to local conditions.
- Diverse poultry production systems and breeds, which gives chances to respond to market demands
- Connectivity, through the port of Mombasa to international market for feed ingredients that are not locally produced
- Presence of development agencies that support the value chain in all the nodes e.g., NARIGP, ASDSP and other donor funded projects

The weaknesses to shore up

- Shortage of ingredients for poultry feed, making the sector less competitive in comparison to neighboring countries with sufficient grain.
- Limited opportunities for value addition due to an overall preference for selling chicken meat rather than by-products.
- Farmers' exploitation by middlemen because of limited market opportunities for farmers.
- Inadequate qualified/specialized poultry veterinarians and knowledge support.
- Extension services lack knowledge of key risks to agriculture, such as climate change, which exacerbates the lack of support to farmers in accessing risk-based financial schemes.
- Weak supply and uptake of basic vaccination practices.
- Poorly developed market system leading to over and undersupply and price fluctuations.

The opportunities the value chain should capitalize on

- Cooperatives can substantially support farmers with accessing climate and market-based information to set appropriate prices, increase their empowerment at the market and selling stages, and accessing credit and agricultural insurance.
- Build capacity of the human resource in the veterinary field, both public and private to be sensitive on impacts of climate on the value chain and respective adaptive and mitigation strategies.
- Diversification of sources of feeds feed i.e., hydroponic, black soldier fly amongst others
- Enhance the market opportunities for indigenous poultry products by promoting information on consumption which is healthier due to higher nutritional qualities than the commercial options, as well as profitability due to lower inputs and their adaptability to effective climate.
- Develop and strengthen sector-based business development services along the value chain.

The threats the value chain needs to recognize, mitigate, and avoid

- Feedstuff contaminated by mycotoxins especially during rainy seasons when fish used in feed is difficult to dry
- Poultry diseases are not sufficiently under control posing risk of disease outbreaks of e.g., NCD
- Rapidly growing and more competitive poultry industry in neighbouring countries.
- Shortage of grain and increasing competition of poultry with human nutrition
- Dumping of poultry meat and/or eggs from regional markets.

4 Recommendations

4.1 The key recommendation for programmatic value chain improvement

Enhanced access to chicken feeds

Feeds is the highest determinant of chicken enterprise competitiveness. The high cost of commercial feeds coupled with inadequate quality control of both raw materials and compounded feeds adversely affects the production cost and ultimately profits from the enterprise. High costs of feeds are attributed to inadequate supply and high cost of feed ingredients. In this regard, farmers should be encouraged and facilitated to grow alternative sources of energy and protein for the poultry industry to meet local demand. In addition, opening opportunity for competitive sourcing of imported raw materials while at the same time putting in place regulatory measures to control adulteration of raw materials and compounded feeds. Stakeholders should facilitate the development of cost-effective and suitable formulation of feeds for improved indigenous chicken using alternative local resources.

Food safety

Meeting food safety standards is a precondition for the further growth and development of the poultry meat sector. Currently, most farmers / traders slaughter the birds for the market in their backyard which is not recommended. Strengthening poultry producer associations to establish slaughter slabs with basic facilities in peri urban areas would address this challenge. The larger farms should eventually create their own cold rooms from which they supply the markets.

Value addition and marketing

Government, stakeholders, and development agencies ought to facilitate development of market infrastructure, address the cost of poultry value addition equipment and technology and promote processing to enhance safety regulation mechanisms for high quality poultry products. Value added products ensure steady supply because they can be kept in cold storage hence avoiding seasonality of supply.

Group marketing through cooperatives (bulking centers) should be a focus in improving marketing of chicken from smallholder farmers. This will not only give the farmers bargaining power but also reduces the marketing costs for the assemblers. These groups can also serve as avenues for value addition and sharing information on improved production methods. They would play an active role in sharing and exchanging critical backward and forward linkage information in collaboration with the various value chain actors. Producer/marketing groups also provide an opportunity for gender mainstreaming in value chain as women and youth groups could be targeted.

Enhance access to quality veterinarian drugs and services

Quality control measures in the poultry value chain have declined due to weak enforcement of regulations. There is need for enforced vigilance in importation, production, distribution, and utilization of these products. An efficient cold chain system and alternative vaccines e.g., thermo-stable vaccines are required to ensure good quality and effective vaccine delivery system. Collaboration of relevant stakeholders will be needed to address capacity needs, such as training (including use of indigenous knowledge), equipment, financing among others, of all service providers.

Access to information and training

There is need to create stronger linkages between the private and public sector institutions to harmonize, what information package is delivered to farmers and other value chain players. On many occasions data and statistics of poultry in the country is based on estimates. In this regard, partners need to collaborate to put in place regular data and information collection and management system. Further, there is a need for a framework to facilitate exchange of data and information between stakeholders. Farmer training programs need to aim at increasing awareness on biosecurity and good farm management practices.

Capacity development on improved production process

Farmers need to be trained on improved poultry production methods such as affordable proper housing, provision of medications and homemade ratio supplementary feeding. This will enable them to operate the enterprises profitably.

Infrastructure development

Most markets do not have specialized places for keeping live chickens until they are sold. They are normally kept in crowded cages under the sun with little food leading to stress, weight loss and consequently deaths. Provision of a live poultry sections within market structures where chickens could be received, tagged, treated for disease while awaiting purchase would reduce losses due to deaths in storage.

Policy

Agricultural policies in have been biased towards crops production and large livestock such as cattle leading to neglect of small livestock like chickens. Consequently, extension and resource allocation has also been biased towards crops and large livestock. Lobby for advancing the Poultry Act 2012 will ensure inclusion of the sector on the national agenda and subsequently considerable allocation of resources towards research in poultry breed development, improved production systems as well as marketing systems will be availed to boost performance of the sector.

4.2 The key recommendation for value chain development actors.

Breeders and hatcheries

There is need to promote breed improvement as a strategy for adaptability of poultry production systems. This will prevent production losses that come with inappropriate on-farm flock multiplication practices. They should promote models for hatching chicks and distributing at scale to sustain a market-oriented poultry enterprise. Models such as serialized hatching, synchronized hatching as well as use of incubators for multiplication at the Producer Organization level should be promoted.

Agro-dealers

To achieve efficient provision of products and services, agro-dealers must engage with the Department of Veterinary Services, Kenya Veterinary Vaccines Production Institute (KEVEVAPI) and other relevant government agencies to improve disease surveillance and reporting, access quality vaccines, promote appropriate vaccine handling, storage and administration and implement rigorous vaccination calendars for the endemic diseases to ensure effective disease prevention and control. There is need to incorporate education program to train farmers on the need to use qualified animal health service providers instead of self-administration of drugs.

Feed manufactures

Small and medium manufactures need to partner with KALRO to undertake feed formulation trials and testing for different additives. This will foster quality standards and impact value chain productivity.

Producer and marketing cooperatives

Setting up and or building the capacity of existing poultry producer cooperatives is essential in sustaining the growth of smallholder poultry farmers and competitiveness of the sector. The cooperatives where successful as in Kiambu county have been involved in setting up a feed mill ensuring they get quality feed reducing the cost of production substantially. The farmers also collectively source for inputs and access markets thus benefit from economies of scale. Cooperatives with basic equipment can also ensure food safety and hygiene of poultry and poultry products that go to the mass market.

Annex

Annex 1. Scale millers SMEs of Poultry feed located in the Nyanza, Western and North Rift region

i)	Happy Feeds Busia Rd, Kisumu 0740 709949
ii)	Pembe Mills 0726 341526 Kanu Market, Off Gumbi Road, Kisumu
iii)	Rusinga-Animal Feeds Millers Migosi Lake Basin, Kenya Re, Kibos Rd, Kisumu
iv)	Unifeeds Next To Lacheke Kisumu, Kisumu - Kamas, Obote Rd, Kisumu
v)	Kitale Best Animal Feeds Kitale Trans Nzoia 0718531836
vi)	Nyanza Ahadi Feeds P O Box 1460 Nakuru.
vii)	Nyanza Chirry Gunia & Animal Feeds Eldoret
viii)	Nyanza Connect Feeds Suppliers Nakuru 0705689568
ix)	Nyanza Interfarm Agro-Supplies Eldoret 0711589033
x)	Nyanza Kayfa General Stores Nakuru P O Box 655-20100 0721448881Nakuru. fkatingah@yahoo.com
xi)	Nyanza Keys Feeds Ltd P O Box 15064 Nakuru 020 2312544
xii)	United Millers Kisumu Obote Road Kisumu
xiii)	Nyanza Real Agrifeeds Eldoret 0722996388
xiv)	Nyanza Rift Valley Products Ltd Nakuru P O Box 1023-20100. Nakuru hiren@rvpcotton.com 0719333284
xv)	Nyanza Ronz Agro Feeds Eldoret 0706710939

Annex 2. County Agro-dealer association contacts

County	Name	Position in Association	Name of Shop	Email
Bungoma	Mr. Boniface Wekesa	Chairman	Nakewa Enterprises	nakewaenterprises@yahoo.com
	Dr. Sheikh Amin	Treasurer	Bungoma Chemist	bgchem@msn. com
Kakamega	Mr. Habakkuk Khaamala	Chairman	Shibuli Agrovet	hkhaamala@yahoo.co.uk
	Mr. Pius Namungu Wamalwa	Secretary	Kongoni Farmcare Agrovet	pnamungu@gmail. com
Kisumu	Mrs. Beatrice Okello	N/A	Tiva Agrovet	Bettyokello073@yahoo.c om
	Mr. Micah Abura	N/A	Ranalo Agrovet	ranaloenterprises@gmail.com
Vihiga	Mr. Alex Adala	Chairman	Magada Farm Inputs	alexadala@yahoo.com
	Dr. Isaac Livumbazi	Member	Serem Agrovet	Isaac_livumbazi@yahoo.com
Siaya	Mr. Julius Okoth	Member	Avepo Agrovet	Juliusokoth2010@yahoo. com
	Mr. Zachary Okongo	Chairman	Siaya Agrovet	zachokongo@gmail.com
Busia	Mr. Anthony Wahome	Chairman	Busia Agrovet	Busia.agrovet@yahoo.co m
	Mr. Geoffrey Nyongesa	V/Chairman	Butula Ebenezer	gnyongesa@gmail.com
Homabay	Mr. Stephen Muga	Member	Farmers Agrovet	mugastephen@gmail.com
Kisii	Mrs. Norah Mageto	N/A	Stans Agrovet	Noramoraa444@gmail. com
	Dr. Enoch Monda	N/A	Enochem Agrovet	enochemagrovet@gmail.com

Source: Kenya Market Trust (2018): *Feed the Future Kenya Crops and Dairy Markets systems* -Technical Report: Agro-Dealer Associations Development in Priority Counties