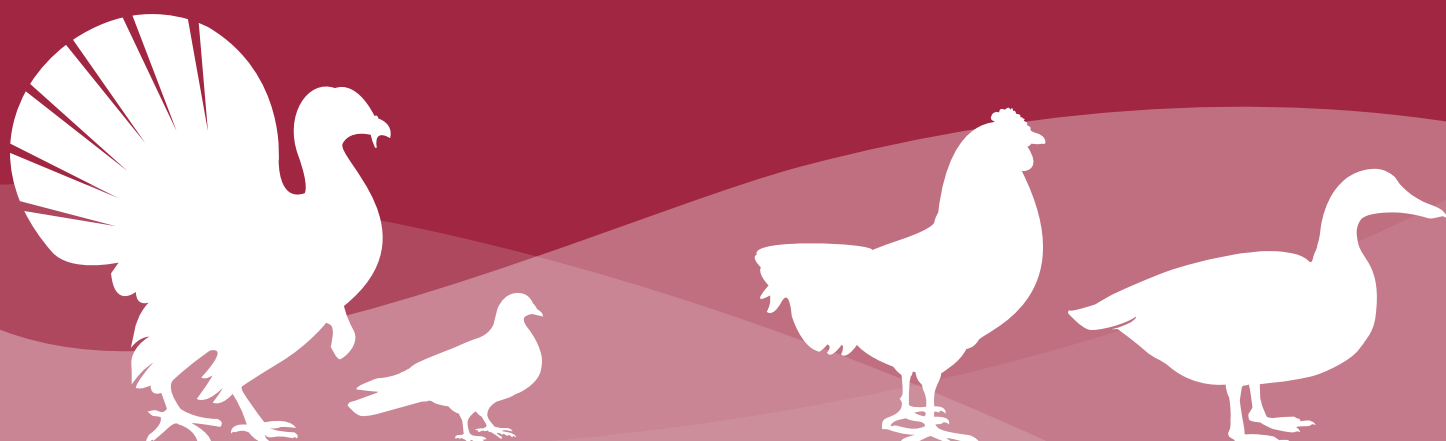




Food and Agriculture
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11

FAO ANIMAL PRODUCTION AND HEALTH



livestock country reviews

POULTRY SECTOR

Ethiopia

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Foreword

The poultry sector continues to grow and industrialize in many parts of the world. An increasing human population, greater purchasing power and urbanization have been strong drivers of growth. A clear division is developing between industrialized production systems of large and medium size feeding into integrated value chains, and extensive production systems supporting livelihoods and supplying local or niche markets. The primary role of the former is to supply cheap and safe food to populations often distant from the source of supply, while the latter acts as a source of nutrition and livelihood safety net, often as part of a diverse portfolio of income sources. Understanding how poultry production systems and value chains work is essential in order to develop a country's poultry sector sustainably.

This review for Ethiopia is part of a series of Country Reviews commissioned by the Animal Production and Health Division (AGA) of the Food and Agriculture Organization of the United Nations (FAO). The reviews aim to support sustainable and effective development interventions and policy recommendations and contribute to informed decision-making and investments in the poultry sector by:

- providing information and data about national poultry supply chains (with a special focus on poultry production);
- analysing strengths, weaknesses and prospects along the supply chain;
- identifying opportunities for poultry sector development.

This review is not intended to be exhaustive. Some topics are only partially covered or not covered at all and the document will be supplemented and updated on a continuous basis. Contributions and feedback are welcome by the author(s) and AGA¹.

¹ For more information please visit the FAO website at: www.fao.org/poultry-production-products or contact Poultry-Gateway@fao.org

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Acronyms and abbreviations

AGP	Agricultural Growth Program
ATA	Agricultural Transformation Agency
CSA	Central Statistical Authority
CRGE	Climate-resilient green economy
DZARC	Debre Zeit Agricultural Research Centre
DOCs	Day-old chicks
EIAR	Ethiopian Institute of Agricultural Research
FAO	Food and Agriculture Organization of the United Nations
FCR	Feed conversion ratio
FDRE	the Federal Democratic Republic of Ethiopia
GDP	Gross domestic product
GNI	Gross national income
GP	Grandparent
GTP	Growth and transformation plan
HPAI	Highly pathogenic avian influenza
ILRI	International Livestock Research Institute
LMP	Livestock Master Plan
MoANR	Ministry of Agriculture and Natural Resources
MoA	Ministry of Agriculture
NAHDIC	National Animal Health Diagnostic and Investigation Centre
ND	Newcastle disease
NVI	National Veterinary Institute
NGO	Non-governmental organization
OIE	World Organization for Animal Health
SMEs	Small and micro enterprises
SNNPR	Southern Nations, Nationalities and Peoples' Region
USDA	United States Department of Agriculture

Executive summary

Poultry production is one of the key livestock subsectors of Ethiopia. It plays important roles in terms of generating employment opportunities, improving family nutrition, and empowering women. It is a suitable business for poor households due to the small quantity of land needed and low investment costs required to start up and run the operation.

The current poultry population of Ethiopia is estimated to be around 60 million out of which the majority (37.9 percent or 22.7 million) are chicks and only 33.6 percent (20.2 million) are laying hens. About 56 percent (9.6 million) of Ethiopian households have poultry holdings with varying range of flock size. However, about 80 percent of the households with poultry keep from 1 to 9 chickens. The sector is indeed dominated by extensive scavenging and small-extensive scavenging family poultry production systems (please see the classification system available in Appendix 1) in rural areas.

Small-scale intensive and semi-intensive poultry production systems are found both in urban and rural areas. However, the former are mainly concentrated in urban and peri-urban areas in the central parts of the country. Such producers use different breeds of exotic and indigenous chicken and obtain inputs (e.g. day-old chicks of broilers and layers, pullets, feed and vaccines) from the medium- and large-scale intensive poultry producers in addition to a very limited supply from government sources, particularly research centres.

Ethiopia has a small (but growing) number of medium- and large-scale intensive broiler and layer farms (>1 000 broilers or >500 layers) located in and around Addis Ababa, Debre Zeit, Modjo and Adama. Such poultry farms are also emerging in the growing urban areas of Mekele, Bahir Dar, Gondar, Hawassa and Dire Dawa. Throughout the country, there are about 35 farms that are estimated to produce more than 1 000 broilers. The number of producers operating with capacity of over 10 000 birds is very small.

The dominant proportion of the national poultry meat and eggs are produced under the scavenging family poultry production systems using low producing indigenous breeds. However, exotic breeds in intensive production systems are contributing to an increasing share of production. In 2016, exotic breeds contributed to more than 27 percent of the total number of eggs produced nationally, despite they constitute only 9 percent of the total national flock.

Over the past several decades, the consumption of poultry meat and eggs was very low, and remains today far below African and global averages. The average annual per capita poultry meat consumption level in Ethiopia in 2013, estimated at 0.66 kg, was far below the East African average of 1.64 kg. The annual per capita poultry meat consumption level of Africa, estimated at about 6.73 kg, was more than ten times the consumption level in Ethiopia. Likewise, the annual per capita poultry egg consumption of Ethiopia in 2013 was estimated to be 0.36 kg, while the estimates for East Africa and Africa during the same year were about 1.03 and 2.65 kg, respectively.

The domestic market for poultry is constrained by seasonal fluctuations in demand and price. Such fluctuations are mostly associated to the fasting tradition that prohibits consumption of livestock products for up to 250 days of the year to Orthodox Christians, accounting for around 43 percent of the total population (CSA, 2007). However, these seasonal variations are expected to smooth out because there are an increasing number of people of other religious

backgrounds and faiths (more than 50 million today) who also consume poultry products during these fasting periods. Moreover, rising incomes, rapidly growing population and increasing urbanization of the country suggest that consumption and demand for poultry products will rise in the future.

Exports and imports of poultry are limited. Export of poultry products is almost nil. The import trade chiefly includes introduction of day-old chicks and parent stocks by large-scale intensive poultry producers.

The value chains of both the medium and large-scale intensive and family poultry production systems show that the sector is seriously challenged in terms of achieving optimum production efficiency, feed availability and quality and marketing of products and inputs. However, the prospects for the development of the poultry sector are high in both systems. There is strong recognition and support for the sector by policy makers. The government has set ambitious goals to transform the existing poultry system with a plan to produce a surplus of eggs and poultry meat for export in year 2020 and to increase the contribution of poultry meat to the total national meat consumption from the current 9 to 30 percent by 2030. Industrial and integrated systems have already begun to grow substantially. The capacity of local poultry integrators is rising. An increasing number of foreign companies are setting up base in Ethiopia. Recent surveys of the sector indicate that there are many opportunities for investment in the existing value chains. The country should exert further and sustained efforts through investment interventions in better genetics, feed and animal health services and marketing together with complementary policy support to attract competent new investments to develop the sector.

1.Introduction

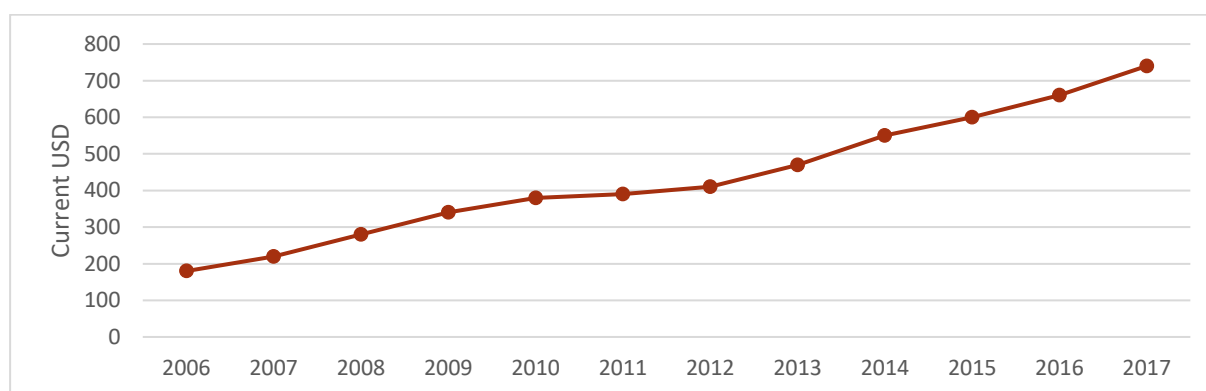
1.1. COUNTRY PROFILE

TABLE 1. Geographic location, land area, population and economy

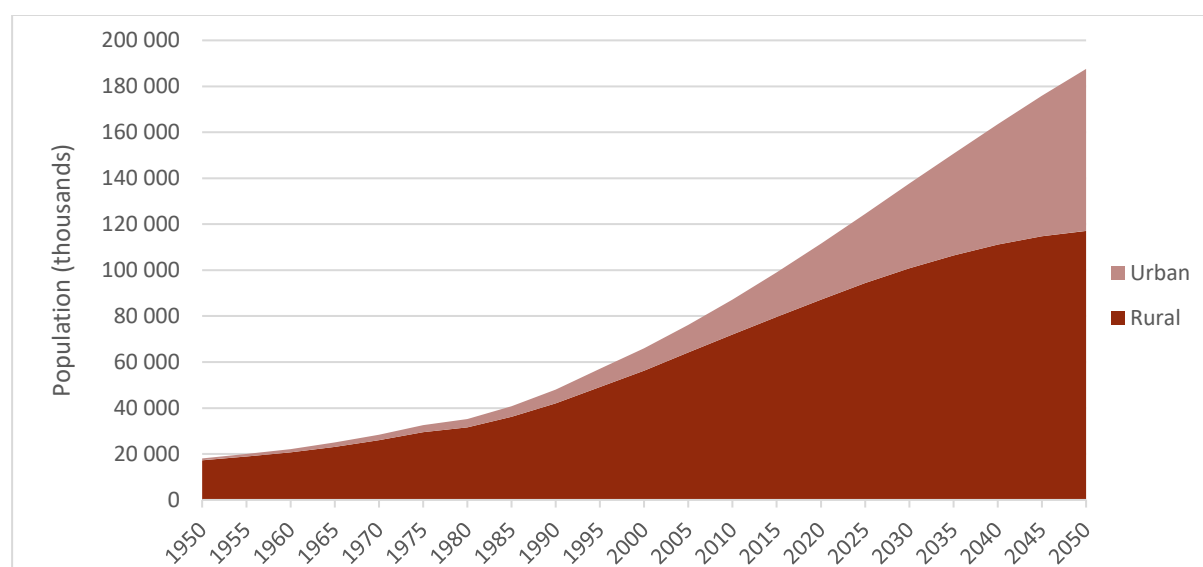
Region	Eastern Africa
Surface area (sq. Km)	1 104 300 (FAO estimate)
Land area (sq. Km)	1 000 000 (FAO estimate)
Population, total (millions, 2017)	104.9 (World Bank, 2017)
Population, growth rate (annual %, 2017)	2.5 (World Bank, 2018)
Economy group	Low-income economy (World Bank, 2018)
GDP (current USD, billions, 2017)	80.6 (World Bank, 2018)
GDP growth rate (annual %, 2017)	10.2 (World Bank, 2018)
GDP per capita (Current USD, 2017)	767.6 (World Bank, 2018)
Human development index (HDI, 2015)	0.448, rank 174 (UNDP, 2016)

Ethiopia is located in Eastern Africa. It is bordered by Eritrea, Sudan, South Sudan, Kenya, Somalia and Djibouti. It is the second most populous nation in Africa, after Nigeria, with a population of about 104.9 million growing at a rate of about 2.5 percent annually (Table 1). Although it is the fastest growing economy in the region, it is also one of the low-income economies, with a per capita GNI of 740 USD in 2017 (Figure 1). Currently, about 20 percent of the population lives in the cities. The urban population increased from 9.7 to 19.3 million between 2000 and 2015. This number is expected to rise further to 30.2 million by 2025 and 70.5 million by 2050 (Figure 2).

FIGURE 1. Gross national income (GNI) per capita, Atlas method (current USD)



Source: World Bank, 2018

FIGURE 2. Urban and rural population

Source: United Nations, Department of Economic and Social Affairs, Population Division, 2017

1.2. AGRICULTURAL SECTOR

TABLE 2. Agricultural land (as percent of total land area) and contribution of agriculture to national GDP and employment

Agricultural land (% of land area, 2015)	36.26 (FAOSTAT, 2018)
Agriculture, value added (% GDP, 2016)	37.23 (World Bank, 2018)
Employment in agriculture (% , 2017)	68.2 (ILO, 2018)
Employment in agriculture, female (%, 2017)	59.4 (ILO, 2018)

Agriculture is the dominant sector of the Ethiopian economy. In the 2013/14 Ethiopian fiscal year, agriculture contributed 40 percent of the national GDP and the contribution of livestock to the agricultural GDP was estimated to be 20.7 percent (MoFEC, 2018). In 2016, agriculture contributed approximately 37.2 percent of the GDP. In 2017, it employed about 68.2 percent of the population, the proportion of females employed in the sector being about 59.4 percent (Table 2).

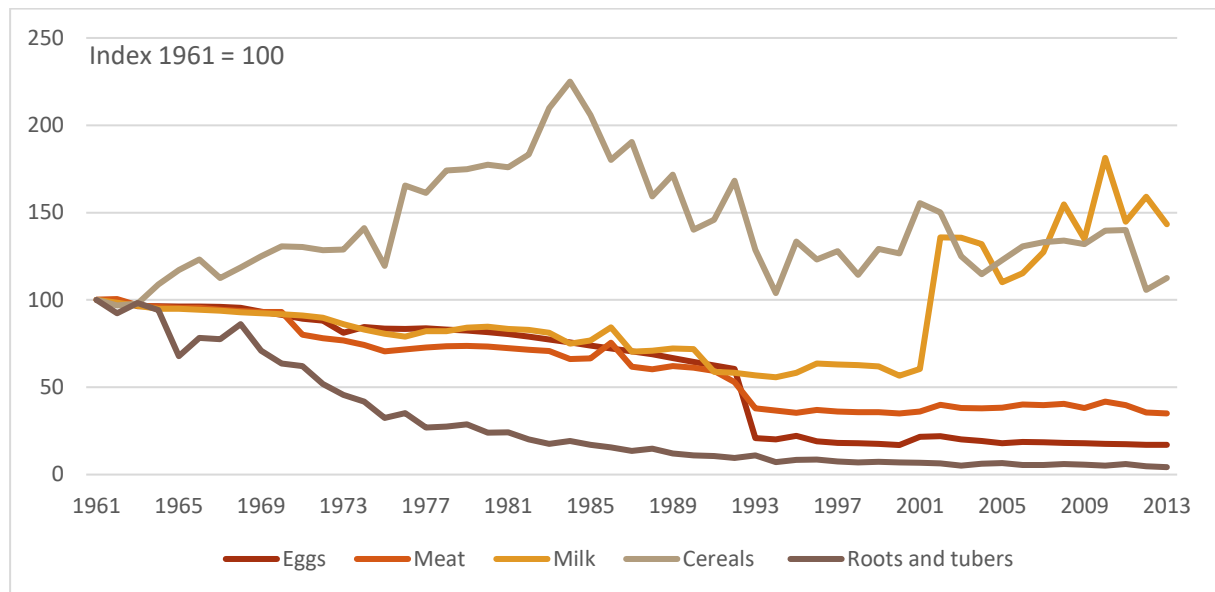
Livestock is an integral component of the agricultural sector. Ethiopia has the largest cattle population in Africa, with around 59.5 million cattle. The country has 30.7 million sheep and about similar number of goats, 1.2 million camels and 59.5 million chickens (CSA, 2017). Livestock play a significant role as source of food and income in addition to several other important economic and sociocultural functions.

Between 1961 and 1993, the per capita consumption of milk, meat and eggs has been declining slightly (Figure 3.a.). Since 1993, however, the per capita consumption of milk has been increasing while the consumption of eggs and meat has remained almost unchanged. The trend in the production of eggs and milk followed an almost similar pattern to that of consumption (Figure 3.b.). Meat production tended to grow slightly from 1993 to 2013.

Introduction

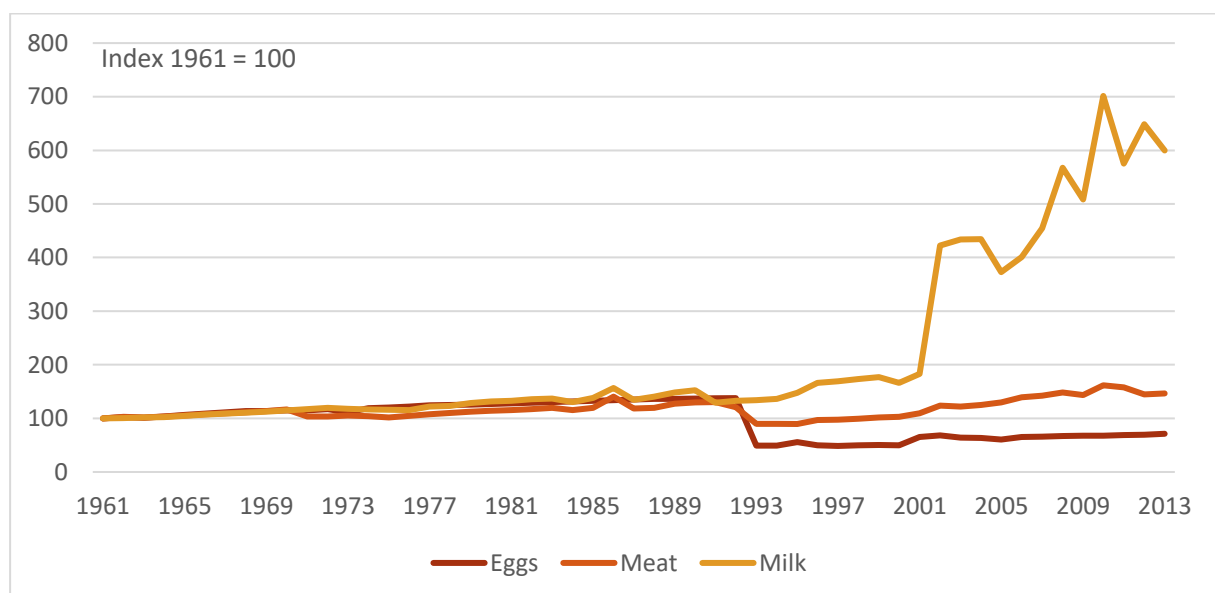
However, the contribution of poultry meat to the total meat production in 2013 was only around 9 percent (FAOSTAT, 2018). Figure 3.c. shows the contribution of different food items to the daily per capita protein consumption in Ethiopia. The data across the time periods considered (i.e. 1993–1995, 2003–2005, 2011–2013) showed that most of the daily per capita protein consumption was derived from vegetal products; milk and meat from cattle, goats and other non-poultry species. The average per capita protein consumption from eggs (0.11–0.13 g/capita/day) and poultry meat (around 0.22 g/capita/day) over the periods considered was very low (Figure 3.c.).

FIGURE 3.A. Per capita consumption of major food items in Ethiopia, 1961–2013



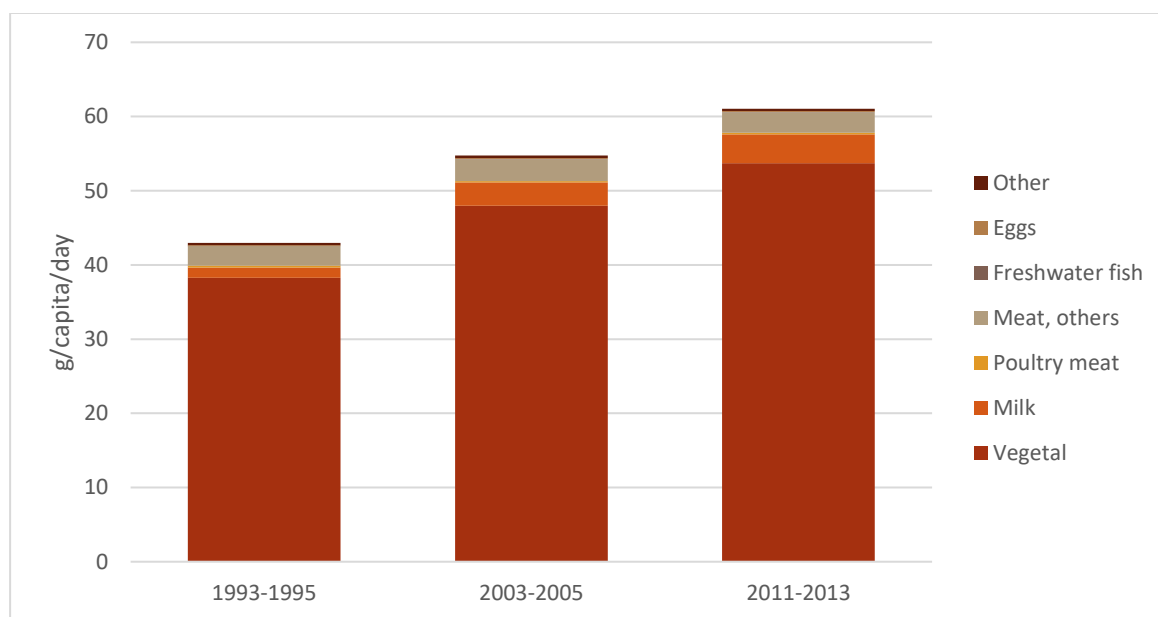
Source: FAOSTAT, 2018

FIGURE 3.B. Production of animal-source foods in Ethiopia, 1961–2013



Source: FAOSTAT, 2018

FIGURE 3.C. Protein consumption



Source: FAOSTAT, 2018

2. Current status of poultry production and supply chains

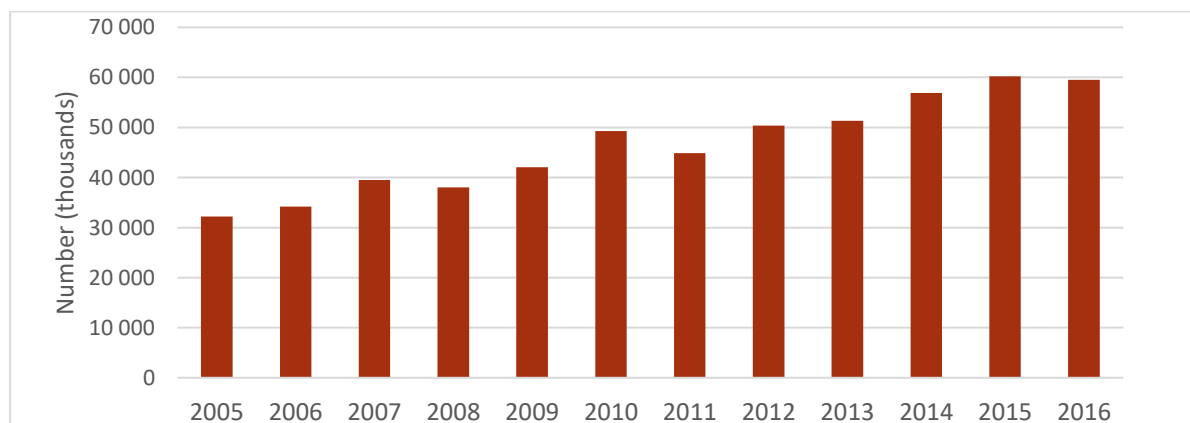
In Ethiopia, the term poultry is almost synonymous to chicken. Other poultry species such as guinea fowl, geese, turkeys and ducks are not common in the country. Poultry production offers considerable opportunities in terms of generating employment opportunities, improving family nutrition, empowering women (especially in rural areas) and ultimately ensuring household food security. Extensive scavenging poultry production is often the domain of poor women. Reasons include that it requires little initial investment and that it does not usually conflict with women's other household duties.

Section 2 provides statistical information on the national poultry population (Figure 4) and on its geographic area of distribution (Table 3). It presents the different poultry systems operating in Ethiopia at different scales along commercial lines and the predominant systems in the country, the extensive scavenging and small-extensive scavenging family poultry production systems (see the classification system available in Appendix 1). Two case studies are also presented. The first case study is on a medium-scale intensive poultry producer and includes information on animals and management, housing, health, service availability, inputs, sales, overall farm facilities and waste management. The second case study is on an extensive poultry producer and includes production and household information (e.g. age, sex and family size of owner, ownership, key uses of poultry, and percentage of income from poultry). The information in the case studies was collected at the farm level through a questionnaire.

2.1. THE POULTRY FLOCK

The total poultry population from 2005 to 2016 is presented in Figure 4. The figure shows that the increase in poultry population over the years has been slow and that the poultry population in 2016 was estimated at 59.5 million. The major reason for the stagnation of the poultry population growth is the high poultry mortality due to diseases and predators prevalent in the scavenging production systems. For instance, about 32 million birds died due to disease and close to 30 million birds were lost due to causes other than disease, e.g. mainly predators in 2016 (CSA, 2017). The other reason is the limited expansion of commercial poultry production, both in terms of number of operators and volume of operation.

FIGURE 4. National poultry population, 2005–2016



Source: FAOSTAT, 2018 (for data from 2005 to 2013); CSA, 2015a, 2016, 2017

2.1.1. Geographical distribution of poultry flocks

Table 3 shows the distribution of the total poultry population among the different regions of Ethiopia in 2016. The figures indicate that Oromia region has the largest number of chickens, followed by Amhara. The SNNPR, Oromia, Tigray and Amhara regions together represent 96 percent of the total national chicken population. The remaining 4 percent are mainly distributed among Afar, Somali, Benshangul Gumuz and Gambela regions. Almost all of the exotic and hybrid chickens are found in the SNNPR, Oromia, Tigray and Amhara regions.

TABLE 3. Distribution of poultry, 2016

Geographic area (region)	Chickens (thousands)			
	Total	Indigenous	Exotic	Hybrid
SNNPR	11 197	9 997	485	715
Oromia	20 408	19 604	291	513
Tigray	5 746	4 288	892	566
Amhara	19 962	18 020	930	1 012
Subtotal	57 313	51 909	2 598	2 806
% of the country's total	96	96	99.7	99
Benshangul Gumuz	1 249	1 225	4	20
Gambela	386	378	4	4
Afar	198	198	-	-
Somali	161	161	-	-
Harari	91	91	-	-
Dire Dawa	101	98	-	3
Subtotal	2 186	2 151	8	27
% of the country's total	4	4	0.3	1
Country's total	59 499	54 060	2 606	2 833

Source: CSA, 2017

2.1.2. Breeds

Use of improved genetics is one of the key elements to improving productivity in the poultry sector. Lack of access to productive and adaptable chicken breeds still remain one of the most critical challenges to increasing the economic contribution of the sector. Most of the chickens kept by smallholder farmers are unimproved indigenous flocks, well-adapted to the local environments but having slow growth rates and very poor egg productivity. Attempts to increase productivity are mainly focused on the introduction of high yielding exotic chickens to replace indigenous stocks. However, the success achieved in terms of improving productivity in villages through the introduction of exotic breeds is still limited due to the failure of imported breeds to adapt to local conditions. Other reasons include poor management; lack of input and output markets; and shortage of quality feeds, vaccines and veterinary inputs. Efforts to develop high yielding indigenous chicken breeds are still insufficient.

Exotic breeds

Currently there are about 5.4 million exotic and hybrid chickens, representing 9 percent of the total national poultry population (Table 3). Exotic chickens were first introduced into Ethiopia in 1953 and 1956 by Jimma Agricultural and Technical School and Alemaya College of Agriculture, respectively (Wondmeneh *et al.*, 2016). Four breeds of chickens (Rhode Island Red, Australorp, New Hampshire and White Leghorns) were imported from Kenya, Denmark and the United States during this time. Later, the Debre Zeit Agricultural Research Centre (DZARC) was also involved in evaluating the performance of these breeds including additional introductions such as the Brown Leghorn, Light Sussex and Barred Rock. Egg production, hatchability and mortality rates of the breeds were evaluated over several years. The White Leghorn was rated the best in terms of egg production, adaptability, disease tolerance and feed efficiency (DZARC, 1984). In 1996, the Ministry of Agriculture and Livestock introduced the Fayoumi chicken from Egypt. These chickens were directly distributed to rural households throughout the country to improve the extensive scavenging and small-extensive scavenging family poultry production systems.

In the mid 2000s, DZARC introduced the Lohman Silver and Koekoek breeds. The Lohman Silver did not adapt to the village production system while Koekoek performed well in several villages (Wondmeneh *et al.*, 2016). In 2010, a layer grandparent (GP) generation was imported and tested at the Debre Zeit poultry research farm for the first time. Two broiler parent stocks from Hubbard breeders (Hubbard classic and Hubbard JV) were tested. The parents and broilers of the classic line outperformed their JV counterparts. The GP was generally found to be adaptive and suitable under on station conditions at Debre Zeit. In addition to ensuring sustained supply of improved genetics to producers, the establishment of the GP stock enabled the national poultry research program to develop the skill required to manage larger breeder flocks and demonstrated the capacity of the research farm as a future source of parent stock.

In 2015, additional introductions of exotic breeds known for their wider adaptation and high performance were tested. Three dual purpose (Red barred, Lohman Dual and Novo color) and three layer (Lohman brown, dominant Sussex and Novo brown) breeds are being kept at Debre Zeit research centre. These six breeds are still under evaluation at the research centre (Wondmeneh *et al.*, 2016).

The Rhode Island Red (RIR), Fayoumi and Koekoek were among the chicken breeds widely distributed to village producers, although the supply of the RIR and Fayoumi has almost ceased. Instead, several medium- and large-scale intensive producers are involved in the distribution of exotic breeds to producers in the different family poultry production systems. At present Ethiochicken is the largest supplier of exotic breeds mainly to the extensive scavenging and semi-intensive family poultry producers, operating in the four largest poultry producing regions (the SNNPR, Oromia, Tigray and Amhara). Currently, the broiler and layer breeds kept by most of the intensive poultry farms in the country include Cobb broilers, and ISA, Lohman and Ross layers with parents imported mainly from the European Union (EU).

Indigenous breeds

In 2016, indigenous chickens represented about 91 percent of the total national poultry population (Table 3). As in many other parts of Africa, the indigenous chicken of Ethiopia actually comprise chickens with a wide range of morphologic or genetic diversity. Currently,

eight indigenous chicken 'types' of Ethiopia, named after either their plumage colour or geographic origin of sampling, were reported in DAD-IS (DAD-IS, 2017). The small number of breeds included in the database indicates the shortage of data on the chicken genetic resources of Ethiopia. It also suggests that much of the diversity that exists in the locally adapted populations still remains undocumented. A number of morphologic, phenotypic and genetic characterizations (Tadelle, 2003; Halima, 2007; Nigussie, 2011; Emebet, 2015) showed that very little variations exist among ecotypes (or the chicken 'types') and that most of the variations in the indigenous chickens are given to variations within individual populations.

Indigenous flocks are slow in growth rates and very poor in egg productivity. Mean body weights at 8 and 16 weeks of age could be as low as 242 and 621 g, respectively (Nigussie, 2011). The mean annual egg production does not exceed 60 eggs/hen. Despite their lower productivity, indigenous birds are still the major suppliers of poultry products in Ethiopia. They are well adapted to their environments, resistant to diseases, can scavenge for food, and are able to avoid predators as they are agile and fast, with the colour and patterns of their feathers providing natural camouflage. This suggests that improving the productive attributes of indigenous poultry could have a significant impact on the poultry sector. The opportunities arising from the existing huge genetic variation within indigenous populations should be exploited. For instance, selective breeding of the indigenous Horro chicken at the DZARC carried out since 2008 increased egg production by 123 percent and body weight by 95 percent during the first 8 generations (Wondmeneh *et al.*, 2016).

2.2. POULTRY PRODUCTION SYSTEMS

In this review, the poultry production systems of Ethiopia are classified into the industrial and integrated/medium- and large-scale intensive systems and the different categories of family poultry production systems (i.e. the small-scale intensive, semi-intensive, extensive scavenging and small-extensive scavenging systems) (Appendix 1). Producers keeping over 1 000 broilers or 500 layers are considered in the section presenting the medium- and large-scale intensive systems. Within such systems, there are large variations among producers in terms of technology use, management level and scale of operation. Although not exhaustive, information is provided on some of the larger companies, with around 10 000 birds or more. In the section regarding family poultry production systems (Section 2.2.3.), small-scale intensive and semi-intensive production systems are treated together. The extensive scavenging and small-extensive scavenging systems are also presented together due to the lack of clear statistics identifying these sub systems.

2.2.1. Poultry production systems and their distribution

Medium- and large-scale intensive poultry producers are mainly located in and around cities and major towns. They are largely concentrated between Addis Ababa, Debre Zeit and Adama. Broiler production is concentrated in Adama, Modjo and Debre Zeit; pullet rearing is heavily concentrated in Debre Zeit; while egg production is mainly in Addis Ababa (Vernooij *et al.*, 2012).

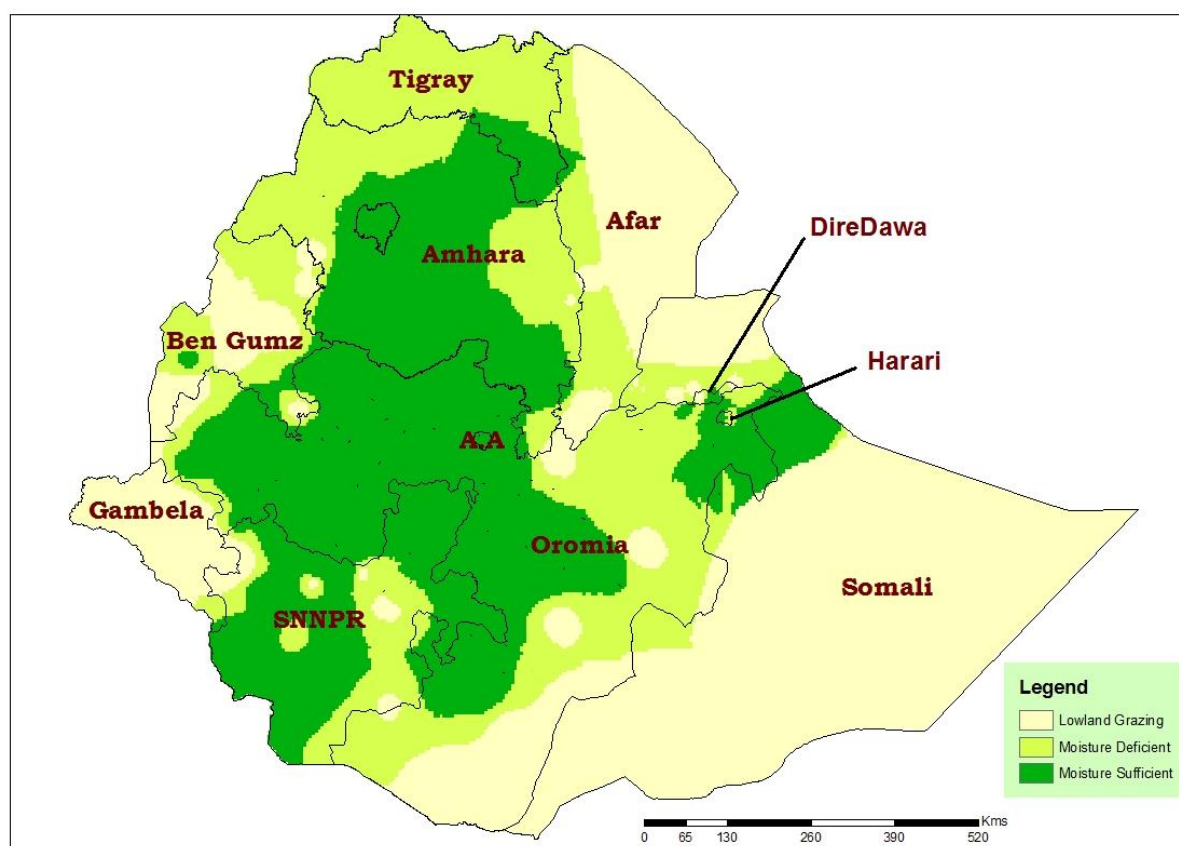
The total number of small-scale intensive poultry producers and their specific contribution to the national poultry production is not known. However, they provide the largest share of poultry eggs and meat to the growing urban population (Boere *et al.*, 2015). Their distribution is similar to that of medium- and large-scale intensive poultry producers. The semi-intensive

family poultry producers, instead, are also common in rural areas connected to urban markets. The distribution of the extensive scavenging and small-extensive family poultry production systems is not limited to any specific location.

In order to support decisions on intervention strategies suitable for livestock development in the different production environments of Ethiopia, the Ministry of Agriculture and Natural Resources (MoANR) and ILRI (2014) defined the major livestock production systems under each environment. The main livestock production typology zones identified are the: (i) lowland grazing zone (includes the lowland pastoral and agro-pastoral systems); (ii) highland mixed crop-livestock rainfall sufficient; and (iii) highland mixed crop-livestock rainfall deficient (MoANR and ILRI, 2014).

The distribution of medium- and large-scale intensive poultry production system is not linked to the production typology zones identified by MoANR and ILRI. However, the distribution of family poultry production systems shows clear patterns along the production typology zones. Family poultry systems are mostly found in the highlands (both in the mixed rainfall sufficient and mixed rainfall deficient typology zones) and more rarely in agro-pastoral areas. Pastoral communities do not keep chickens at all. Figure 5 shows the map of the main typologies of livestock production zones by major administrative regions of Ethiopia.

FIGURE 5. Map of the main typologies of livestock production zones by the major administrative regions of Ethiopia



Source: MoANR and ILRI, 2014

2.2.2. Industrial and integrated/medium- and large-scale intensive systems

Farms with >1 000 broilers or >500 layers are classified as medium- and large-scale intensive poultry systems (see Appendix 1). In Ethiopia, statistics on the size and distribution of such producers is not exhaustive. According to the estimates reported by USDA in 2017, approximately 35 farms in the country are considered to produce over 1 000 broilers. Producers operating with a capacity of over 10 000 birds are very small in number and are found in and around Addis Ababa, Debre Zeit, Modjo and Adama while they are also emerging in the growing urban areas of Mekele, Bahir Dar, Gondar, Hawassa and Dire Dawa. Currently, there are only a few poultry integrations in Ethiopia at this scale: ELFORA Agro-Industries PLC, Alema Farms PLC, Ethiochicken, SAFE Poultry PLC, Astral Foods, and Feedco Animal Feeds PLC (Boere *et al.*, 2015). ELFORA Agro-Industries PLC, located in Debre Zeit, Addis Ababa and Chefa, was established in 1997 and is one of the largest companies engaged in poultry operations. The company produces parent stock, hen table eggs, day-old chicks (DOCs), pullets, broilers, and is also involved in meat processing and retailing for local and export markets.

Breeding stocks and hatching eggs

In Ethiopia, both broiler and layer parent stock are imported from other countries either in the form of DOCs or hatching eggs. The poultry companies importing parent stocks own hatcheries and multiplication facilities for producing DOCs for their own farms or for dissemination to other smaller farms. Alema Farms, ELFORA Agro-Industries, Ethiochicken, SAFE Poultry PLC, Astral Foods and Feedco Animal Feeds PLC are among the major companies importing breeding stock, supplying DOCs and hatching eggs.

TABLE 4. Some of the major hatcheries in Ethiopia, 2015

Company name	Capacity		DOC delivered per year	Parent source
	Setters	Hatchers		
Abebaw (Modjo)	28 080	7 000	365 000	ISA
Alema Farms (new)	225 000	98 000	2 880 000	ISA, Cobb and Lohman
Ayma Poultry Farm (Alemshet Degife)	57 000	19 200	250 000	ISA
Daniel Getu	57 600	19 200	100 000	ISA
ELERE Farm (Fanta Terefe)	180 000	72 600	1 300 000	Cobb and Lohman
Gerado Farm (Ebrahim)	76 800	19 200	250 000	ISA
Hawasa Genene	57 600	18 000	120 000	ISA
SW Poultry Farm (Samson Wossen)	77 000	19 200	300 000	ISA
Kombolcha (Shimelis)	168 400	42 000	450 000	ISA and Koekoek
ELFORA	210 000	76 000	112 000 (per week)	Ross and Hendrix
ELFORA (new farm in Chefa)	410 472	82 944	6 000 000	Cobb
Bracod Agro-industry	38 400	19 200	2 000	Lohman
Andasa (Bahir Dar)	38 000	12 000	10 000	Lohman
Milkias Albert	76 800	19 200	-	Cobb
Ethiochicken	N/A	N/A	2 400 000	N/A
SAFE Poultry PLC	N/A	N/A	2 000 000	N/A
Astral Foods PLC	N/A	N/A	50 000 (per hatch)	N/A
Feedco Animal Feeds PLC	N/A	N/A	50 000 (per hatch)	N/A

Note: N/A= not available.

Source: Boere *et al.*, 2015

Table 4 presents some of the major hatcheries in Ethiopia in 2015. The parent stock farms at Alema Farms PLC rear 10 000 broilers and 5 000 layers of Ross and Lohman breeds,

respectively. The hatchery produces 2.88 million broiler and layer DOCs per year; approximately half of the broiler DOCs produced are used for own production, the remaining half are for sale.

The existing hatchery of ELFORA Agro-Industries can produce 112 000 DOCs per week and an additional four new hatcheries are being established with capacity of 6 million DOCs per year. Although ELFORA has the largest DOC production capacity, SAFE Poultry PLC, producing around 2 million DOCs per year, is probably the largest supplier of layer DOCs to small-scale intensive family poultry producers having a formal marketing chain with farmers for the DOCs they provide. The DOCs produced by the former are mainly for use within its own farms.

Ethiochicken is the other company engaged in the introduction of parent stock and DOCs. It also operates through a tailor-made distribution model with the government by supplying 40-day-old dual purpose chicken to rural smallholder farmers. Its hatchery has a capacity of at least 2.4 million DOCs per year.

Astral Foods PLC and Feedco Animal Feeds PLC also produce substantial numbers of broiler and layer DOCs each with a hatching capacity of 50 000 DOCs per batch. None of these companies are apparently engaged in the supply of fertile hatching eggs.

Despite the growing production of broiler and layer DOCs, the total output of the Ethiopian hatcheries is too low and currently there is a severe shortage of DOCs in the country. Most of the hatcheries in Ethiopia are poorly functioning. Knowledge on the hatching process is low and management standards in most of the hatcheries are poor. Management of parent stocks and hatcheries are below global industry standards (Boere *et al.*, 2015).

Broiler meat

ELFORA Agro-Industries PLC and Alema Farms are the two major large-scale intensive broiler producers in the country. ELFORA Agro-Industries PLC has a processing plant with an annual production capacity of 1 000 tonnes of broiler meat. In addition to this, in 2015 it has established an integrated poultry farm in Chefa with a capacity of 714 000 broilers per year, producing 5 000–6 000 tonnes of broiler meat annually. Two of its processing plants have export hygiene standards approved and registered by the Ministry of Agriculture (MoA). Alema Farms has an annual production capacity of 150 000 broilers. The farm has a chicken processing plant with a single processing line for 2 000 birds per hour; they also further process some of the chicken meat into sausages. Currently, Alema Farms operates at limited production, slaughtering only 4 000 broilers per day.

Hen table eggs

ELFORA produces about 112 million table eggs annually. The layer farms of Alema Farms hold around 15 000 commercial layers. Ethiopia has around 10–20 medium-scale intensive poultry producers keeping between 1 000–10 000 broilers and layers, e.g. Maranata, Almaz, Abebaw Modjo, Genesis and Fanta poultry farms. Although data on their exact contribution to national production is not available, they provide a large amount of eggs and poultry meat to the growing towns (Boere *et al.*, 2015; Vernooij *et al.*, 2012).

Feed resources and feeding systems

Most of the poultry companies described above have their own feed mills. The feeds produced by most of these companies are intended primarily for consumption within their own farms and only the surplus is sold to other producers. However, not all intensive poultry producers own feed mills. Producers operating at and around 1 000 birds purchase compound feeds from larger poultry producers and other companies specialized in feed mill operations. Compound feeds are available mostly in the form of mash. Pellets are not common. Feeding systems are rarely automated, including in large-scale intensive farms operating over 10 000 birds.

Environmental aspects (waste management)

Most intensive poultry farms in Ethiopia do not have clear waste management schemes. The manure and processing by-products are usually disposed of right outside the towns where the farms are located. Part of the poultry litter is sold to livestock producers, particularly to be recycled as an ingredient of the feed mixtures for fattening cattle. The litter sold as feed ingredient is untreated and carries many undesirable elements and contaminants such as feathers, antibiotics and other poultry house wastes. Vegetable producers and gardeners are also regular customers buying untreated poultry litter and manure for use as fertilizer. The current practice of using untreated poultry litter by vegetable producers and gardeners in close proximity to poultry farms can potentially cause spread or recurrence of disease. Inspection and regulation by environmental protection authorities is almost non-existent.

CASE STUDY 1. Adama Poultry Farm, Poultry Products and Feed Processing PLC.: a medium-scale intensive layer farm in Adama

This company is located in Oromia Regional State, Adama town, about 90 km East of Addis Ababa. It is a private commercial farm owned by Mr Wondwesen Belay and managed by Mr Ghirmai Gebreselassie. The farm employs a total of 28 workers including a veterinarian, administrative and feed mill operating staff, a supervisor, poultry farm attendants, gardeners and security guards. The poultry farm is located in a well-developed site with electricity and adequate water supply and all weather road access.

The poultry houses have concrete walls with corrugated iron roofs, equipped with relatively modern feeding and watering troughs and laying nests. The birds are housed on bedded floors with standard housing spaces in sufficiently ventilated and clean houses.

The total annual production capacity of the farm is 10 000 birds. The farm has a hatchery with capacity of producing 10 000 DOCs per month and a feed mill with capacity of 1 tonne/hour. It also has a mini –processing plant with a small freezer capacity. Currently the farm produces table eggs only and is operating at about half its total capacity with 5 250 Bovans Brown layers. Laying hens (and replacement stock) are raised from DOCs purchased from other large-scale intensive poultry producers. The hatchery and processing facilities are not functional due to technical reasons.

The farm produces its own compound feed using raw feed materials obtained from local markets, premixes are purchased from importers. Vaccinations against ND, Marek's, Gumboro and Fowl Pox are carried out on a regular basis following the schedules provided by the

manufacturer. The mortality rate of the farm during the brooding and growing period ranges from 10 to 15 percent. Daily records are kept on laying performance, morbidity and mortality. Table eggs are sold to local traders and supermarkets around Adama and Addis Ababa. Prices fluctuate seasonally, falling substantially during the Orthodox Christians' fasting periods. Interference of brokers and lack of market information are serious constraints to the marketing of products. The poultry farm wastes are disposed into deep pits while dead birds are incinerated.

2.2.3. Family poultry production systems

In rural areas, family poultry production systems generate tremendous opportunities in terms of improving food security and nutrition and empowering women. Family poultry production is a suitable enterprise for women and poor households due to the small quantity of land needed and low investment costs required to start up and run the operation. Family poultry production can empower rural women, despite their often poorer access to land and inputs as well as their heavy work burden within rural households.

In this review, family poultry production systems are classified into four categories based on market access, production objectives, level of specialization/technology use, flock size, etc. (Appendix 1). The characteristics of such systems in Ethiopia are described below:

1) The *small-scale intensive system*, is based on the use of specialized, commercial DOCs or pullets (200–1 000 broilers, 100–500 layers), commercial balanced rations and good quality houses. Producers under this system have full access to veterinary services and the overall mortality rates of birds are low to medium (<20 percent).

The small-scale intensive system is rapidly growing in the urban and peri-urban areas of the country. They are mostly run as family businesses and considered as important sources of income for many families. Small-scale intensive poultry production currently plays a significant role in the employment of youth.

Producers obtain DOCs from the medium- and large-scale intensive poultry farms and hatcheries indicated in the previous section (Table 4). They purchase compound feeds from large-scale intensive farms and feed mills, such as the Alema Koudijs Feeds, but their supply is inadequate and intermittent. The majority of the feed used by these producers comes from smaller feed mills which include feed producers preparing small quantities of poultry feeds at the household level and smaller feed mills processing feeds for poultry, sheep, goats and dairy cattle.

2) The *semi-intensive system* is characterized by flocks ranging from 50 to 200 birds, using commercial, crossbred or indigenous breeds reared under scavenging management conditions with regular supplementation. Differently from scavenging systems, birds are provided with housing and improved health care, resulting in low to medium mortality rates (from 20 to >50 percent).

The Ethiopian Livestock Master Plan (LMP) estimated that there were about 120 000 households under the semi-intensive family poultry system in 2014 (Shapiro *et al.*, 2015). However, the CSA report shows that the number of chicken holders with flock sizes ranging from 50 to 199 is only about 9 000, of which around 8 000 holding from 50 to 99 chickens (CSA, 2017).

TABLE 5. Number of chicken holders by size of chicken holding, 2017

Region	Total number of households owning chickens (thousands)	Number of households by size of chicken holding			
		1 to 9 chickens	10 to 49 chickens	50 to 99 chickens	100 to 199 chickens
Country's total	9 649.2	7 696	1 945	7.1	1.1
SNNPR	2 032.4	1 702	330	0.3	0.1
Oromia	3 256	2 581	674	1	-
Tigray	919.6	727	192	0.6	-
Amhara	3 174	2 500	669	4	1
Benshangul Gumuz	148.4	101	47	0.3	-
Gambela	36.3	21	15	0.3	-
Afar	22.5	15	7	0.5	-
Somali	27	22	5	-	-
Harari	14	11	3	-	-
Dire Dawa	19	16	3	0.04	-

Source: CSA, 2017

3) The *extensive scavenging system* shares almost all the attributes described below for small extensive system. However, it is based on a larger flock size (ranging from 5 to 50 birds) comprised of indigenous and/or crossbred chickens and it is practiced by households having access to rural markets. Producers in this system do not have regular access to exotic chickens and usually raise their own replacement stock. Food security and income generation are the primary reasons for keeping chickens. They use broody hens to hatch replacement stock.

4) The *small-extensive scavenging system* is practiced by households located in remote villages with little or no access to markets, with the main purpose of chicken rearing being for household consumption. It is based on a flock size of 1–5 indigenous chickens kept under scavenging conditions. Birds have no or little supplementary feeding and no housing. Chicks are produced through natural incubation. This system is also characterized by high chicken mortality (often >70 percent) due to lack of proper health care and veterinary services.

The extensive scavenging and small-extensive scavenging systems are the dominant forms of poultry production in Ethiopia. A report by the CSA (CSA, 2017) shows that out of the estimated total of 17.2 million households in the country, the number of households keeping poultry is about 9.6 million (56 percent). About 80 percent of such households (7.7 million households) keep from 1 to 9 chickens while 19.6 percent (about 1.9 million households) keep from 10 to 49 chickens (Table 5), indicating that the dominant proportion of poultry producers practice small-extensive scavenging family poultry production followed by extensive scavenging.

In extensive scavenging systems, poultry keeping is mainly an activity undertaken by women and can be a source of supplementary income. Poultry can contribute to as much as 20–25 percent of the household income, much of which is controlled by women (Ayele and Rich, 2010). A study by Gebremedhin *et al.* (2016) found that decisions on the income generated

from scavenging poultry belonged to women in 30 percent of the cases and by both women and men in about 54 percent of the cases. Poultry income is often used to cover school expenses, indicating that targeting rural women in family poultry development schemes does not only mean empowering women but also contributing to the education of their children.

The small-extensive scavenging and extensive scavenging family poultry production systems are low-input low-output systems. Table 6 presents the proportion of different poultry types in the flock. The overall flock structure shows significant number of unproductive birds carried both to ensure replacement and also as a means of averting risks associated to the heavy mortality inherent in this type of system. Laying hens comprise only about 34 percent of the total national poultry flock.

TABLE 6. Estimated number (thousands) of poultry by type and breed classification in Ethiopia, 2017

Poultry type*	All poultry		Breed classification					
			Indigenous		Exotic		Hybrid	
	Number	%	Number	%	Number	%	Number	%
Cocks	5 843	9.8	5 283	8.9	258	0.4	302	0.5
Cockerels	3 296	5.5	2 997	5.0	102	0.2	197	0.3
Pullets	6 246	10.5	5 416	9.1	437	0.7	393	0.7
Non-laying hens	1 629	2.7	1 506	2.5	59	0.1	64	0.1
Chicks	22 568	37.9	21 499	36.1	240	0.4	830	1.4
Laying hens	19 912	33.6	17 352	29.2	1 515	2.6	1 045	1.8
Total	59 495	100	54 054	90.9	2 610	4.4	2 831	4.7
*Poultry are classified according to the Ethiopian context: males and hens over 24 weeks of age are referred to as cocks and laying-hens, males and females between 8 and 24 weeks are referred to as cockerels and pullets, both males and females from day-old to 8 weeks of age are referred to as chicks, and spent hens in the poultry flock are referred to as non-laying hens.								

Source: CSA, 2017

CASE STUDY 2. Elfinesh Balcha uses income from extensive scavenging chickens to send her children to school

Elfinesh Balcha is a 30-year old woman with a family of 5 members, living in a rural village called 'Dubbo' in the SNNPR region. Beside working on the farm and undertaking household activities, she is responsible for the day-to-day management of family poultry (e.g. feeding, watering and cleaning of night shelters), with the help of her three children.



Ms Balcha completed secondary school and received training on poultry production offered jointly by the government extension service and the Areka Agricultural Research Centre. She keeps eight exotic chickens – which she purchased from the government extension service – and three indigenous hens under scavenging management with

occasional feed supplementation. The supplements used are cereals, mainly maize and wheat, purchased from the local market. Commercial poultry feeds, veterinary pharmaceuticals, vaccines (only available for cattle) and improved birds are not easily accessible. The chickens are sheltered during the night with other animals. Ms Balcha keeps no records on the performance of the chickens.

Elfinesh Balcha raises chicken for income and occasional household consumption. The sale of chickens and eggs makes around 10–15 percent of her income. The prices of poultry products are seasonal. For instance, during the Orthodox non-fasting season three eggs are sold for 10 Birr while during the major fasting seasons four eggs are sold for the same price. Much of the poultry money is used to pay for children's school fees and materials (e.g. books and pens). Ms Balcha's main source of income is butter trading.

2.2.4. Feed resources

In small-extensive scavenging family poultry systems, production is almost entirely dependent on the scavenging feed resources available within the local environment such as household wastes and food leftovers, field crops, worms and insects. The quantity and quality of the scavenging feed resources vary mainly depending on the season of the year. Occasional supplementation exists for birds in the extensive scavenging family poultry production system. In the intensive systems, poultry are fed compound rations and feed is the single most important factor determining the cost of poultry production.

The most common poultry feed ingredients in the country are cereal grains, milling by products (e.g. wheat shorts and middling) and oil seed cakes (e.g. noug seed cake, cotton seed cake, sunflower cake, sesame cake, groundnut cake and linseed cake). The major cereals grown include maize, wheat, sorghum, teff and barley. In 2014, maize, the major cereal crop used in poultry feeding, covered about two million hectares of land with annual production of around 7.2 million tonnes of grains. At the same time, soybean, the major oil seed used in poultry rations, covered about 35 000 hectares of land with an annual production of around 72 000 tonnes of grains (CSA, 2015b).

TABLE 7. Production capacities of some of the major feed mills

Name of feed mill	Facility/production capacity				
	Feed mill (tonnes/hour)	Mixer (tonnes/hour)	Liquid mixing facility (tonnes)	Ingredient storage capacity (tonnes)	Processed feed storage capacity (tonnes)
Alema Koudijs Feeds PLC	12.5	15	1.5	500	1 000
Ashraf	6.25	6.25	-	500	300
Akaki Animal Feed PLC	5.2	8	-	1 000	500
Kaliti Animal Feed Enterprise	4	6	-	1 500	-
Addis Alem Agriculture Development PLC	2	4	-	3 000	1 000
BSLF Animal Feed Processing Plant	0.5	0.5	-	-	-
Fantu and Family	0.5	0.5	-	100	
HBH General Business	2	1.5	-	50	20
Adaa Dairy Cooperative	1.5	1	-	100	60
Almaz Poultry and Feed Processing Enterprise	0.5	0.5	-	40	-
Ethiofeed PLC	2	1	-	300	20
Astral Foods PLC*	10	-	-	-	-
Feedco Animal Feeds PLC*	10	-	-	-	-

Source: B. Yemane, personal communication, 2017; *Boere *et al.*, 2015

However, there are still substantial gaps in the supply of major feed raw materials used in poultry feeding, particularly maize and soybean. For instance, the amount of poultry feed required for semi-intensive family poultry production in the year 2020 is estimated at 266 600 tonnes of maize and 127 300 tonnes of soybean meal. This would imply that 51 900 ha of additional land would be required for maize production and 43 200 ha for soybean production (Shapiro *et al.*, 2015). Intensive poultry systems also need significant quantities of these ingredients.

Table 7 presents some of the major commercial feed producers manufacturing specialized poultry feeds in the country. Some of the notable companies include Alema Koudijs Feeds, Ethiofeeds and Friendship Agro-industries. These three companies use local feed raw materials. Premixes used in the feed formulations are generally imported. However, a number of foreign companies, including Astral Foods and Feedco, have recently gotten involved in feed manufacturing.

The feed mills of Astral Foods and Feedco produce pellet lines and extruders. Feedco plans to grow its annual capacity to 150 000 tonnes and to produce premixes in Ethiopia. The other large poultry companies such as Ethiochicken and Elfora Agro-industries PLC also produce

significant quantities of compound poultry feeds but chiefly for their own consumption. Moreover, Modjo feed company produces about 1 500 tonnes of feed per week. Much of the poultry feeds used in small-scale intensive and semi-intensive family poultry farms comes from feed producers preparing poultry feeds at the household level (Ayele and Rich, 2010). As most feed companies require payments in cash before or on delivery, the small- and medium-scale poultry farmers who do not have easy access to hard cash can be challenged.

Despite the existence of several feed companies in Ethiopia, a survey conducted between September 2015 and August 2016 by the Ethiopian Animal Feed Industries Association (EAFIA) indicated that the national supply of commercial feeds is very low (Seyoum, forthcoming). Although around 50 percent of the compound feeds produced during the survey period were for poultry, the total quantity produced was less than 31 000 tonnes per year (Table 8). Considering the production potentials indicated in Table 7, most of the feed mills in the country do not seem to operate at their capacities. This could be an opportunity for international feed companies, but they would have to face the challenge of producing quality feed at affordable prices for Ethiopian poultry producers.

Reliable data on the prices of commercial feeds are lacking. However, the price of compound feeds is generally perceived to be high by producers, particularly small-scale intensive and semi-intensive family poultry producers. As availability, price and quality of feeds are the most important factors limiting commercial poultry production in Ethiopia, the promotion of feed efficiency through removal of the 15 percent VAT on imported supplements (VAT on poultry feeds has recently been exempted) and reducing the 53 percent import tax on premixes and concentrates combined with the enforcement of the existing quality control regulations deserve considerations.

TABLE 8. Quantity of major compound feeds produced (tonnes/year) by private feed processing plants and farmers' unions from September 2015 to August 2016

Feed type	Private feed processing plants	Feed plants of farmers' unions	Total	% share
Dairy feed	12 276	4 156	16 432	27
Beef cattle feed	6 572	5 372	11 944	19
Poultry feed	30 750	143	30 894	50
Other feeds (sheep, goats, pigs)	2 220	95	2 315	4
Total	51 820	9 766	61 586	
% share	84	16		

Source: Seyoum, forthcoming

2.2.5. Poultry and public health

Highly Pathogenic Avian Influenza (HPAI)

Currently, HPAI is reported in 11 African countries (OIE, 2017). Although there have been no HPAI outbreaks in Ethiopia, the country has experienced scares resulting in demand shocks in the past (Ntsefong *et al.*, 2017).

With a few exceptions, the biosecurity level is low in most of the intensive poultry farms in the country. In family poultry production systems, there is almost no concern over biosecurity issues.

Other major poultry diseases

Newcastle disease (ND), Infectious bursal disease (IBD), Marek's disease, Mycoplasmosis, Salmonellosis, Colibacillosis, Coccidiosis, Toxoplasmosis and Helminthosis are poultry diseases with significant economic importance both in the family poultry production systems and intensive production systems in Ethiopia. ND is identified to be the most important disease in all production systems, being responsible for the largest proportion of morbidity and mortality in all parts of the country (Desalegn, 2015).

The National Veterinary Institute (NVI) produces 16 types of livestock vaccines, including against major poultry diseases such as ND and fowl pox. The institute produces a range of ND vaccines (HB1, La Sota and I-2 strains) and provides them on request to large and small poultry producers. The guidelines supplied to users along with the vaccines and the dosages are suitable for intensive systems (including semi-intensive family poultry systems) but not tailored for use in scavenging family poultry production systems. Although flocks in the medium- and large-scale intensive systems appear to be vaccinated regularly, vaccination in the extensive and small-extensive scavenging poultry systems is only carried out in times of outbreak.

CSA (2017) reported huge losses of chickens due to disease and causes other than disease in different parts of the country during the year 2016 (Table 9). The huge losses due to different diseases (over 34 million birds in total) result from the little or no national programme for control and prevention of poultry diseases. The CSA report shows that there was no vaccination programme in all regions, and that some regions attempted to treat afflicted birds but with poor results. During the same year, close to 30 million birds was lost due to causes other than disease. The high number of poultry losses (Table 9), severely impacts the income and livelihood of rural poultry farmers. A national major initiative would be required to reduce the incidence of poultry losses.

TABLE 9. Number of chickens afflicted, treated and died of disease and other causes in different parts of Ethiopia, 2016

Geographic area	Afflicted/ diseased	Treated	Died from disease	Died/lost due to other causes
Tigray	3 518 279	303 934	3 341 847	3 330 134
Amhara	14 041 685	1 635 077	13 325 307	10 392 633
Oromia	10 956 017	1 762 241	10 213 579	8 745 963
SNNPR	3 705 908	493 168	3 356 217	6 066 455
Benshangul Gumuz	1 650 719	203 619	1 516 426	960 913
Gambela	206 688	6 365	196 430	204 767
Afar	76 530	-	69 630	51 599
Somali	59 472	-	58 636	79 079
Harari	8 129	-	7 728	100 658
Dire Dawa	29 122	-	27 043	55 712
Ethiopia	34 252 549	4 404 404	32 112 843	29 987 913

Source: CSA, 2017

The high number of poultry losses suggests inefficiencies in animal health services, despite the many institutions and professionals working in the sector. In almost every wereda (district), there are veterinary clinics staffed with veterinarians. Approximately one for every three kebele (village) has an animal health post with animal health assistants responsible for the diagnosis and treatment of diseases emerging at the farm level. The assistants are supported by the veterinarians stationed in the wereda/district offices of agriculture. In addition to this, there is one federal animal health laboratory (the National Animal Health Diagnostic and Investigation Centre, NAHDIC, at Sebeta) and 14 regional animal health laboratories distributed across all regions. In 2015, according to Precise Consult International, there were a total of 9 711 animal health professionals, 256 at federal level and the remaining 9 455 distributed in all regions. Veterinarians accounted for about 9.3 percent (902 of 9 711), with the remaining being lower level animal health professionals (BSc, Animal Health Assistants).

The public clinics and animal health posts generally lack diagnostic capacities and drug sales outlets. The capacity for diagnosis of poultry diseases, both physical and human, does not exist even at regional and wereda/district levels. On the other hand, the private sector is poorly involved in the provision of animal health services (Table 10). There is an urgent need to finalize and implement the recent initiative of the country to rationalize public and private sector roles in the provision of veterinary services with the aim to transition to private provision of clinical services, wherever feasible.

TABLE 10. Number of private and public formal animal health service centres in 40 sample weredas/districts

Sector	Clinics and animal health posts	Drug sales outlets	Total
Public	318	0	318
Private	47	139	186
Total	365	139	504

Source: Boere *et al.*, 2015

The high losses associated to causes other than disease are mainly due to predator attacks. Such losses can be largely attributed to poor management practices and lack of poultry housing under small-extensive and extensive scavenging family poultry systems.

2.2.6. Environment

The most serious environmental concern in the Ethiopian poultry sector arises from the existing poor waste management practices. Manure and poultry litter are poorly handled and randomly disposed of. Some farms sell untreated poultry litter as cattle feed and manure for fertilizing horticultural crops. Waste from larger poultry integrators includes large number of dead birds, hatchery and processing plant wastes. Clear waste management schemes and facilities are lacking and the increasing scale of commercialization and mass production that are expected in the foreseeable future implies the need for adequate preparations.

Although many of the investment projects are required to undergo environmental assessment through the Environmental Protection Authority of Ethiopia before licensing, government regulatory bodies have poor awareness and capacity to make critical assessment on environmental impacts, whether short or long term.

2.3. POULTRY VALUE CHAIN ANALYSIS

Several studies have been conducted to map the poultry value chain of Ethiopia. Vernooij *et al.* (2012) mapped the commercial poultry value chain for broiler chicken meat and table eggs of exotic origin describing the challenges and opportunities in the supply chain by classifying the producers based on the definition of farm sizes as small-scale (capacity of 50 to 1 000 birds), medium-scale (1 000 to 10 000 birds) and large-scale (over 10 000 birds). Both the broiler and layer poultry value chains showed a low level of specialization with a limited number of actors. There is a high level of integration of activities in the value chain of the large-scale poultry producers, with feed, multiplication, hatching, production and retailing often all in one business.

The number of actors on different scales in the broiler and layer poultry value chains follows a pyramid structure, with only a few large-scale farms, a few tens of medium-scale farms and a few hundred small-scale farms. The findings of the value chain mapping by Vernooij *et al.* (2012), showed that the structure of both the chicken meat and table eggs value chains have many features in common, as described below.

2.3.1. Chicken meat

Feed

The number of feed manufacturers producing specialized poultry feeds is small. Although recently expanding through the establishment of foreign feed companies such as Astral Foods and Feedco, the number of local companies manufacturing compound feeds is limited (the notable ones being Alema Koudijs Feeds, Akaki Animal Feeds PLC, Ethiofeed, Friendship Agro-industry). All the feed companies use local raw materials and imported premixes.

The growing demand for poultry and poultry products in Ethiopia, provides a huge opportunity for both local and international poultry feed manufacturing companies.

Vaccines and drugs

Most of the vaccines used in the poultry sector are produced locally by the National Veterinary Institute (NVI). The NVI obtains the necessary licences and certificates from the Ethiopian Veterinary Drugs and Animal Feeds Administration and Control Authority (VDFACA). The vaccines produced by NVI include live and inactivated vaccines against ND, IBD, fowl typhoid, and fowl pox, gumboro and marek's disease. Large-scale intensive poultry producers also use gumboro-marek's disease combined vaccine imported from France. Currently, the Equatorial Business Group, Rangvet PLC, East Africa Pharmaceuticals, and Gasco Trading are the notable importers and suppliers of veterinary products (Boere *et al.*, 2015).

Equipment

Almost all equipment used in commercial poultry farms are imported by many different traders. Small and medium farms usually buy feeders and drinkers directly from local suppliers. The more specialized equipment such as processing equipment, hatchers and climate systems used by large-scale farms are purchased by the farms directly from companies abroad. Friendship Agro-Industries, Gasco Trading and Wiseman PLC are the most important importers and suppliers of equipment.

Multiplication and hatching

Large-scale farms operating over 10 000 birds import DOCs directly from multiplication centres abroad. Smaller intensive farms instead need to make joint orders to meet the minimum number of DOCs permitted by the government for import. Large-scale farms also import parent stock to produce DOCs and occasionally hatching eggs. The large-scale farms use the DOCs both for their own production and to supply other farms, mainly small- and medium-scale farms.

The total output of the hatcheries is currently too low to meet the demand for DOCs. According to a survey conducted in 2014, this resulted in long waiting lists of poultry keepers and empty houses for as long as 7 months (Boere *et al.*, 2015). This makes poultry production a risky venture and leads to many producers dropping out of the business.

Production of broilers

The number of producers involved in broiler production is much lower compared to table egg production. There are approximately 25–30 medium- to large-scale integrated farms that process and distribute their products themselves. The most important farms involved in

chicken meat production are indicated above (Section 2.2.2.). Generally, the sizes of such farms varies significantly ranging from farms keeping a few dozens of birds to farms keeping around 20 thousand birds.

Slaughtering/Processing

Small-scale farms usually sell live birds and do not have slaughtering facilities. Those who slaughter chickens at their farm use hired labour/butchers and brokers who take the carcasses to their own premises to dress and freeze them for marketing. Slaughtering and processing is carried out manually and 'Halal' slaughter is not practiced. The small-scale farms mostly produce whole plucked and eviscerated carcass.

The medium- and large-scale farms slaughter and process their own birds into plucked, eviscerated and frozen carcass. However, only a few of these farms go further into producing specialized cuts. The number of farms having automated slaughtering facilities is very small.

Collecting, trading and retailing

Broilers, mostly deep-frozen whole chickens, from large- and medium-scale farms are marketed through the farm's own super/mini markets or sold to other super/mini markets or market vendors. Small-scale farmers instead, generally sell poultry to brokers who collect, freeze and market processed products. Some small-scale farmers sell live birds directly to consumers in local markets.

2.3.2. Table eggs

Inputs

The input flow of the table eggs value chain is the same as that of the chicken meat value chain (see section 2.3.1).

Multiplication and hatching

The large-scale farms import parent stock to produce DOCs and occasionally hatching eggs to produce layer hens. The large-scale farms use the DOCs both for their own production and to supply other farms, mainly small- and medium-scale farms. The government multiplication centres (most of which are now privatized, leaving one or two out of the seven that existed a few years ago) distribute DOCs and pullets to rural farmers. A few medium-scale farms operating their own hatcheries buy fertile eggs from hatching egg exporters in Europe and hatch their own layer DOCs.

Production of table eggs

The most important farms involved in table egg production are mentioned in section 2.2.2. Similarly to broiler chicken farms, the size of layer farms varies significantly, ranging from farms keeping a few dozen layers to farms keeping a couple of ten thousands.

All large-scale layer farms rear pullets themselves, mostly from their own or imported DOCs. Most small-scale farms and some medium-scale farms, on the other hand, specialize either in pullet rearing or layer production. Some multiplication centres raise pullets to a point of lay and sell to small-scale farms for egg production.

Slaughtering/Processing

Spent chickens, comprising meat and egg producing females and males are usually marketed live directly to the local consumers mostly during festive occasions. However, some farms slaughter, process and sell spent chickens to market vendors for sale in minimarkets and specialized shops equipped with deep freezing facilities.

Collecting, trading and retailing

Large-scale farms use several routes to market the eggs they produce. These include sales through their own super/mini markets, sales to other super/mini markets, or direct sales to market vendors. Primary collectors are another route to the market, playing the role of middlemen in the distribution channel.

The key market channels for small and medium-scale farms are primary collectors. The latter collect the eggs from different farms and sell them to market vendors or super/mini markets. Consumers buy eggs from local markets as well as from kiosks and shops in villages or supermarkets in bigger cities.

3. Poultry and egg markets and regulations

Poultry and egg markets in Ethiopia are at an early stage of development. The scavenging family poultry production systems are the principal providers for the domestic market, supplying most of the marketable poultry products. The share of the intensive and semi-intensive poultry systems in the national market is currently on the rise. This section deals with aspects related to poultry supply and demand, trade, marketing and markets and issues related to policies and regulations. The section on poultry supply and demand highlights the sector's gaps in meeting the consumption needs of the population. The section on trade, marketing and markets highlights the position of the country in the global poultry export-import trade. Issues related to policies and regulations influencing the development of the sector are presented in the final section.

3.1. POULTRY SUPPLY AND DEMAND

The supply of poultry meat and eggs remained very low during the past several decades. Section 3.1.1. covers highlights of current production and of trends in outputs of poultry meat and eggs over the past years. The per capita poultry meat and egg consumption in Ethiopia are presented in section 3.1.2. and compared with global averages and consumption figures in other developing countries.

3.1.1. Production

The national poultry meat output in 2016 was estimated at about 13 000 tonnes. Ethiopia's share of the total poultry meat outputs in East Africa, Africa and the world in 2016 was only 2, 0.2 and 0.01 percent, respectively (Table 11). Similarly, its share of total eggs production when compared to East Africa, Africa and the world poultry eggs production in the same year (Table 12) was 11, 1.7 and 0.07 percent, respectively (FAOSTAT, 2018).

TABLE 11. Annual poultry meat production in Ethiopia as percentage share of African and global production, 2016

Country	Production (thousand tonnes)	Ethiopia (% share)
Ethiopia	13	
East Africa	688	2
Africa	5 913	0.2
World total	120 302	0.01

Source: FAOSTAT, 2018

TABLE 12. Annual poultry egg production in Ethiopia as percentage share of African and global production, 2016

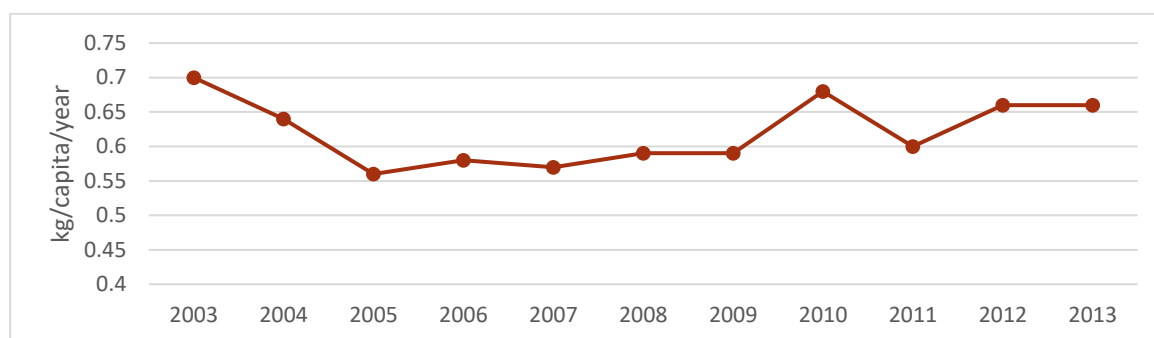
Country	Production (thousand tonnes)	Ethiopia (% share)
Ethiopia	54	
East Africa	492	11
Africa	3 225	1.7
World total	80 754	0.07

Source: FAOSTAT, 2018

3.1.2. Consumption

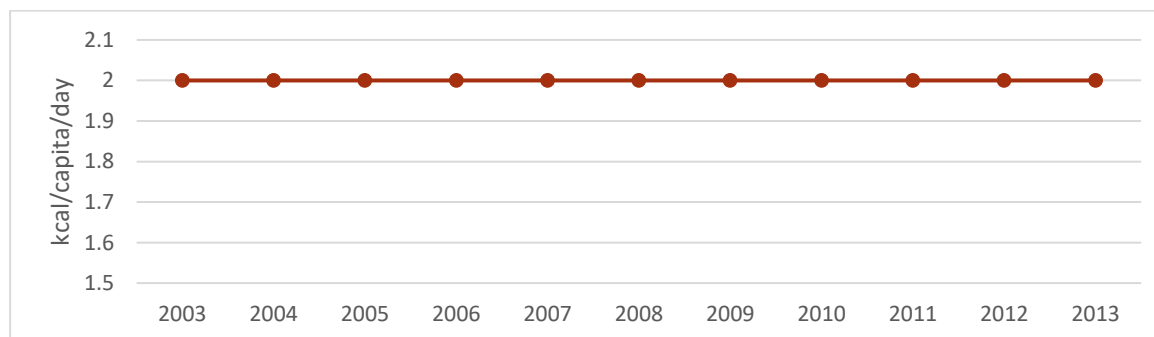
Poultry meat and egg consumption in Ethiopia is extremely low. In 2013, the per capita consumption of poultry meat was about 0.66 kg (Figure 6.a.). During the same year, the per capita annual poultry meat consumption of East Africa and Africa was estimated to be 1.64 and 6.73 kg, respectively, while the global average stood at 14.99 kg (FAOSTAT, 2018). The trends in consumption and the per capita intake of energy and protein derived from poultry meat (Figure 6.b., Figure 6.c.) have not changed much since 2003. The per capita consumption of eggs was also low, accounting for around 0.36 kg in 2013 (Figure 7.a.). The per capita intake of energy and protein derived from poultry eggs in 2013 were only 1 kcal/day and 0.11 g/day, respectively (Figure 7.b., Figure 7.c.).

FIGURE 6.A. Poultry meat consumption, 2003–2013



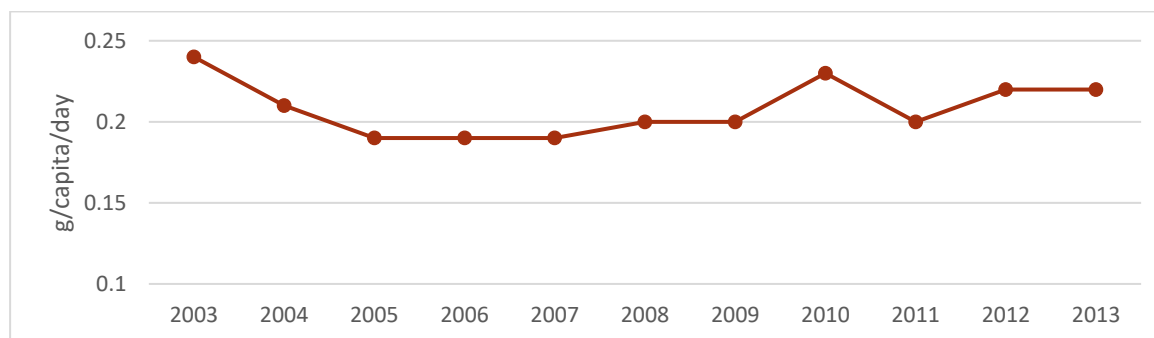
Source: FAOSTAT, 2018

FIGURE 6.B. Per capita intake of energy derived from poultry meat, 2003–2013

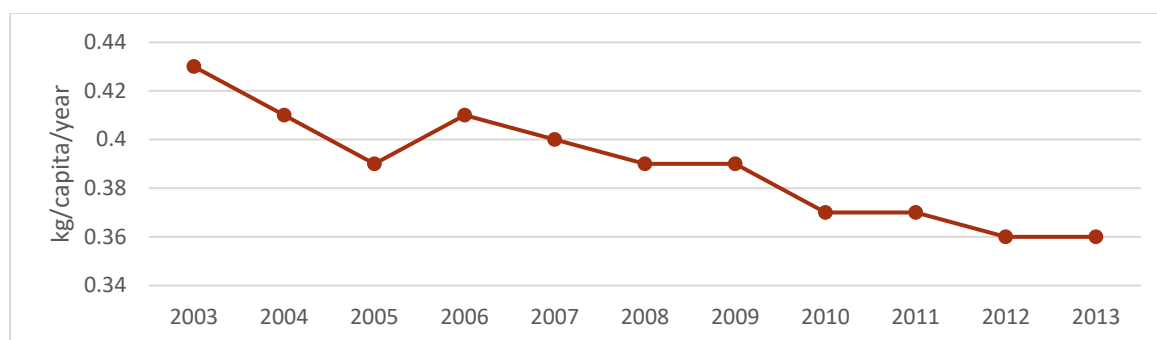


Source: FAOSTAT, 2018

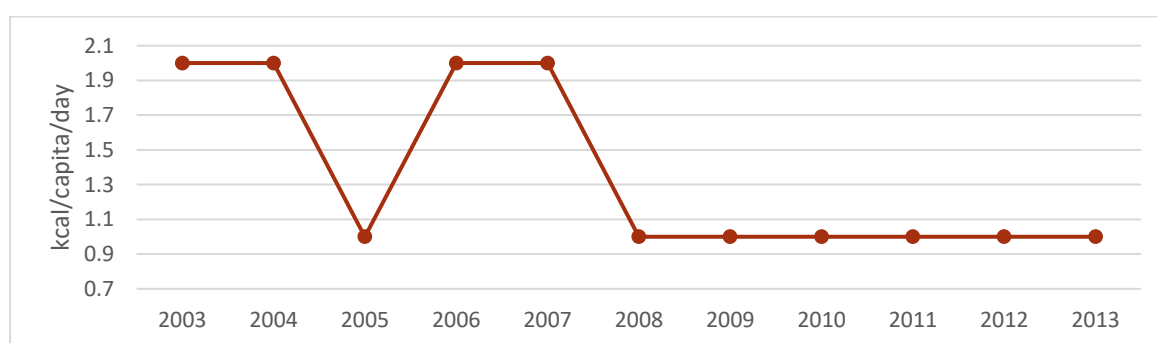
FIGURE 6.C. Per capita intake of protein derived from poultry meat, 2003–2013



Source: FAOSTAT, 2018

FIGURE 7.A. Poultry egg consumption, 2003–2013

Source: FAOSTAT, 2018

FIGURE 7.B. Per capita intake of energy derived from poultry eggs, 2003–2013

Source: FAOSTAT, 2018

FIGURE 7.C. Per capita intake of protein derived from poultry eggs, 2003–2013

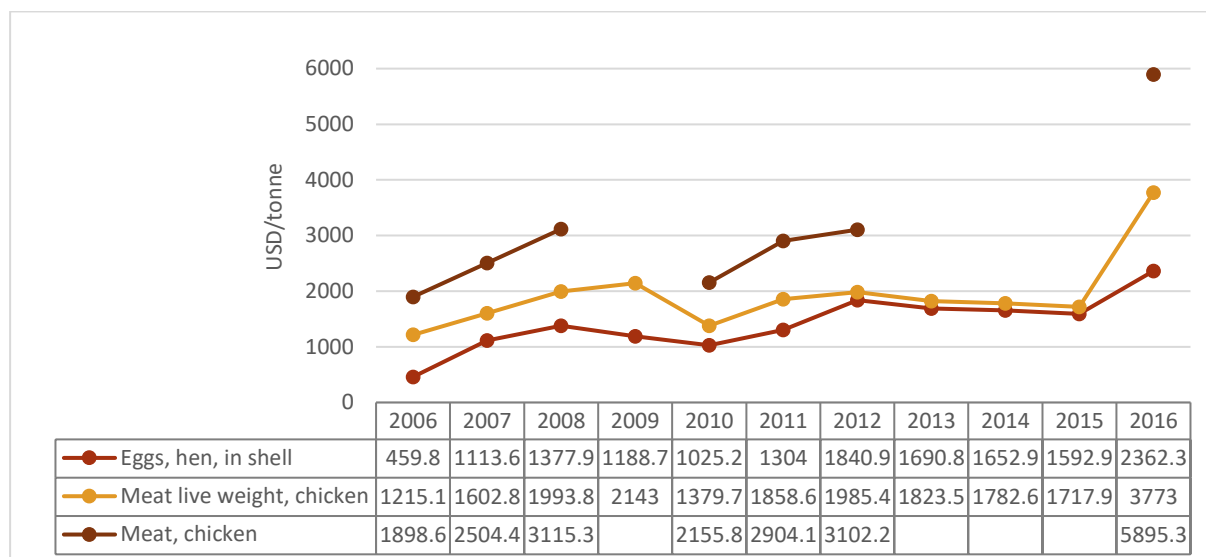
Source: FAOSTAT, 2018

3.1.3. Prices

Information on producer prices for production of hen eggs and chicken meat is presented in Figure 8. The general trend is that producer prices have slightly increased from 2006 to 2008. The trends in producer prices fluctuated until they showed sharp rises in 2016. Compared to 2006, the producer price per tonne of hen eggs in shell increased five-fold in 2016, from 460 to 2 362 USD, while prices for production of live weight chickens and chicken meat increased by about three-fold each. The reason for the sudden sharp rise in the prices per unit of hen eggs in shell and chicken meat produced is not clear.

Market prices of chicken in Ethiopia are seasonal. Consumer prices generally rise during holidays such as Easter, New Year and Christmas. Consumer price information obtained in June 2017 shows that price of a live bird weighing between 1.5 to 1.8 kg is between 9–10 USD while the retail price for frozen whole chicken produced locally was between 4–5 USD per kg (USDA, 2017). The reason for this price difference is attributed to the preference of Ethiopian consumers to buying live birds and slaughtering them at home.

FIGURE 8. Producer price (USD/tonne), 2006–2016



Source: FAOSTAT, 2018

3.2. TRADE, MARKETING AND MARKETS

The section on domestic market (3.2.1.) presents the current trends and prospects existing in the country for increased consumption and hence demands of poultry products. The section on trade (3.2.2.) provides brief information on the import and export of poultry and poultry products. It shows that import trades are largely based on introduction of parent stocks and DOCs for broiler and egg production by large-scale intensive poultry producers from poultry breeding and multiplication companies in Europe.

3.2.1. Domestic market

With over 100 million people, the Ethiopian population is the second largest and one of the fastest growing in Africa. It is expected to grow to about 112 million in 2020 and to 125 million in 2025 (UNDESA, 2017). Currently, about 20 percent of the population lives in the cities. The urban population increased from 9.7 million to 19.3 million between 2000 and 2015. This number is expected to rise further to 30.2 million by 2025 and 70.5 million by 2050 (Figure 2). Although the current consumption of poultry products is among the lowest in the world, the domestic market is expected to take off following the trends in the population growth and increasing income. The market share of eggs and chicken meat from exotic breeds is growing. For instance, in 2014 the contribution of exotic chickens to the total national egg output was less than 5 percent (CSA, 2015a). In 2016, exotic breeds contributed to 27.3 percent of the total number of eggs produced nationally (CSA, 2017).

Although traditionally the eggs and meat from exotic breeds are less preferred to the indigenous owing to the existing cooking and consumption habits, the trend is changing. There are large numbers of bulk consumers such as full board public universities and colleges (serving over half a million students), hospitals, hotels and restaurants. Promotion and education on preparation of different food recipes is underway and public awareness on diverse cooking styles is on the rise.

None of the major international fast food brands (e.g. McDonald's or Kentucky Fried Chicken) have restaurants in Ethiopia. The reason is that there are no poultry meat processing plants in Ethiopia meeting the welfare, slaughter, health, biosecurity and Hazard Analysis and Critical Control Points (HACCP) standards required by these major fast food chains (USDA, 2017).

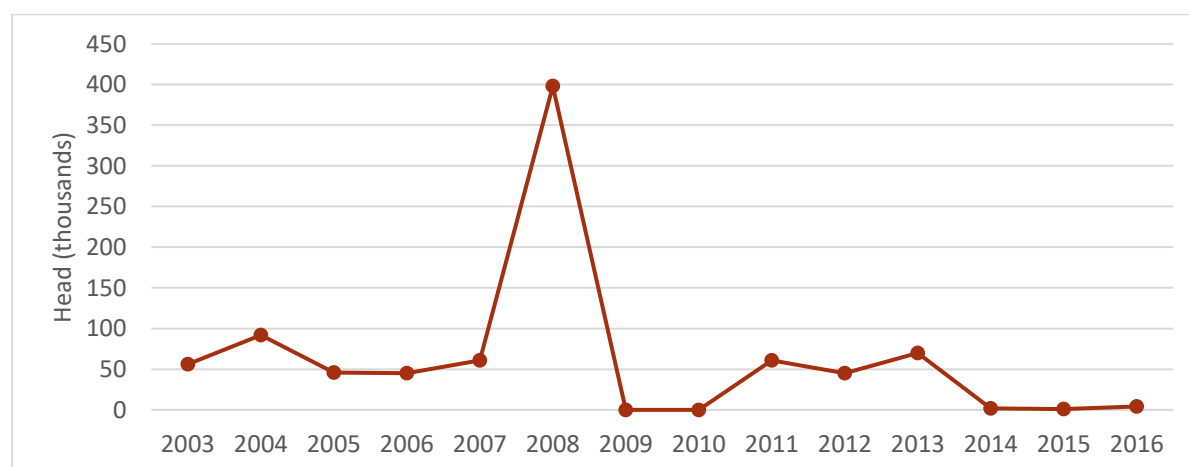
3.2.2. Trade

Poultry and poultry products are probably among the least traded commodities in Ethiopia. Despite the lack of consistent and reliable statistics, some sources indicate that Ethiopia has been importing parent DOCs for many years. All the breeding stock and DOCs used by large-scale intensive poultry producers and government multiplication centres are imported. Figure 9.a. shows that the country imported varying quantity of live chickens from 2003 to 2016. The largest quantity imported was in 2008 (398 000 heads), with no imports in the subsequent two years, and very small quantities imported afterwards (FAOSTAT, 2018).

The only significant volume of chicken meat imported was 130 tonnes recorded in 2013 (Figure 9.b.). Relative to chicken meat substantial volumes of canned chicken meat were imported between 2014 (193 tonnes) and 2016 (141 tonnes). Importers of chicken meat and canned chickens are not clear, but Ethiopian Airlines and some of the international brand hotels in Addis Ababa that serve international customers are probably among the potential ones.

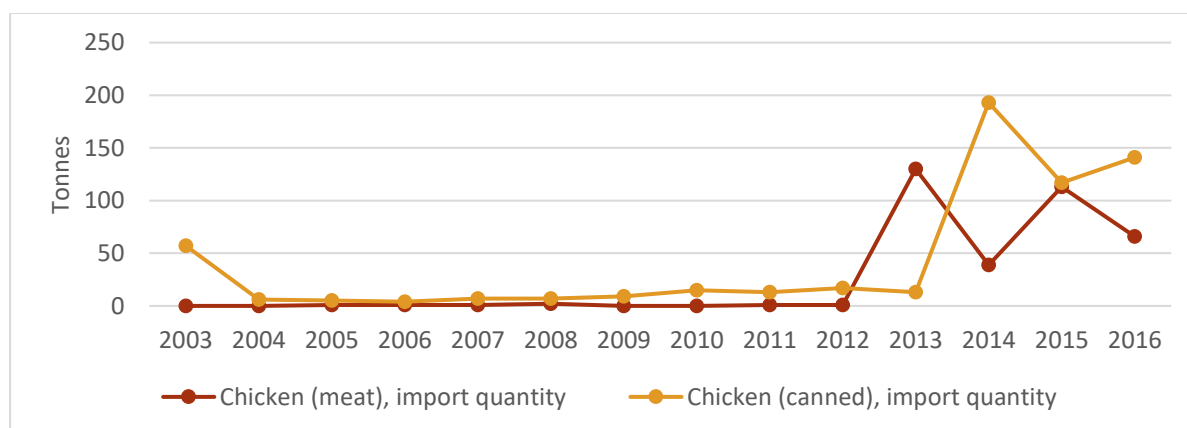
Ethiopia has almost no record of exporting either live poultry or any form of processed chicken meat. The Ethiopian LMP aims to achieve exportable surplus of poultry meat by 2020. However, export during this planned period appears to be impractical because local demand is expected to surpass supply and also it would be difficult for Ethiopia to compete on price and quality terms with major exporters such as the United States and Brazil (USDA, 2017).

FIGURE 9.A. Live poultry imports, 2003–2016



Source: FAOSTAT, 2018

FIGURE 9.B. Poultry meat imports, 2003–2016



Source: FAOSTAT, 2018

Poultry egg imports and exports

Ethiopia has no notable records of poultry eggs import and export so far.

3.3. CURRENT GOVERNANCE, POLICIES, AND LEGAL FRAMEWORK

3.3.1. Policies

Agricultural Development Led Industrialization (ADLI) strategy

The ADLI strategy is the key guideline to the overall economic development of the country. It elaborates the leading role of the agricultural sector in industrial development and subsequent transformation of the national economy. It sets the directions towards achieving structural transformation in the agricultural sector.

Climate Resilient Green Economy (CRGE) strategy

One of the key strategies in the Ethiopian agriculture and economic development is the CRGE strategy (CRGE, 2011). The strategy intends to foster development of green economy through reduction of carbon emissions to near zero. The key sectors identified for implementation of the green economy strategy include power generation, transport, forestry, and livestock. With regards to the livestock sector, the strategy stipulates consistent and significant reduction of the ruminant livestock population and a shift towards increasing the share of poultry meat consumption in the total meat consumption.

The Growth and Transformation Plan (GTP II, 2016–2020)

Ethiopia has been implementing the GTP since 2010. The first phase lasted from 2010 to 2015 and the second phase is ongoing (2016–2020). The pillar of the GTP is achieving transformational change in all sectors of the economy so that Ethiopia will attain the lower middle-income country status in 2025 (National Plan Commission, 2015).

The Ethiopian Livestock Master Plan (LMP)

The LMP is developed as a road map for the growth and transformation of the livestock sector. It is based on a comprehensive analysis of the sector, intending to produce export surplus of

livestock commodities mainly focusing on cattle (dairy, red meat/milk and feedlot systems) and poultry development. Promoting large-scale intensive poultry system and substituting scavenging family poultry production with small-scale intensive and semi-intensive family poultry systems are the key elements of the poultry development agenda stipulated in the LMP.

The LMP is produced in the context of the GTP and advises what can and needs to be accomplished to develop the livestock sector, along with action plans and 'Roadmaps' (outlining how it can be achieved). The LMP also intends to inform Government of Ethiopia policymakers, as well as development investors involved in livestock development, on the current status of the livestock sector and the future potential of priority investment options for poverty reduction and economic growth (Shapiro *et al.*, 2015).

Trade policy

The trade policy generally follows the export oriented economic growth policy of the country. As a result, the government encourages foreign direct investment as well as local investment to involve in export trade. Currently a wide range of incentive packages are set in place to motivate export.

Road maps, strategies and legislations

Some of the most important policy tools relevant to poultry sector development are listed below:

- The poultry development road map;
- Veterinary rationalization road map;
- Legislation for regulation of veterinary drugs and animal feeds administration and control; and
- Livestock and fisheries research strategies (2016–2030).

3.3.2. Producer organizations

There are tens of thousands of primary cooperatives and thousands of cooperative unions in the agricultural sector throughout the country. However, the overwhelming majority of these cooperatives and unions are related to crop production and marketing. Insignificant numbers of producer organizations exist in the livestock sector and almost none exist in poultry.

A limited number of cooperatives have been organized in feed processing. In the SNNPR, there are six cooperatives that established feed mills and started supplying feed mixes for chicken and other livestock species. About the same number operate in the three other major regional states, Oromia, Tigray and Amhara. The Ethiopian Poultry Producers and Processors Association (EPPPA) was established as part of the Dutch support for the Ethiopian poultry sector. However, EPPPA has not been very active since its establishment and its contribution to the poultry sector has been negligible. The Ethiopian Animal Feed Industries Association is relatively more active although its roles and impacts on the feed sector are not clearly visible.

4.Sustainable development of the poultry sector: Status and prospects

The development of the poultry sector should be viewed in the context of addressing the entire value chain. Engaging and mobilizing the multiple array of actors, both public and private, involved in the value chain is critical in order to address the many issues involved in developing the sector.

The first section presents the current strengths and weaknesses in both the large- and medium-scale intensive systems and the family poultry production systems in terms of technical performance, feed availability and quality and marketing of products and inputs. The section on poultry development includes a brief assessment of the country's past poultry development strategies and provides information on some of the major projects (ongoing and recently completed) in poultry research and development. Finally, the future prospects of the poultry sector are highlighted based on the existing challenges and emerging opportunities.

4.1. CURRENT ECONOMIC, SOCIAL AND ENVIRONMENTAL STRENGTHS AND WEAKNESSES OF THE POULTRY SECTOR

4.1.1. Strengths and weaknesses in production, inputs, etc.

Strengths

- Poultry keeping is widely known and practiced.
- Poultry is a source of income for rural people (especially women).
- Increased recognition of poultry production as a business and employment opportunity for the youth and women, both in rural and urban areas.
- Poultry is a great avenue to empower rural women.
- Ethiopia has conducive climatic conditions.
- No HPAI outbreaks in the country.
- Increasing production of agricultural commodities particularly cereals and oil seeds.
- Rapidly growing number of agro-processing industries.

Weaknesses

- Irregular supply of day old chicks (irregular supply from abroad, low national production).
- Lack of proper recognition and support for women in the sector.
- Lack of quality feed and poor enforcement of quality control regulations.
- No local production of premixes.
- No domestic production of veterinary drugs (except for some vaccines produced by NVI).

- Limited access to services (extension support, finance, etc.) and supplies.
- Lack of facilities for processing, storage and transportation.
- Poor hatching conditions and management.
- Shortage of trained workers.
- No veterinary monitoring.
- Poor farm management leading to high morbidity and mortality.
- Lack of knowledge of management factors (health care, feeding, growing chicks).
- Lack of knowledge of regulations and requirements for getting a loan to invest (mainly local large-scale intensive producers).
- Extended government bureaucracies for licensing new investments and facilitating land acquisitions (mainly foreign industrial and integrated/large-scale intensive producers).

4.1.2. Strengths and weaknesses in marketing and trade

Strengths

- No cultural taboos in the consumption of poultry products.
- Increasing coverage of mobile communications and rural road access.
- Investment opportunities exist.
- Growing per capita income.
- Increasing urbanization.
- Existence and expansion of large number of full boarding public universities and colleges, and other institutions such as hospitals.

Weaknesses

- No consumption of poultry products by Orthodox Christians for a prolonged period of time every year due to religious reasons (fasting).
- Lack of marketing options and market access.
- No reliable statistics and market information on poultry production and demand.
- Lack of competition in the value chain (monopoly position of some big farms).
- Inadequate infrastructure to transport fresh broiler meat to the market.
- Commercial poultry production is concentrated in a few poultry hubs, increasing the risk of disease spreading.
- Low level of product differentiation of broiler meat.
- Preferences for indigenous poultry products.

4.2. POULTRY DEVELOPMENT

4.2.1. Past poultry development strategies

So far, extension support for developing intensive poultry production systems (from large- to small-scale) has not been carried out in Ethiopia. With the exception of the very limited interventions initiated at the beginning of the GTP II period (2016) to support semi-intensive family poultry production systems, the extensive scavenging family poultry system has been the sole beneficiary of government extension services and technical support.

In the past decades, considerable attempts were made to improve the productivity of extensive scavenging and small-extensive scavenging family poultry. Nearly all of these attempts focused on improving the poor production performance of indigenous chickens through replacement with exotic breeds. The extension schemes largely constituted in the distribution of pullets at point of lay (usually from 5–10 per household). Other inputs and services such as feed, veterinary services and training on improved management practices were not part of the package. As a result, the birds did not survive the challenges of the scavenging environment.

In the 1980s, the MoA initiated a cockerel distribution scheme. This involved importation and distribution of exotic breeds of cockerels to be used as breeding males in villages. The cockerel distribution scheme failed because farmers were unwilling to remove their indigenous cocks and the exotic cocks failed to adapt to the environments.

During the late 1990s, the Ministry of Agriculture developed a new set of packages intending to address the extensive and small-extensive scavenging, semi-intensive and small-scale intensive family poultry production systems. The packages presented a number of alternative intervention schemes suiting the needs of different systems. It also attempted to integrate different actors in the system from input supply to marketing and provision of credit services. However, no part of these packages was implemented. The distribution of varying numbers of exotic breeds (ranging from 15–25 hens) was the sole practice followed to improve the productivity of the family poultry production systems.

Over the past couple of years, small and micro enterprises (SMEs) have become involved in DOC growing and other specialized activities related to poultry production. This has occurred as part of the country's initiative to expand employment opportunities for youth and women around towns and cities. This scheme consists of a contractual arrangement with large private poultry companies that supply vaccinated DOCs and feed to raise the chickens until 45 days of age with technical backstopping of the government extension services. The 45-day old chickens are eventually distributed chiefly to the scavenging family poultry producers through the extension system. Although lack of adequate extension support and poor market linkages challenged the scheme it seems to hold a promising future.

The other notable strategy for developing the sector is probably the plan of the Ethiopian Agricultural Transformation Agency (ATA) initiated in the middle of the GTP II period (2016–2020) which aims to transform the scavenging family poultry systems into semi-intensive family poultry production systems in selected poultry commercialization clusters located in the SNNPR, Oromia, Amhara and Tigray regions.

The poultry sector did not have a clear roadmap guiding its development until the recent production of the LMP (Shapiro *et al.*, 2015). The poultry development road map was prepared in the context of the country's growth and transformation plan (GTP II, 2016–2020) and its subsequent phases projected until 2030. The MoA is expected to release the final version of this document. The EIAR has also developed a comprehensive research strategy for the coming 15 years – 2016–2030 (EIAR, 2017) – to support the development goals anticipated in the poultry sector. The other important recent initiative of the MoA relates to improving the existing poor veterinary services through privatizing the delivery of veterinary clinical services and upgrading the public veterinary services. To this end, the Ministry developed the veterinary rationalization road map which is expected to be implemented soon.

4.2.2. Major ongoing and recently closed projects

Agricultural Growth Program (AGP) II

<i>Implementing agency</i>	The World Bank and the Government of Ethiopia
<i>Duration</i>	2016–2020
<i>Geographical area</i>	Oromia, Amhara, Tigray and the SNNPR
<i>Beneficiaries</i>	Hundreds of thousands of smallholder farmers in 150 weredas/districts
<i>Brief description</i>	The objective of the AGP for Ethiopia is to increase agricultural productivity and market access for key crop and livestock products in targeted weredas/districts with increased participation of women and youth. After the official phasing out of the first term, the second phase (AGP-II) was launched on 14 November 2015 to run from 2016 to 2020 as an official support program for the implementation of the second GTP (GTP-II) of the Ethiopian Government. The additional features in the AGP-II are that it increased the number of target weredas/districts from 96 to 150, identified strategic commodities for intervention (including poultry among the high priority commodities) and extended significant support to enhancing the extension system, technology generation, multiplication and transfer and building capacity of agricultural research centres and extension services.

African Chicken Genetic Gains (ACGG) project

<i>Implementing agency</i>	International Livestock Research Institute (ILRI)
<i>Duration</i>	5 years (2014–2019)
<i>Geographical area</i>	Three African countries: Ethiopia, Tanzania and Nigeria. In Ethiopia the project focuses on the four major poultry producing regions (Oromia, SNNPR, Tigray and Amhara) and, in and around, Addis Ababa
<i>Beneficiaries</i>	Smallholder farmers

<i>Brief description</i>	The program aims to improve chicken genetics and delivery of adapted chicken breeds to support poverty reduction, productivity growth, increased household animal protein intake, and the empowerment of women in rural communities.
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Feed Enhancement for the Ethiopian Development (FEED II) project

<i>Implementing agency</i>	ACDI-VOCA
<i>Duration</i>	3 years
<i>Geographical area</i>	Oromia, SNNPR, Tigray and Amhara regions
<i>Beneficiaries</i>	Smallholder farmers and Farmers' Cooperative Unions
<i>Brief description</i>	ACDI-VOCA implements USDA's Feed Enhancement for the Ethiopian Development (FEED II) project. Building on the progresses achieved during FEED I, The project aims to increase livestock and poultry productivity by developing the animal feeds sector. It mainly targets to (i) develop the feed ingredients supply chain and service delivery; (ii) develop feed manufacturing enterprises; (iii) develop a sustainable forage production system; (iv) introduce and expand feedlot, poultry and dairy enterprises; and (v) promote on-farm feeding practices.

Ethiopian-Dutch poultry sector relations

<i>Implementing agency</i>	The Dutch poultry sector
<i>Duration</i>	Long term, since 1990
<i>Geographical area</i>	Mainly large-scale intensive poultry producing areas of Ethiopia
<i>Beneficiaries</i>	The poultry sector, large-scale intensive poultry producers and the Ethiopian Poultry Producers' and Processors Association
<i>Brief description</i>	The Dutch poultry sector has been involved in the Ethiopian poultry sector since 1990. Through this relationship a large-scale integrated farm was established which contributed significantly to the local poultry development. It supported establishment of a small-scale intensive poultry farm named Alema Farms which has later become one of the largest poultry integrators in the country. Since 2008, Dutch support in the poultry sector expanded further giving rise to the establishment of the Ethiopian Poultry Producers and Processors Association. In 2011, a mission of a large group of Dutch companies created momentum for a more extensive engagement and establishment of the Holland-Africa Poultry Partners (HAPP) consortium.

4.3. PROSPECTS OF THE POULTRY SECTOR – OPPORTUNITIES AND CHALLENGES

4.3.1. Prospects of the poultry sector

Ethiopia aims to reach a lower-middle-income status by 2025. The likelihood of success appears to be high given the sustained close to double digit economic growth the country achieved during the past decade. Currently, around 20 percent of the population lives in urban cities, and a rapid rise is expected in urban population and income in the coming years, indicating a rising number of consumers.

During the first five years of GTP I (2010–2015), productivity of the main crops grown in Ethiopia (particularly cereals) has increased at a rate of over 6 percent annually (National Plan Commission, 2015). This growth is expected to continue due to the increasing use of modern agricultural technologies by farmers, application of improved production practices and increased market access. The area coverage and total output of oil seed crops is also increasing rapidly. At the same time, agro-industrial parks are emerging in all parts of the country. Construction of several agro-industrial parks is underway since 2016. Efforts to discourage export of raw agricultural commodities are stronger than ever before. As a result of these developments, a significant rise in the supply of feed ingredients is expected and the poultry sector would be the major beneficiary.

In 2011, Ethiopia has launched a strategy to develop a climate resilient green economy (CRGE). The CRGE has identified a set of strategic interventions towards developing a low carbon emission economy. One of the interventions is a consistent and significant reduction of the ruminant population and a shift away from red meat production. The country developed the Livestock Master Plan (LMP) with the aim to (i) realize the stipulations in the CRGE, (ii) achieve the goals set in the GTP (which is now in the second phase, 2016–2020), and (iii) meet the existing huge gaps in the supply of livestock products (Shapiro *et al.*, 2015). The LMP forecasts the poultry sector to help close the total national meat production-consumption gap and achieve the increase of the share of poultry meat consumption to total meat consumption. To realize this, it plans to increase poultry meat production from 49 000 to 164 000 tonnes and the number of eggs produced from 419 million to 3.9 billion between 2015 and 2020. Although the plan seems to be overambitious and the accuracy of the base line statistics appears to be unreliable (particularly in reference to the figures reported by the CSA and FAOSTAT) the prospects for future development of the poultry sector are apparent from the strong recognition and policy support accorded to the sector by the government.

The LMP envisions achieving this ambitious plan through transforming the structure of the poultry sector. The LMP plan aims to cut the contribution of the extensive scavenging and small-extensive scavenging family poultry systems to poultry meat and egg production by 41 percent by 2020 and increase poultry meat and egg production from the small-scale intensive and semi-intensive family poultry by 251 and 246 percent, respectively, in the same time period. The targets for the large-scale intensive production are even more ambitious: to increase poultry meat production by 32 000 percent and table egg production by 10 314

percent in year 2020. Considering these ambitious plans for growing the large-scale intensive poultry system and the small-scale intensive and semi-intensive family poultry production the prospects for new investments in commercial poultry development are tremendous.

Prospects of commercial poultry development

The prospects for the future growth of commercial poultry in Ethiopia is high, with an average poultry meat consumption of about 0.66 kg per capita compared with about 1.64 kg in East Africa and around 6.73 kg in Africa (FAOSTAT, 2018). Firstly, Ethiopia could and should be considered as a logical expansion and or potentially a breeding hub in and for East Africa especially given its fast growing economy, urbanization, population and growing domestic demand for poultry meat as a more sustainable and cheaper source of protein.

Forecasts indicate the Ethiopian poultry sector is expected to grow annually by between 6–10 percent until 2025. According to a report produced in 2015 by Wageningen UR Livestock Research, NABC and Agri-Business Support facility on the Ethiopia poultry sector, opportunities in Ethiopia are almost endless and one of the promising areas is the agro-sector of Poultry. Ethiopia is now going through constant multifaceted economic growth and transformation. The country's improved economic infrastructure, abundant and affordable labour along with its excellent climate and fertile soil remains Ethiopia's comparative advantage attracting investors.

Investors in Ethiopia are provided with various incentives depending on the sectors such as custom duty payment exemptions on capital goods and construction materials, and income tax exemptions from two to seven years and carry forward losses. Similarly, several export incentives have been put in place to encourage investors looking for export opportunities.

Ethiopia has investment protection schemes through its Investment Code that protects private property, and repatriation of capital and profit. More importantly, the government guarantees constitutional protection from expropriation. For those companies considering using Ethiopia as a spring board to other African markets, Ethiopia is a signatory to several International Investment agreements such as the Multilateral Investment Guarantee Agency (MIGA), Bilateral Investment Promotion & Protection Treaties (BIPPT), and the International Convention for the Settlement of Investment Dispute (ICSID). Equally, Ethiopian products have duty-free access to the US and EU markets. The aforementioned points provide positive and important information for any company considering investing in the poultry sector in Ethiopia.

However, there are some negatives. Current import regulations regarding the registration and importation of vaccines and additives pose significant danger to flock health and ultimately to the profitability of a poultry breeding or broiler growing company. Labour whilst low cost and abundant lacks the necessary skills and therefore requires training and education.

If the poultry industry is to continue to grow and meet the increasing demand for poultry meat either fresh or frozen then a significant investment in cold chain is required. Expansion in the poultry sector will require a significant increase in the current number of hatcheries and feed

mills quickly followed by additional poultry processing facilities for broiler meat production. To aid in the shift away from the current reliance on imported hatching eggs and day old chicks, more local parent and Grand Parent stock farms are needed.

So far, as poultry feed ingredients are concerned, Ethiopia has a huge production of maize with a significantly lower production of Soybeans both of which are the most important ingredients in chicken feed production. Maize inclusion rate in breeder feed formulations is 60–70 percent and soybean meal 9–21 percent, depending on the use of other raw materials such as sun flower meal, wheat bran, and maize gluten meal.

According to a 2017 presentation by Nan-Dirk Mulder, Senior Animal Protein Analyst at Rabobank, Ethiopia is currently utilising around 15 million hectares of farm land for production with a potential to expand by another 5 million hectares. Therefore, there is a huge opportunity to increase production.

Similar to other African countries, Ethiopia's crop yields are low at around 15 percent when compared to US and EU who achieve on average yield of 60 percent. So by using more stable and homogenous quality and supply of feed grains, this should lead to increased yield and more efficient supply.

One of the most exciting pieces of news for the Ethiopia poultry sector is the recent announcement by Nutropia that it will initially invest capital of 20 million euros to build a new farm. The first stage will consist of hatchery, a broiler farm and a primary processing plant capable of producing 4 700 tonnes of poultry meat annually. Once completed, it will also have parent stock rearing and production farms.

Other major African poultry companies are also setting up poultry operations in Ethiopia. The Wadi Group, based in Egypt, are one of the largest poultry integration companies in Egypt placing around 4 million parents annually. They also have well established and successful poultry integrations in Lebanon and Sudan. In general, the commercial poultry sector of Ethiopia has positive prospects.

4.3.2. Opportunities and challenges of the poultry sector

Opportunities

- Export opportunities to the Middle East by employing 'halal' slaughtering practices (although: competition from Brazil).
- Tremendous opportunities for empowering rural women.
- Growing production of feed ingredients in the country.
- Large and growing domestic (urban) market.
- Good feed conversion as compared to beef (in intensive production).
- Growing number of bulk consumers (hotels, restaurants, universities, colleges, hospitals, etc.) purchasing broiler meat and table eggs from exotic chicken breeds.

- Support and attention from (business) development programs, both national and international.
- Current farms can potentially gain huge increases in efficiency and output by applying simple management practices and measures.
- The Ethiopian Agricultural Research Institute is undertaking a breeding program to improve productivity of indigenous chicken and also searching for exotic chicken breeds suitable to the local situation.
- Broad outreach to rural farmers through development agents of the extension system for enhancing employment opportunities for women and youth.

Challenges

- Poorly functioning farmers' organizations.
- Most potential investors tend to be risk averse and incline towards adopting short term investment strategies (potential investors are unlikely to make large long-term financial investments unless they can achieve an adequate return on their investment).
- Low level of education among primary producers.
- Lack of feed quality control.
- Inadequate availability of credit services.
- Inadequate availability of water and electricity.
- Poor coordination in the value chains: links among input suppliers, service providers, producers, and actors in the marketing channel are poorly coordinated.
- Fluctuation in demand (especially as demand declines drastically during the Orthodox Christians' fasting periods).

4.3.3. The way forward

Ethiopia has plans for transforming its poultry sector by promoting the active engagement of actors in the public and private sectors. The roles of both the public and private sectors need to be clearly defined within the context of the poultry value chain. The MoA is the apex government body responsible of developing supportive policy guidelines and designing appropriate implementation strategies and intervention schemes. Despite the irregularities in enforcement, most of the existing policy tools and strategies for development of the national poultry sector are favourable. Strategic measures should be taken towards investing on women-led poultry businesses for the far reaching positive impacts that this has on communities, nutrition and livelihood options.

In addition to supporting the existing systems and dealing with the emerging systemic bottlenecks, the MoA should consider three main sets of issues when making interventions for the sustainable intensification of the poultry sector (Precise Consult International, 2015):

1) Integrated/systemic change approach

Interventions should be designed in such a way as to realize systemic changes in the poultry value chain. To this end, a 'Complete Package Approach' addressing the following seven elements should be adopted.

- i. Market
 - Need to commercialize the family rural poultry value chains.
 - Activities in the value chain should be market oriented.
- ii. Health (focused on disease prevention rather than cure)
 - Carry out planned vaccination programmes and improve veterinary service delivery systems at farmer level.
 - Undertake regular disease surveillance.
 - Build diagnostic capacity at regional and national level.
 - Enforce existing quality control regulations for vet drugs and animal feed.
 - Institute biosecurity measures at different levels.
 - Improve poultry housing through the provision of separate houses for poultry under extensive and small-extensive scavenging systems and improve housing conditions for small-scale intensive and semi-intensive poultry systems.
- iii. Feed (must be affordable, available and of good quality)
 - Increase feed production and distribution significantly.
 - Ensure adequate availability of major feed ingredients (e.g. maize, soybean, premixes).
 - Support potential producers of feed and inputs.
 - Promote feed efficiency through the reduction of duty (currently 53 percent) on imported feed mill ingredients.
- iv. Breeds
 - Ensure supply of breeds that adapt to local environments and are disease resistant/tolerant and productive.
 - Capacitate public and private sector (including research and development institutions) for breeding and multiplying appropriate chicken breeds.
- v. Knowledge/skills trainings (technology transfer) – Extension system
 - Efficiently deliver complete packages of inputs and services.
 - Identify and address capacity gaps in the value chain actors.
- vi. Business support services (historical deficit of SMEs and entrepreneurial farmers)
 - Assess feasibility/profitability/sustainability of business support services.
 - Design and implement SME development packages (business skills, marketing, etc.).
 - Design and implement interventions targeting women and youth.
 - Develop business models.

- Promote ICT usage (especially the mobile platform holds much promise).
 - Promote and encourage value addition: processing plants, hygienic processing, dressing, and packaging.
 - Re-visit taxation system (VAT exemptions, TIN requirements).
 - Engage and support farmer organizations.
- vii. Financing (conventional financing difficult for most investors)
- Expand microfinance institutions (small farmers, SMEs).
 - Set up grants (for innovators).
 - Support investment promotion and joint ventures.
- 2) *Getting the economics right*
- Poultry value chain actors should be capacitated and incentivized through the following actions:
- Ensure that farmers can earn profit from the operations they are involved in.
 - Capacitate and support the DA (Development/Extension Agent) system.
 - Ensure attractive business cases for feed producers, distributors, traders, transporters, input providers, processors, retailers, restaurants, kiosks, etc.
 - Public – Private pivot must be found and delicately balanced.
 - Satisfy consumer preferences.
 - Identify and meet capacity gaps at all levels of the poultry value chain.
- 3) *Active market development*
- Ensure an early focus on markets, given ambitious supply of development targets.
 - Support activities such as: cuisine development (potential for further job creation for SMEs), fast foods, franchise models possibly working with processors, institutional buyers (including universities), supermarkets/kiosks, and promotional campaigns.

5. Appendix

APPENDIX 1. CLASSIFICATION OF POULTRY PRODUCTION SYSTEMS

	Industrial and integrated / medium- and large-scale intensive	Family poultry production systems			
		<i>Small-scale intensive</i>	<i>Semi-intensive</i>	<i>Extensive scavenging</i>	<i>Small-extensive scavenging</i>
Location	Peri-urban areas; near capital and major cities	Peri-urban areas; near smaller towns		Everywhere. Dominates in rural areas	
Production/farming system	Poultry only	Poultry only	Usually poultry only	Mixed, livestock and crop	Mixed, poultry and crops, often landless
Other livestock raised	No	No	Sometimes	Usually	Rarely
Flock size (adult birds)	> 1 000 broilers > 500 layers	> 200 broilers > 100 layers	50–200	5–50	1–5
Access to markets	Yes (export and urban)	Yes (urban and rural)	Yes (urban and rural)	Limited (rural)	Rarely (rural)
Poultry housing	Yes; conventional materials; good-quality houses	Yes; conventional materials; good-quality houses	Yes; conventional materials; houses of variable qualities	Sometimes; usually made from local materials	Seldom; usually made from local materials or kept in the house
Poultry breeds	Commercial	Commercial	Commercial, crossbred or indigenous	Indigenous or crossbred	Indigenous or rarely crossbred
Source of new chicks	Commercial day-old chicks or pullets	Commercial day-old chicks or pullets	Commercial day-old chicks or natural incubation	Natural incubation	Natural incubation
Source of feed	Commercial balanced ration	Commercial balanced ration	Scavenging, regular supplementation	Scavenging, occasional supplementation	Scavenging, almost no supplementation
Access to vet services and veterinary pharmaceuticals	Yes	Yes	Yes	Sometimes	Rarely
Access to conventional cold chain	Yes	Yes	Yes	Rarely	No
Poultry mortality	Low to medium < 20 %	Low to medium < 20 %	Medium to high 20 to > 50 %	Very high >70 %	Very high >70 %
Food security of owner	High	Ok	Ok	From ok to bad	From ok to bad

Sources: Adapted from [FAO, 2014](#) and [FAO biosecurity classification](#)

APPENDIX 2. KEY SECTOR STAKEHOLDERS

Ministry of Agriculture

Government Ministry responsible for designing and implementing policies and strategies for developing the national livestock sector. It develops the national livestock development plan and oversees and leads its implementation through the Bureaus and Agencies of Livestock in the regional states. The Ministry is also responsible for developing policies and legislations on marketing and trade of livestock and livestock products, inputs and services.

Veterinary Drugs and Feeds Administration and Control Authority

The agency is in charge of administering and controlling the quality and safety of veterinary drugs and animal feeds in the country.

Ethiopian Institute of Agricultural Research

Undertakes, coordinates and leads the national research in agriculture including research in livestock and poultry. The institute is responsible for availing agricultural and poultry technologies suitable for producers at different levels and agro-ecologies.

National Veterinary Institute

The National Veterinary Institute is the only institution involved in the production of vaccines for livestock and poultry diseases in the country. It also provides feed analyses services. However, it does not produce vaccines for large-scale intensive poultry production.

Agricultural Transformation Agency

The Ethiopian Agricultural Transformation Agency is established to promote transformation of the agricultural sector by supporting existing structures of the government, private sector and other non-governmental partners to address systemic bottlenecks in the system. It works to deliver on the growth and transformation agenda in the agricultural sector.

National Animal Health Diagnostic and Investigation Centre

It is the most important veterinary laboratory in Ethiopia owned by the state. It works as the centre of excellence for animal disease surveillance, investigation, diagnosis and veterinary research. The investigation centre has implemented ISO/IEC 17025–2005 in three laboratories and six tests have been accredited so far.

National Animal Genetics Improvement Institute (NAGII)

It is responsible for genetic improvement and dissemination of improved genetics of livestock in Ethiopia.

Ethiopian Animal Feed Industries Association

The association of feed milling enterprises in the country.

Ethiopian Poultry Producers and Processors Association

Association of private poultry producers in the country.

International Livestock Research Institute (ILRI)

A member of the CGIAR group with global mandate for research in livestock, with particular emphasis on smallholder livestock production. Its headquarters are in Nairobi, Kenya.

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