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2050

*Livestock production systems spotlight*

# KENYA

Cattle and  
poultry sectors



Republic of Kenya



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# **Livestock production systems spotlight**

## **Cattle and poultry sectors in Kenya**

### **1. Introduction**

Policies and investments in the livestock sector are effective when they take into account the multiple dimensions of livestock farming. These dimensions include monetary and non-monetary benefits for producers and other actors along the value chain, such as income, food, draft power and insurance. They also include public health and environmental dimensions, such as the availability of protein for good nutrition and health, the use of dung for fertilizing soil, or the negative impacts of zoonotic diseases on public health and the environmental consequences of overgrazing.

A multi-stakeholder multi-disciplinary approach is a precondition for designing and formulating effective livestock policies and investments, which consider and manage the trade-offs inherent in the multiple dimensions of the sector. When stakeholders, looking at the livestock sector from different perspectives, share a common understanding of livestock production systems – agreeing on common descriptions of the production systems and sub-systems – they can arrive at constructive conclusions about the pros and cons of alternative policy actions and investments.

This document presents a snapshot of the cattle (beef and dairy) and poultry (meat) production systems in Kenya as agreed by key national stakeholders affected by the livestock sector, notably the Ministry of Agriculture, Livestock and Fisheries, the Ministry of Environment and Natural Resources, the Ministry of Health and Kenya National Bureau of Statistics. It is the first time these stakeholders have ever embarked in a multi-disciplinary process to jointly define cattle (beef and dairy) and poultry (meat) production systems. This process involved a three-step approach:

- Based on their knowledge and expertise, the stakeholders agreed on a narrative description of the different livestock production systems.
- They validated and improved cattle (beef and dairy) and poultry (meat) distribution maps of the FAO Gridded Livestock of the World (GLW) and identified, for each administrative unit, the relative proportions of the different production systems (e.g. 60 percent extensive and 40 percent semi-intensive).
- Stakeholders have assembled datasets, policy documents, and published and unpublished literature on cattle (beef and dairy) and poultry (meat) production systems and generated statistics for each production system. Geographic variables have allowed “adding-up” information from different sources.

This approach has three strengths:

- It is stakeholder driven – stakeholders ex-ante define the different livestock production systems.
- It allows “adding-up” scattered information by using geographical locations as the common denominator.
- Its outputs can easily be visualized through combining maps and bar charts.

### **2. Why cattle (beef and dairy) and poultry (meat) production systems?**

As part of the implementation of Africa Sustainable Livestock 2050<sup>1</sup> (ASL2050), the Ministers responsible for livestock, health and environment have engaged stakeholders to assess the current and long-term impact of livestock production systems on the economy and people’s livelihoods, on public health, and on the environment. To start with, they have agreed to focus on two livestock sectors. Cattle (beef and dairy) and poultry (meat) were selected because of their relevance for the national

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<sup>1</sup> <http://www.fao.org/ag/againfo/programmes/en/ASL2050.html>

economy and people's livelihoods, their status as a priority in the current policy framework, and their anticipated growth in the coming decades.

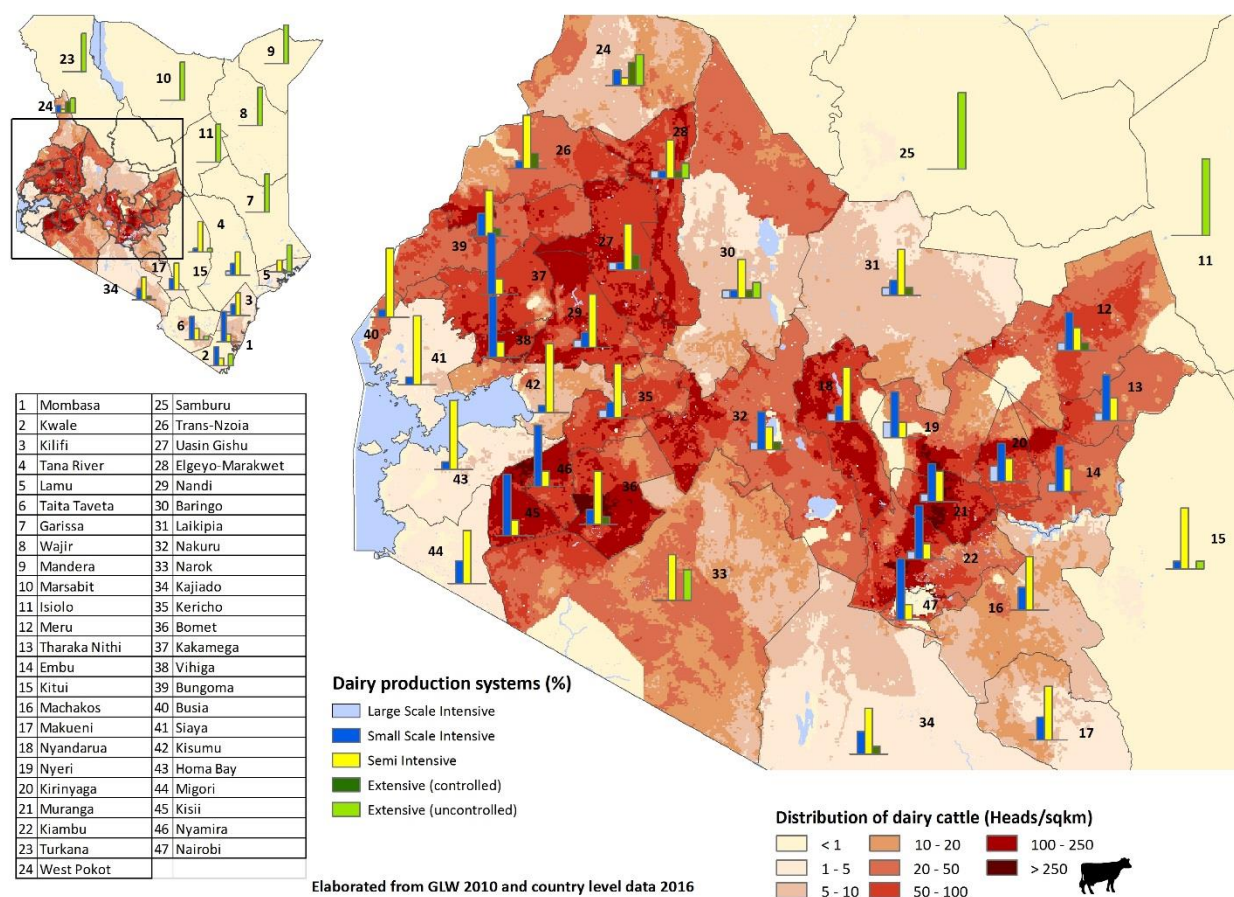
### 3. Dairy cattle

Dairy cattle production in Kenya is the second largest contributor to the agricultural GDP (Kosgey *et al.*, 2011). Livestock production as a whole contributes about 13.4 percent (USD 3.1 billion) to agricultural value added (cattle being the most important contributor) (KNBS, 2017). The country produced over 4.48 billion litres of milk in 2014 valued at KES 243 billion, of which 76 percent is from cows and the rest from camels and dairy goats (FAO, 2017). Per capita consumption is approximately 117 litres of milk per year – one of the highest in Africa (SDP, 2004). The dairy sector is a major source of employment in rural areas (Staal *et al.*, 2001) with small scale farms being pervasive and producing about 80 percent of the total milk in the country (GOK, 2017; KDMP, 2010). Livestock stakeholders have identified three dairy production systems in Kenya; intensive, semi intensive and extensive systems. With intensive and semi-intensive comprising about 85 percent of all dairy farms (Table 1).

**Table 1. Dairy production systems and their proportions (experts' and stakeholders' knowledge)**

Dairy production system	Intensive		Semi-intensive	Extensive	
	Large scale	Small scale	(Semi-grazing)	Controlled dairy production systems	Uncontrolled dairy production systems
Proportion of farms (%)	5%	35%	45%	10%	5%

**Map 2. Relative proportion of dairy cattle in the different production systems (experts' and stakeholders' knowledge)**



### 3.1 Intensive (zero grazing)

Intensive dairy systems involve confinement of animals, a high level of management and optimum feed resource planning. The scale of operations ranges from small scale (1–20 cows) to large scale (more than 20 cows).

- Although the number of intensive dairy farms is not known, the system is dominated by small scale dairy farms estimated to make up 40 percent of dairy production. It is predominant in Mount Kenya and central Rift Valley regions, where crop production is also practiced. It is also common in many urban and peri-urban centers in humid and sub-humid areas of the country.
- Small scale farms keep 1–15 animals: the average herd size is 1–3 animals in rural areas and 7–8 dairy animals in urban and peri-urban areas (Staal *et al.*, 2001; SNV, 2015; Njarui *et al.*, 2010; Lanyasunya *et al.* 2006). There are few large farms with herd sizes of more than 20 animals. Main breeds are exotic high grade dairy (Friesian, Ayrshires, Fleckvieh, Guernsey and Jersey).
- Farmers tend to use high quality feed, either purchased or grown on their farm, to maximize production. Animal health practices are strictly observed including regular tick and internal parasite control. Vaccinations against diseases such as East Coast fever (ECF) (28.1 percent), blackquarter (17.5 percent), foot and mouth disease (FMD) (7.5 percent), lumpy skin disease (6.2 percent), Rift Valley fever (RVF) (5.5 percent) and anthrax (4.8 percent) have been reported in small scale systems [11]. Other significant diseases in the system include mastitis (prevalence rate between 30 and 45 percent) and brucellosis (prevalence is about 24 percent in some small-holder farms) (Ogola, Shitandi and Nanua, 2007; Njuguna *et al.*, 2017).
- Basic housing or simple shelter is provided.
- Milk yield per cow per day ranges between 15 and 30 litres (SNV, 2015; Lanyasunya *et al.*, 2006).
- Milk is primarily produced for market. In small scale farms a small proportion is used for home consumption. Small farmers mainly sell to cooperatives (Staal *et al.*, 2001) and middle men; large scale farmers sell their milk mainly to processors and large cooperatives (KDMP, 2010).

Driven by the foreseen increase in demand for milk and other dairy products, intensive dairy has great potential for expansion, especially in urban and peri-urban areas. However, it is constrained by poor and highly priced feed and inadequate veterinary services to tackle the major diseases common in this system. Urban laws tend to limit livestock keeping, which means urban farmers often work informally, with few possibilities for intensification and expansion. In addition, small scale farmers are typically prevented from engaging in upstream chain functions by their financial and infrastructural capabilities.

### 3.2 Semi-intensive (semi-grazing)

This is the predominant dairy system. Animals are partly confined and allowed to graze freely or under paddocking and enclosed in the evening, when feed supplementation is provided. The dairy cattle are often raised together with other animals such as chicken, sheep, goats, donkeys and, occasionally, pigs (Staal *et al.*, 2001).

- Stakeholders estimate that 45 percent of dairy farms practice semi-intensive dairy farming, predominant in Mount Kenya, central and north Rift Valley and coastal regions, and other areas where crop farming is practiced, such as western and Nyanza regions.
- Farmers keep fairly small herds (1-20 animals) mainly crosses and exotics breeds (42 percent Friesian, 25 percent *Bos indicus* (Zebu, Sahiwal and Boran), 18 percent Ayrshire, 12 percent Guernsey, and 3 percent Jersey) (Staal *et al.*, 2001). Artificial insemination (AI) is not accessible to all farmers, so more than 70 percent of farms use natural mating, resulting in limited productivity (Staal *et al.*, 2001).
- Feeding practices vary across the regions including use of natural grass, improved pasture and post-harvest grazing. The main diseases are East Coast fever (47 percent of dairy farms),

anaplasmosis (16 percent), mastitis (7 percent), worm loads (7 percent) and respiratory problems (7 percent) (Staal *et al.*, 2001). There is minimal provision for animal health practices compared to intensive systems. The main water source is rivers, often forcing the animals to walk long distances to get water. Simple structures for milking and feeding are provided.

- Production is relatively low in this system, averaging less than 6 litres of milk per cow per day. Productivity in crop–livestock systems stays around 5.9 litres per cow per day for exotic breeds and 2 litres for indigenous cattle (Staal *et al.*, 2001).
- The milk produced is largely consumed at home, with about 40 percent of farmers not marketing any milk [4]. The surplus milk is sold in raw, liquid form through informal channels, with 40 percent of farms selling to their neighbors.

The semi-intensive/semi-grazing system, while pervasive, is strongly constrained by seasonal variation in pasture and water availability. Additionally, limited access to AI services constrains breed improvement and productivity. Removing these constraints would certainly increase production and productivity.

### 3.3 Extensive

This is a pasture based production system dominated by exotic breeds and crosses of indigenous breeds. It is practiced in areas with large farms (controlled grazing) and in marginal and communal grazing lands (uncontrolled grazing), where few animals are kept.

- While robust statistics on the relevance of this system are not available, there is an agreement that it comprises a very low number of farms keeping a considerable proportion of the dairy cows e.g. 3 percent of farms keep 35 percent of the dairy cattle population (Omoro *et al.*, 1999). It is predominant in North and South Rift Valley, eastern and coast regions.
- Farmers keep large herds from a minimum of 10 (uncontrolled grazing) to over 50 animals (controlled grazing).
- Under controlled grazing, animals are placed on natural and improved pastures using paddocks or strip grazing and supplemented with high quality fodder, mineral licks and commercial concentrates. Uncontrolled grazing is characterized by free grazing and limited supplementation. Vaccination and parasite control is practised more in controlled grazing than in uncontrolled grazing. Major causes of death in this system are tick-borne diseases (ECF and anaplasmosis) (Staal *et al.*, 2001) with parasitic disease mortality rates up to 25 percent (Kahi, Wasike and Rewe, 2006). The prevalence of contagious bovine pleuropneumonia (CBPP) tends to be higher in this system (Tambi *et al.*, 2006). Uncontrolled use of acaricides and dewormers increases the possibility of drug resistance occurring. Farm infrastructure, such as hay barns, dips, water troughs and crushes, are generally available in controlled grazing systems.
- Milk production is relatively low compared to the intensive system, ranging between 4 and 11 litres of milk per cow per day (Lanyasunya *et al.*, 2006).

While comprising a large share of the total dairy animals, the extensive system is constrained by seasonality in feed availability following rainfall. Uncontrolled grazing faces the challenge of dwindling communal grazing fields as a result of increasing human settlement and development. Dairy products from this system are perceived as high quality (organic, low use of antimicrobials) and are often sold in niche and high quality markets.

## 4. Beef cattle

The beef industry is the largest contributor to agricultural GDP in Kenya, at around 35 percent (Kosgey *et al.*, 2011; Otieno, Hubbard and Ruto, 2012). It is an important contributor to the Kenyan economy in terms of value and employment (Alarcon *et al.*, 2017), especially in the arid and semi-arid lands (ASALs), where beef production from pasture is the main economic activity (Kahi, Wasike and Rewe, 2006; Kinyamario and Ekeya, 2001). The production subsystems for beef cattle in Kenya are classified

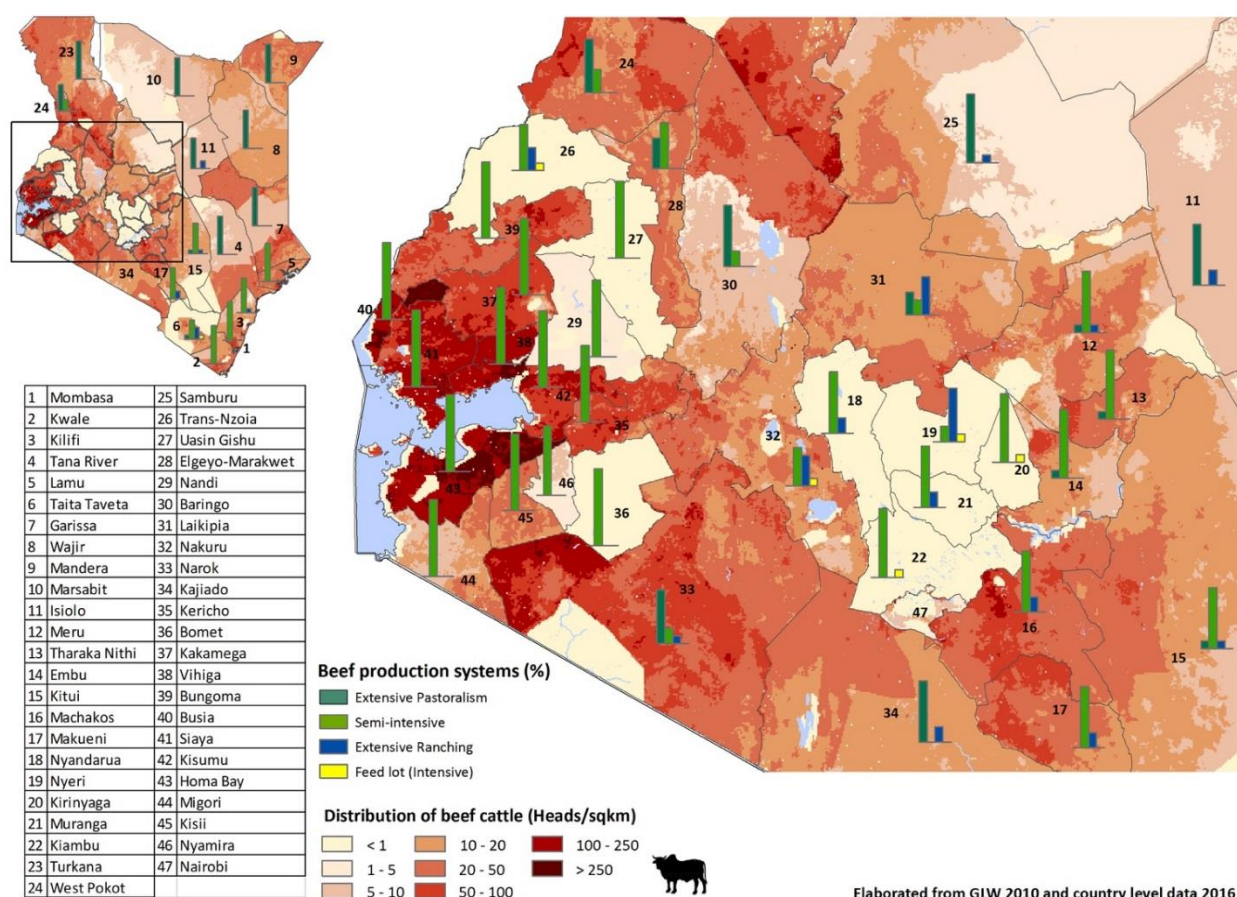


as extensive grazing system (both pastoralism and ranching), semi-intensive grazing system (agro pastoralism) and intensive (feed lot) (Table 2).

**Table 2. Beef production systems and their proportions (experts' and stakeholders' knowledge)**

Beef Cattle Production Systems	Extensive pastoralism	Extensive ranching	Semi-intensive	Feed lot (intensive)
Proportion of farms (%)	34%	11%	54%	1%

**Map 2. Relative proportion of beef cattle in the different production systems (experts' and stakeholders' knowledge)**



#### 4.1 Pastoralism (extensive system)

Pastoralism is a subsistence system, based on low input and low output as animals rely entirely on open grazing for their maintenance and productivity. Transhumance and nomadism are practiced (Kahi, Wasike and Rewe, 2006; Ouda *et al.*, 2001). This system has the lowest livestock densities of 11 TLU/km<sup>2</sup> (tropical livestock units). Indigenous beef cattle breeds dominate and are kept in mixed herds with other animals (Kahi, Wasike and Rewe, 2006).

- 70 percent of the national livestock herd is held in ASAL areas (GoK, 2012; Ouda *et al.*, 2001), where pastoralism is mostly practiced on communal grazing lands.
- The average cattle herd size for nomads is around 50, but herds are combined for purposes of security, pasture management and labour management. Almost 70 percent of farmers keep mainly indigenous cattle breeds (Otieno, Hubbard and Ruto, 2012). The most common breed is

African Zebu, other common breeds include Boran and Sahiwal (Kosgey *et al.*, 2011; Kahi, Wasike and Rewe, 2006).

- Feeding is based on grazing on natural pastures. The feeding regime is poor and affected by seasonality. Animals are moved in search of pasture and water, which often leads to conflicts over grazing rights and water resources (Otieno, Hubbard and Ruto, 2012). In general, vaccination coverage is low due to the nature of pastoralism and climatic and infrastructural conditions: for example RVF vaccination coverage during the 2007/08 outbreak was 11 percent (Kimani *et al.*, 2016). Brucellosis is found to be higher in pastoralism systems, with a prevalence around 15 percent and higher (Kadohira *et al.*, 1997).
- Average beef production is estimated at 408 000 tonnes annually, of which 70 percent is from the Zebu cattle in arid and semi-arid lands (ASALs) (GOK 2017). Yield per animal averages 125 kg/head (Behnke and Muthami, 2011).
- The meat produced is sold to consumers in urban markets, satisfying the bulk of domestic demand (Kahi, Wasike and Rewe, 2006). The main marketing channel is live animal markets (primary and secondary markets)<sup>2</sup>, dominated by middlemen and traders. Nearly three quarters of pastoralists do not have prior access to market information (Otieno, Hubbard and Ruto, 2012).

This system contributes to both the maintenance and destruction of fragile ecosystems, both through the provision of manure, the maintenance of arid areas, and through environmental degradation by over stocking, for example. The transhumance nature of the pastoralism predisposes communities to conflicts for land grazing rights and water resources. Acquisition of land along the migratory routes further complicates the conflict. There is indiscriminate use of drugs and antibiotics leading to some drug resistance. The common practice of unhygienic handling and consumption of products is a threat to human health. Some customary practice in handling of sick and dead animals might also pose health risks (Mutua *et al.*, 2017). Addressing these challenges, for example by supporting producer associations, will maximise the potential positive contribution of pastoralism to Kenyan society.

#### 4.2 Ranching (Extensive)

This system is highly commercial and targets prime local niche and export markets. Ranching, though not a major production system in Kenya, contributes the most to beef exports. Ranches are made up of large land areas and have large herd sizes, with the breeds varying from exotic to crosses and Zebu. Some also contribute to wildlife conservancy. It is fairly labour intensive, using unskilled and specialized professional labour. Most ranches have infrastructure for disease control, feeding and water storage.

- The number of operational ranches is below 100 (Government of Laikipia County, 2012; Government of Taita Taveta County, 2012). The majority are privately owned. Ranching is predominant in Laikipia and Taita Taveta counties, with a few government farms spread across the sub humid and semi-arid zones of Kenya.
- The average herd size is 150 beef animals. Main breeds include improved Boran and exotic (Hereford, Simmental, Charolaise and Angus) (Otieno, Hubbard and Ruto, 2012; Kahi, Wasike and Rewe, 2006; Kosgey *et al.*, 2011).
- The major feed input is natural or cultivated pasture with some supplemented feed. Disease control encompasses regular deworming, dipping and treatment of sick animals. Most ranches

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<sup>2</sup> The market structure is as follows: there are several *primary markets* (where animals are bought and sold) before the *terminal market* (up to 3 primary markets before). In Nairobi, the local terminal markets are mainly supplied by the form of *livestock traders* (who buy from primary markets) and *brokers*. Following, *meat traders* run their activity in *terminal markets*. Final destination follows (60 percent of meat goes to 'normal' butchers). Livestock and meat traders control around 80 percent of the supply of livestock and meat (Alarcon *et al.*, 2017).

have infrastructure for disease control, feeding and water storage and more than 75 percent are professionally managed (Kahi, Wasike and Rewe, 2006; Otieno, Hubbard and Ruto, 2012).

- The average meat yield is 240 kg/head (carcass weight) (Behnke and Muthami, 2011).
- Beef production is solely commercial, with the meat reaching local niche markets and the international market. About 70 percent of ranches have access to marketing information and more than 75 percent sell live animals to abattoirs, in many cases (53 percent) on the basis of a regular contract (Otieno, Hubbard and Ruto, 2012).

Major challenges in beef cattle ranching include the high feed cost, particularly during the dry season; difficulties in targeting and reaching affluent markets; recurrent conflicts with pastoralists in search of pasture and water. They also face diseases challenges as result of livestock–wildlife interactions. Addressing these challenges, including the provision of quality genetic material, could enhance the contribution of beef ranching to the national economy to other beef producers in the country, and to knowledge exchange in modern beef production technology.

#### **4.3 Agropastoralism (semi-intensive)**

Agropastoralists keep livestock and grow crops in a complementary way (crop residues and by products as feed for the livestock, and manure and draught power to aid crop production). The production system is low input and low output, subsistence oriented, and mainly practiced in semi-arid areas. Animal densities range between 20 TLU/km<sup>2</sup> in the lowlands and 50 TLU/km<sup>2</sup> in the highlands. Animals graze extensively in communal grazing lands or in paddocks where agropastoralists have large amounts of land.

- Agropastoralism is practiced in more regions of Kenya than any other beef production system – coastal, lower eastern, north and south Rift.
- The average herd size is between 10 and 12 cattle, mainly crossbreeds and pure exotic breeds (Otieno, Hubbard and Ruto, 2012).
- Agropastoralists use rudimentary feeding regimes, with animals predominantly grazing on communal areas and given crop residues as feed supplements. They rely on public veterinary services for vaccination and deworming. Occasionally they also carry out tick control and treat sick animals, sourcing drugs from both formal and informal outlets. They suffer from major parasitic diseases, as well as brucellosis and bovine TB (around Busia, in the Lake Victoria area, the prevalence of brucellosis in cattle is 0.26 percent and TB 2.2 percent) (Fèvre *et al.*, 2017). The only housing provided is night enclosures (*bomas*).
- While no statistics are available on productivity in the agro pastoral system, it is supposed that the dressing weight is similar to that recorded in pastoral areas 240 kg/head.
- Animals are raised to be sold, with the main marketing channel comprising middle men operating in local primary markets and making a link with abattoirs (64 percent of the traded animals reach the abattoirs) (Otieno, Hubbard and Ruto, 2012).

Seasonality in pasture and water availability results in fluctuating production and productivity. Some opportunities include the use of crop residue fortification technologies to enhance quality beef production. However, the use of poorly stored crop byproducts as feed risks mycotoxin contamination in both milk and meat and in many cases agropastoralists tend to diversify their activities, as a way better cope with uncertainty, rather than investing in productivity-enhancing technologies.

#### **4.4 Feed lot (intensive)**

This is a re-emerging commercially-oriented beef system in which animals are kept for a short period (about 3 months). They are given a highly nutritious (fattening) diet to be quickly sold to niche/prime beef markets. It is practiced by individual farmers, livestock traders or cooperate companies as it is both capital and labour intensive. There are two different feed lot systems – one focusing on fattening dairy



culls and dairy bull calves, the other specializing in fattening beef breeds. Feedlot systems have high biosecurity practices and optimal veterinary service practices.

- There are very few feed lots in Kenya. Dairy bull calves and culls feedlots are mainly practiced in the Mount Kenya region and the central rift valley. Beef feedlots are not located in any specific area (e.g. one major commercial feed lot in Nakuru County, Nivasha, keeping up to 3000 beef animals and one is in Nyeri Country, Kieni, keeping about 500 animals).
- Dairy culls/bull calves feedlot herd sizes are small. Beef breed feedlots might reach several hundreds of Boran, Sahiwal and Zebu crosses and some are specialized in beef breeds such as Charolaise, Angus and Frisian.
- Strict animal health practices are in place, with animals regularly vaccinated and dewormed and, when sick, appropriately treated.
- The meat is sold through formal channels and reach niche national markets in urban areas and export markets.

Lack of capital and investment capacities constrains the expansion of feedlot systems, though the system is re-emergng for the high profitability of quality meat reaching affluent consumers' markets. In the long term, major concerns might be related to animal concentration and the disposal of dung, which might easily end up polluting soil, water and air.

## 5. Poultry production in Kenya: a snapshot

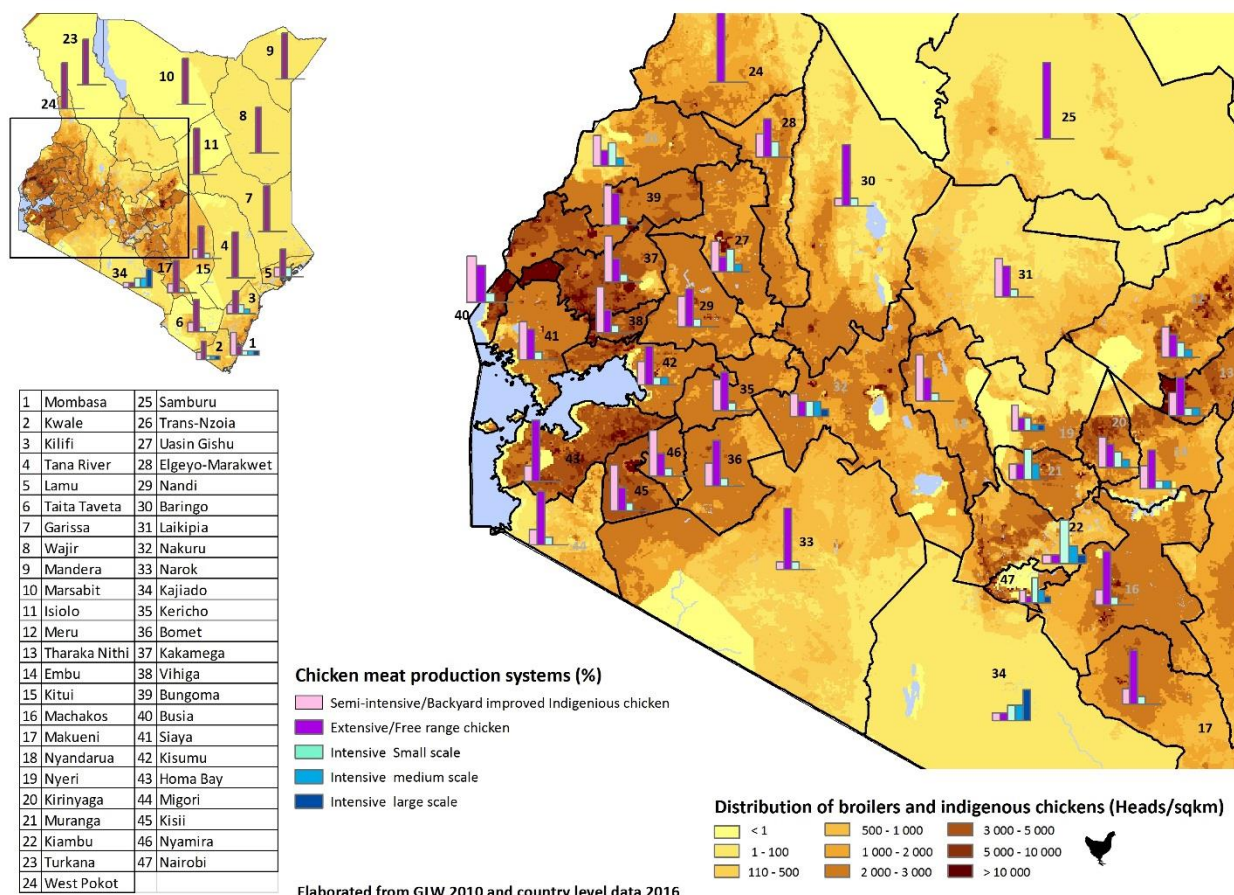
Poultry is one of the main agricultural industries in Kenya. In 2004 it contributed 8 percent to agricultural value added, with the country producing over 25 000 tonnes of poultry meat and 1.3 billion eggs jointly valued at KESs 28.5 billion (FAO, 2017). Per capita consumption is approximately 0.56 kg of poultry meat and 45 eggs per year (FAO, 2017). The sector is highly heterogeneous, comprising of a large number of small scale free-range and backyard indigenous chicken producers; a good number of small scale commercial layers and broiler farms; and few industrial integrated layer and broiler farms. Chickens constitute about 98 percent of the total poultry raised in Kenya and 65 percent of Kenyan households are estimated to keep at least one bird (Omiti and Okuthe, 2009).

Stakeholders have identified 3 poultry meat production systems in Kenya, including free-range (scavenging birds) backyard system; semi-intensive poultry system; and intensive commercial systems.

**Table 3. Distribution of chicken population by production system, KNBS, 2016**

	<b>Broilers</b>	<b>Layers</b>	<b>Indigenous</b>	<b>Others</b>
<b>Bird population</b>	3 056 747	4 161 289	36 578 441	822 181
<b>Proportion of birds (%)</b>	6.9%	9.3%	82.0%	1.8%

**Map 3. Relative proportion of chicken raised for meat in the different production systems (experts' and stakeholders' knowledge)**



### 5.1 The intensive broiler production system

Broiler farming in Kenya is mostly practised in urban and peri-urban areas near highly populated urban centres. This system requires little space with exotic birds kept in large hangars and fed compounded feed. Broiler production can be categorised into small, medium and large systems based on flock size.

- The exact number of broiler farms in Kenya is uncertain, but it is estimated that they keep over 3 million broiler hens close to major urban centres, such as Nairobi, Mombasa, Nakuru and Kisumu.
- Flock sizes per cycle go from 50–500 (small scale) through 500–10 000 (medium) to over 10 000 (large and integrated farms). The breeds kept are exotic hybrids sourced mostly from local hatcheries and a few from neighbouring Uganda.
- Production scale notwithstanding, the birds are fed on commercial concentrates, water is provided ad-lib and the birds are confined throughout the production cycle. Diseases are controlled as per government requirements. Pre-mixes of vitamins and minerals are used to promote bird growth, and there is limited use of feed additives, such as probiotics and antibiotics.
- The birds are sold at 5–8 weeks, with a dressed weight reaching 1.5 kg.
- The system is fully market oriented. The marketing channel depends on the scale of production with small scale producers selling directly or through brokers to local hotels, while medium and large scale producers target large wholesalers and retailers such as supermarkets.

A major challenge faced by broiler farms is the high cost of feed, as it often contains imported ingredients such as soya and pre-mixes. Maize, a staple food for Kenyans, is also a major ingredient in

broiler feed, which could create some food-feed competition. Increased use of antibiotics, particularly for prophylactic use, could also contribute to antimicrobial resistance. The system is very efficient and is sustaining increased consumption of meat by Kenyan consumers by providing affordably-priced animal protein.

## **5.2 Backyard (semi-intensive)**

In the backyard semi-intensive poultry production system, birds are usually confined in simple structures, often within the homestead, and provided with some feed supplementation. Birds are improved and farmers keep from about 30 to 100 birds. With such small flocks, family labour suffices for all production activities.

- About 80 percent of the 46 million poultry in Kenya are indigenous, raised in backyard and free-range production systems. The exact number of backyard farms is not known but experts estimate it could be about 1/3 of indigenous birds. The backyard system is practised across the country.
- Flock size varies from 30 up to 100 birds, largely indigenous chickens, with breed improvement through phenotypic selection being a popular breeding practice (Ndegwa *et al.*, 2015).
- Although birds are sometimes left free-range, the provision of cereals harvested from the farms or purchased from local markets is the dominant feeding strategy.
- Newcastle disease and fowl typhoid, which both cause high flock mortality, are a concern for backyard chicken farmers (Wyatt and Grace, 2013a and 2013b, cited in Grace, 2015; McCarron *et al.*, 2015). Salmonellosis is ranked third by farmers among common poultry diseases in Western Kenya (Okitoi *et al.*, 2007). Vaccination coverage is between 25 and 40 percent (Ndegwa *et al.*, 2015), and mainly against Newcastle disease. However, it is rarely practiced routinely. Treatment of birds by farmers is common using both conventional and traditional practices.
- Birds are provided with clean and cool water and 25 percent of farmers do not provide housing (Ndegwa *et al.*, 2015).
- The average dressed weight is about 1.3 kg per bird (Behnke and Muthami, 2011). Backyard and free-range chickens contribute about 55 percent of total poultry meat and 44 percent of total egg production per year (Kingori, Wachira and Tuitowek, 2010).
- Birds are raised mainly for commercial purposes. Farmers market live birds through informal traders and middlemen who collect birds from different farms and transport them to major markets, with Nairobi having the highest number of live bird markets in Kenya (McCarron *et al.*, 2015). Occasionally some birds are sold to neighbours or consumed by the farmers.

Backyard chicken farmers rarely access veterinary services. In any case, private veterinarians or owners of veterinary medicinal shops are their main source of advice and poultry-related inputs, such as medicines and vaccines. As birds are largely traded informally and sold in unregulated live bird markets (Nyaga, 2007), i.e. through a value chain characterized by poor hygiene, lack of cold chain, and improper practices, the semi-intensive backyard production system poses non-marginal public health risks (Carron *et al.*, 2015). The rising demand of organically produced meat is a good opportunity for the future of the backyard system that, to some extent paradoxically already complies with many features of organic production systems.

## **5.3 Free-range (extensive)**

This is a low input low output system where birds are left to freely scavenge for feed. Together with the backyard system, it represents about 80 percent of the total poultry population in Kenya (Omiti and Okuthe, 2009; KNBS, 2016). Chickens kept are unselected flocks of various ages and largely managed by women and children. It is a subsistence-oriented system, with little and opportunistic informal marketing.

- The number of farms practising keeping scavenging poultry is not known. Stakeholders, however, contend that more than half of indigenous chickens fall under this system. Although popular throughout the country free ranging is predominant in western Kenya regions, some parts of lower eastern, north Rift areas and coastal areas.
- The average flock size is between 5 and 30 birds of indigenous breeds.
- Chickens scavenge and eat whatever they come across but also feed on kitchen leftovers.
- Chickens are rarely dewormed and vaccinated (Peters *et al.*, 2012 cited in Grace, 2015). Housing is not provided and the birds sleep in a coop outside or inside the owner's house, in some circumstances sharing the same room.
- Productivity is low, with about 3 egg laying cycles of less than 20 days eggs per year, and low dressed weight (1-1.5 kg) at maturity.
- Production is for home consumption, though birds are also sold to neighbours and in local markets.

Improvement of this system to provide for bird selection, use of improved housing and feed supplementation will significantly increase productivity.

## 6 Conclusion

This brief presents a snapshot of beef and dairy cattle and poultry meat production systems in Kenya, as described and characterized by the Ministry of Agriculture, Livestock and Fisheries, the Ministry of Environment and Natural Resources, the Ministry of Health, Kenya National Bureau of Statistics and other stakeholders, KARLO and universities.

This common understanding of livestock production systems will support multi-sectoral and multi-disciplinary dialogue among stakeholders to appreciate the production, public health and environmental dimensions of livestock and the formulation of coherent and effective sector policies and investments.

*January 2018. The production of this document has been coordinated by Stephen Gikonyo (FAO), Ana Felis (FAO) and Giuseppina Cinardi (FAO) under the guidance of the Members of the ASL2050 Kenya Steering Committee and in consultation with national livestock stakeholders.*

## References

- Alarcon, P., Fèvre, E. M., Murungi, M. K., Muinde, P., Akoko, J., Dominguez-Salas, P., ... & Rushton, J.** 2017. *Mapping of beef, sheep and goat food systems in Nairobi—A framework for policy making and the identification of structural vulnerabilities and deficiencies*. *Agricultural Systems*, 152, 1-17.
- Behnke, R. & Muthami, D.** 2011. *The Contribution of Livestock to the Kenyan Economy*. IGAD LPI Working Paper No. 03 – 11.  
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.366.3320&rep=rep1&type=pdf>
- Carron, M., Alarcon, P., Häslar, B., Fèvre, E.M., Karani, M., Muinde, P., Akoko, J., Onono, J. and Rushton, J.** 2015. *Using a value chain framework for food safety assessment of broiler and indigenous chicken meat systems of Nairobi*. Presented at the 14th conference of the International Society for Veterinary Epidemiology and Economics (ISVEE), Merida, Yucatan, Mexico, 3-7 November 2015. Nairobi, Kenya: ILRI.
- FAO.** 2017. FAOSTAT (data for 2014)
- Fèvre, E. M., Glanville, W. A., Thomas, L. F., Cook, E. A., Kariuki, S., & Wamae, C. N.** 2017. *An integrated study of human and animal infectious disease in the Lake Victoria crescent small-holder crop-livestock production system, Kenya*. *BMC infectious diseases*, 17(1), 457.
- GoK.** 2012. *National policy the Sustainable Development of Northern Kenya and Other Arid Lands*. Sessional paper No. 8 of 2012.
- GoK.** 2017. *National Livestock policy, 2017 revised*.
- Government of Laikipia County.** 2012. *Laikipia County. First county development integrated. Development plan. 2013-2017. Kenya*
- Government of Taita Taveta County.** 2012. *Taita Taveta County. First county development integrated. Development plan. 2013-2017. Kenya*
- Grace, D.** 2015. *Review of evidence on antimicrobial resistance and animal agriculture in developing countries*
- Kadohira, M., McDermott, J. J., Shoukri, M. M., & Kyule, M. N.** 1997. *Variations in the prevalence of antibody to brucella infection in cattle by farm, area and district in Kenya*. *Epidemiology & Infection*, 118(1), 35-41.
- Kahi, A. K., Wasike, C. B., & Rewe, T. O.** 2006. *Beef production in the arid and semi-arid lands of Kenya: constraints and prospects for research and development*. *Outlook on AGRICULTURE*, 35(3), 217-225.
- KDMP.** 2010. *Kenya dairy master plan*
- Kimani et al.** 2016. *Public Health Benefits from Livestock Rift Valley Fever Control: A Simulation of Two Epidemics in Kenya*. *Ecohealth*, 13, pp.729–742
- Kingori, A.M, Wachira A.M & Tuitowek ,J.K.** 2010. *Indigenous Chicken Production in Kenya: A Review*.  
[https://www.researchgate.net/publication/49965199\\_Indigenous\\_Chicken\\_Production\\_in\\_Kenya](https://www.researchgate.net/publication/49965199_Indigenous_Chicken_Production_in_Kenya) A Review [accessed Aug 15, 2017].
- Kinyamario, J. I. & Ekeya, W. N.** 2001. *Mechanisms of drought management by African pastoralists*. In *Proceedings of animal production society of Kenya symposium* (pp. 117-122).
- KNBS.** 2016. *County summaries for livestock products for year 2016*
- KNBS.** 2017. *Kenya economic survey 2016*.

- Kosgey, I. S., Mbuku, S. M., Okeyo, A. M., Amimo, J., Philipsson, J., & Ojango, J. M.** 2011. *Institutional and organizational frameworks for dairy and beef cattle recording in Kenya: a review and opportunities for improvement*. Animal Genetic Resources/Resources génétiques animales/Recursos genéticos animales, 48, 1-11.
- Lanyasunya, T. P., Wang, H. R., Mukisira, E. A., Abdulrazak, S. A. & Ayako, W. O.** 2006. *Effect of seasonality on feed availability, quality and herd performance on smallholder farms in Ol-Joro-Orok Location/Nyandarua District, Kenya*. Tropical and Subtropical Agroecosystems, 6(2).
- McCarron, M., Munyua, P., Cheng, P. Y., Manga, T., Wanjohi, C., Moen, A., ... & Katz, M. A.** 2015. *Understanding the poultry trade network in Kenya: Implications for regional disease prevention and control*. Preventive veterinary medicine, 120(3), 321-327.
- Mutua, E. N., Bukachi, S. A., Bett, B. K., Estambale, B. A. & Nyamongo, I. K.** 2017. *"We do not bury dead livestock like human beings": Community behaviors and risk of Rift Valley Fever virus infection in Baringo County, Kenya*. PLOS Neglected Tropical Diseases, 11(5), e0005582.
- Ndegwa, J. M., Mead, R., Norrish, P., Shepherd, D., Kimani, C., Wachira, A. & Siamba, D.** 2015. *Evaluating Interventions Uptake in Indigenous Chicken Production in a Participatory Research with Smallholder Farmers in Kenya*. Journal of Agricultural Studies, 3(2), 145-165.
- Njarui et al.** 2010. *Feeding management for dairy cattle in smallholder farming systems of semi-arid tropical Kenya*. Livestock Research for Rural Development 23 (5) 2011  
<http://www.lrrd.org/lrrd23/5/njar23111.htm>
- Njuguna, J. N., Gicheru, M. M., Kamau, L. M. & Mbatha, P. M.** 2017. *Incidence and knowledge of bovine brucellosis in Kahuro district, Murang'a County, Kenya*. Tropical Animal Health and Production, 49(5), 1035-1040.
- Nyaga, P.** 2007. *Poultry Sector Country Review*. UN Food and Agriculture Organization
- Ogola, H., Shitandi, A. & Nanua, J.** 2007. *Effect of mastitis on raw milk compositional quality*. Journal of Veterinary Science, 8(3), 237-242.
- Okitoi, L. O., Ondwasy, H. O., Siamba, D. N. & Nkurumah, D.** 2007. *Traditional herbal preparations for indigenous poultry health management in Western Kenya*. Livestock Research for Rural Development, 19(5), 2007.
- Omiti J.O and Okuthe, S.O.** 2009. *An overview of the poultry sector and status of Highly Pathogenic Avian Influenza (HPAI) in Kenya*. Background paper AFRICA/INDONESIA REGION REPORT
- Omoro, A. O., Muriuki, H., Kenyanjui, M., Owango, M. & Staal, S. J.** 1999. *The Kenya dairy sub-sector: a rapid appraisal*. ISO 690
- Otieno, D. J., Hubbard, L. & Ruto, E.** 2012. *Determinants of technical efficiency in beef cattle production in Kenya*. In Selected Paper prepared for presentation at the International Association of Agricultural Economists (IAAE) Triennial Conference (pp. 18-24).
- Ouda, J. O., Kitilit, J. K., Indetie, D. & Irungu, K. R. G.** 2001. *The Effects of Levels of Milking on Lactation and Growth of Pre-Weaning Calves of Grazing Boran Cattle*. East African Agricultural and Forestry Journal, 67(1-2), 69-75.
- SDP.** 2004. *The Demand for Dairy Products in Kenya. Small-holder Dairy Project*.  
<http://cgspace.cgiar.org/handle/10568/1915>.



SNV. 2015. *The Kenya Market-Led Dairy Programme (KMDP)*.

[http://www.snv.org/public/cms/sites/default/files/explore/download/kenya\\_market-led\\_dairy\\_programme\\_-\\_status\\_report\\_nov\\_2015.pdf](http://www.snv.org/public/cms/sites/default/files/explore/download/kenya_market-led_dairy_programme_-_status_report_nov_2015.pdf)

Staal, S. J., Owango, M., Muriuki, H., Kenyanjui, M., Lukuyu, B. A., Njoroge, L., ... & Muriuki, K. 2001. *Dairy systems characterisation of the greater Nairobi milk shed*.

Tambi, N.E., Maina, W.O. and Ndi, C., 2006. *An estimation of the economic impact of contagious bovine pleuropneumonia in Africa*. Rev. Sci. Tech. 25, 999–1011.

## Appendix: Tables

**Table A1. Proportion of dairy cattle in each production system in each county [30]**

County	Cattle Population	Proportion by production system (%)				
		Large scale intensive	Small scale intensive	Semi intensive (Semi grazing)	Extensive (Controlled)	Extensive (Uncontrolled)
Baringo	160 529	10	10	50	10	20
Bomet	297 439	0	20	70	10	0
Bungoma	129 758	0	30	60	10	0
Busia	17 467	0	10	90	0	0
Elgeyo/Marakwet	204 433	10	10	50	10	20
Embu	98 215	10	60	30	0	0
Garissa	312	0	0	0	0	100
Homa Bay	7 930	0	10	90	0	0
Isiolo	252	0	0	0	0	100
Kajiado	72 718	0	30	60	10	0
Kakamega	143 833	0	80	20	0	0
Kericho	102 684	10	20	70	0	0
Kiambu	247 706	10	70	20	0	0
Kilifi	53 745	10	30	60	0	0
Kirinyaga	80 905	20	50	30	0	0
Kisii	167 931	0	80	20	0	0
Kisumu	20 188	0	10	90	0	0
Kitui	6 448	0	10	80	0	10
Kwale	5 324	0	50	20	0	30
Laikipia	53 936	10	20	60	10	0
Lamu	8 679	0	0	30	0	70
Machakos	51 882	0	30	70	0	0
Makueni	27 539	0	30	70	0	0
Mandera	-	N/A	N/A	N/A	N/A	N/A
Marsabit	400	0	0	0	0	100
Meru	184 196	10	50	30	10	0

Migori	3 210	0	30	70	0	0
Mombasa	1 606	0	80	20	0	0
Muranga	239 750	10	50	40	0	0
Nairobi City	19 261	0	80	20	0	0
Nakuru	297 069	10	50	30	10	0
Nandi	223 943	10	20	70	0	0
Narok	288 450	0	0	60	0	40
Nyamira	82 664	0	80	20	0	0
Nyandarua	322 374	10	20	70	0	0
Nyeri	140 068	20	60	20	0	0
Samburu	5 731	0	0	90	0	0
Siaya	6 071	0	10	90	0	0
Taita Taveta	27 310	0	60	30	0	10
Tana River	89	10	30	60	0	0
Tharaka Nithi	68 924	10	60	30	0	0
Trans Nzoia	179 000	0	10	70	20	0
Turkana	5	100	0	0	0	0
Uasin Gishu	331 621	10	10	60	20	0
Vihiga	42 400	0	80	20	0	0
Wajir	12	0	0	0	0	100
West Pokot	81 725	0	20	10	30	40

**Table A2. Proportion of beef cattle in each production system in each county [30]**

County	Cattle population	Proportion of production system (%)			
		Extensive Pastoralism	Semi-intensive	Extensive Ranching	Feed lot (Intensive)
Baringo	345 242	80	20	0	0
Bomet	56 686	0	100	0	0
Bungoma	252 657	0	100	0	0
Busia	186 340	0	100	0	0
Elgeyo/Marakwet	173 715	40	60	0	0
Embu	96 147	10	90	0	0
Garissa	1 270 242	100	0	0	0
Homa Bay	703 770	0	100	0	0
Isiolo	213 413	80	0	20	0
Kajiado	528 815	80	0	20	0
Kakamega	272 387	0	100	0	0
Kericho	182 372	0	100	0	0
Kiambu	40 446	0	90	0	10
Kilifi	273 722	0	90	10	0
Kirinyaga	32 586	0	90	0	10
Kisii	112 502	0	100	0	0
Kisumu	282 601	0	100	0	0
Kitui	409 243	10	80	10	0
Kwale	201 006	0	100	0	0
Laikipia	246 125	30	20	50	0
Lamu	194 854	0	100	0	0
Machakos	355 753	0	80	20	0

Makueni	238 490	0	80	20	0
Mandera	692 321	100	0	0	0
Marsabit	470 000	100	0	0	0
Meru	219 150	10	80	10	0
Migori	41 235	0	100	0	0
Mombasa	4 186	0	100	0	0
Muranga	21 881	0	80	20	0
Nairobi City	12 529	0	100	0	0
Nakuru	186 225	0	50	40	10
Nandi	96 897	0	100	0	0
Narok	1 190 700	70	20	10	0
Nyamira	41 543	0	100	0	0
Nyandarua	31 961	0	80	20	0
Nyeri	12 441	0	20	70	10
Samburu	214 783	90	0	10	0
Siaya	339 913	0	100	0	0
Taita Taveta	144 700	10	50	30	10
Tana River	529 300	100	0	0	0
Tharaka Nithi	97 301	10	90	0	0
Trans Nzoia	13 500	0	60	30	10
Turkana	1 951 624	100	0	0	0
Uasin Gishu	40 224	0	100	0	0
Vihiga	131 730	0	100	0	0
Wajir	718 928	100	0	0	0
West Pokot	451 270	70	30	0	0

### 8.3 Chicken meat distribution by production system in Kenya

**Table A3: Total number of chickens for meat (Indigenous and Broilers) and relative shares in each production system and by county [30]**

County	Population		Proportion of production system (%)				
	Indigenous chicken	Broilers	Indigenous chicken		Commercial broilers		
			Free-range (extens.)	Backyard (improved free range/semi intensive)	Small scale	Medium scale	Large scale
Baringo	1 012 193	29 559	80	10	10	0	0
Bomet	720 269	12 641	60	30	10	0	0
Bungoma	2 372 244	17 599	40	50	10	0	0
Busia	1 250 913	1 568	40	50	10	0	0
Elgeyo/ Marakwet	494 861	2 000	50	30	20	0	0
Embu	444 195	44 809	50	30	10	10	0
Garissa	264 780	9 660	100	0	0	0	0
Homa Bay	2 768 890	9 700	80	20	0	0	0
Isiolo	42 720	3 380	100	0	0	0	0
Kajiado	243 184	377 172	10	10	20	20	40
Kakamega	2 607 411	41 297	30	60	10	0	0
Kericho	507 138	31 169	50	40	10	0	0
Kiambu	847 056	622 430	10	10	50	20	10

Kilifi	671 962	132 328	50	20	20	10	0
Kirinyaga	722 498	51 400	30	40	20	10	0
Kisii	1 427 906	44 829	30	60	10	0	0
Kisumu	991 622	379 625	50	30	10	10	0
Kitui	1 710 489	26 595	70	20	10	0	0
Kwale	612 944	11 764	50	20	10	10	10
Laikipia	363 061	17 670	40	50	10	0	0
Lamu	310 760	6 065	60	20	20	0	0
Machakos	1 447 350	201 590	70	20	10	0	0
Makueni	1 024 176	19 529	70	20	10	0	0
Mandera	202 995	0	100	0	0	0	0
Marsabit	57 100	2 100	100	0	0	0	0
Meru	1 303 200	68 425	30	40	20	10	0
Migori	120 000	600	70	20	10	0	0
Mombasa	38 450	81 750	20	50	10	10	10
Muranga	554 883	104 573	20	20	40	20	0
Nairobi City	232 678	327 344	10	20	40	20	10
Nakuru	1 363 115	100 561	20	30	20	20	10
Nandi	759 776	9 750	50	40	10	0	0
Narok	989 400	5 000	80	10	10	0	0
Nyamira	350 352	8 600	30	60	10	0	0
Nyandarua	477 643	10 540	30	60	10	0	0
Nyeri	251 435	28 692	20	40	20	10	10
Samburu	239 970	0	100	0	0	0	0
Siaya	829 821	87 063	40	50	10	0	0
Taita Taveta	368 770	16 440	70	20	10	0	0
Tana River	138 768	0	100	0	0	0	0
Tharaka Nithi	2 230 117	33 600	50	30	10	10	0
Trans Nzoia	665 000	16 000	20	40	30	10	0
Turkana	208 137	1 550	100	0	0	0	0
Uasin Gishu	766 788	43 824	20	40	30	10	0
Vihiga	796 390	15 430	30	60	10	0	0
Wajir	188 732	76	100	0	0	0	0
West Pokot	586 300	450	100	0	0	0	0

