Country Analysis Ethiopia

List of abbreviations

ADT	ADT Project Consulting GmbH, Bonn
AI	Artificial Insemination
BMG	Bill & Melinda Gates Foundation
CRGE	Climate Resilient Green Economy
CSA	Central Statistical Agency of Ethiopia
DDGS	Dried Distillers Grains with Solubles
ETB	Ethiopian Birr
EUR	Euro
FAO	United Nations Food and Agriculture Organisation
GDP	Gross Domestic Product
GFA	GFA Consulting Group GmbH, Hamburg
GTP II	Growth and Transformation Plan II
ILRI	International Livestock Research Institute
IPRI	International Property Right Index
ITC	International Trade Council
Kg	kilogram
MOA	Ministry of Agriculture
MOH	Ministry of Health
NVI	National Veterinary Institute
OECD	Organisation for Economic Cooperation and Development
PANVAC	Pan African Veterinary Vaccine Center of African Union
SPS	Sanitary and Phytosanitary Measures
UAE	United Arab Emirates
USD	US Dollar
VC	Value Chain
VwB	Veterinarians without Borders

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Figure 1: National map of Ethiopia

Source: Freeworldmaps.net

1. Economic situation & investment climate for the meat and dairy market

1.1 Economic situation

Forecasts for the Ethiopian economy vary widely: The Economist Intelligence Unit (EIU) expects gross domestic product (GDP) to grow by between 7.4 and 7.5 per cent in 2020 and 2021. The World Bank even expects 8.1 and 8.2 per cent in both years. These are very optimistic forecasts. By contrast, local businessmen are much more pessimistic. They report a significant slowdown in business activity due to a lack of capital.

Due to extensive state infrastructure investments in recent years, public debt has also skyrocketed. This is exacerbated by a chronically high trade deficit. Both of these factors have led to a massive shortage of foreign exchange since around 2017, which has affected almost all sectors of the economy.

President Abiy Ahmed has initiated many courageous political reforms. Now he wants to push ahead with economic opening. Among other things, logistics, telecommunications, air transport and the sugar sector are to be liberalized. The opening of the Ethiopian economy seems urgently needed, as it is heavily regulated and has limited attractiveness for private investment and foreign investors.

Nevertheless, in recent years Ethiopia has developed into an increasingly interesting market in Africa for German companies. Several companies opened offices in the capital Addis Ababa. Their focus is on the sale of technical components.

1.2 Investment Climate

Ethiopia is undergoing a transition process triggered by the appointment of Prime Minister Abiy Ahmed in 2018 following continuing protests against the government. Abiy Ahmed has committed to reforming Ethiopia's authoritarian state, which has been governed by the Ethiopian People's Revolutionary Democratic Front (EPRDF) since 1991, and to renewing the country's repressive electoral, terror and media laws. However, Ethiopia continues to be characterised by political factionalism and occasional violent conflict. Abuses by the security forces and human rights abuses continue to be observed, many restrictive laws are still in place and the enforcement of basic rule of law principles is lacking.

The parliamentary elections in May 2020 will be important for the political stability of the country and thus also for investors. Their outcome will determine whether the current government under the incumbent Prime Minister Abiy Ahmed can continue to govern. Even if Ahmed is considered the favourite, his victory seems anything but certain.

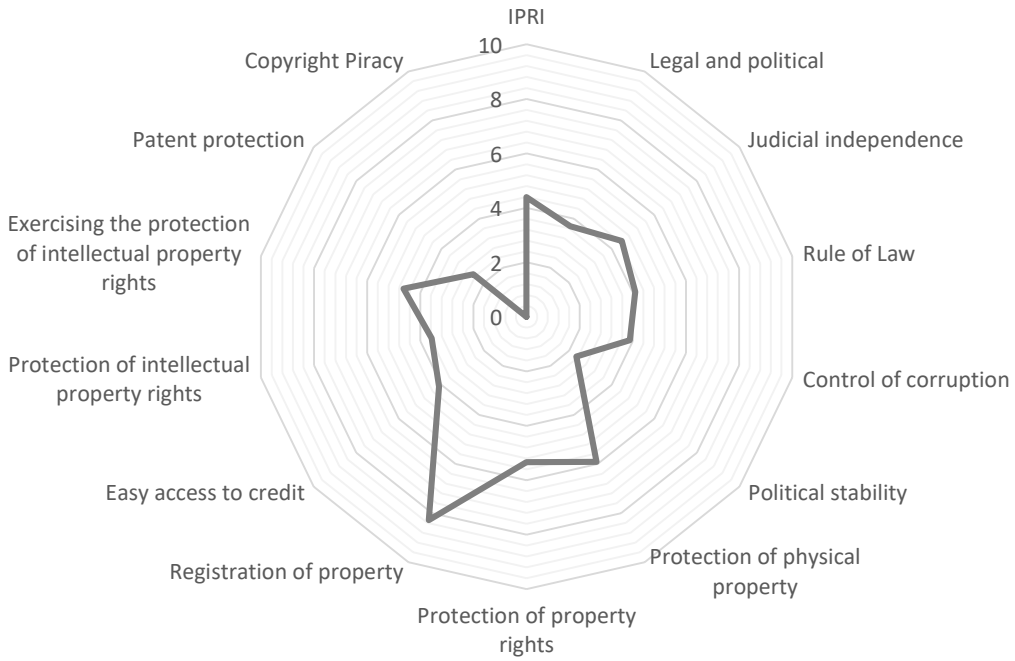
Private ownership over agricultural land does not exist, but land use rights are registered and respected in most populated areas. The government reserves the right to expropriate land for the common good, including expropriation for the commercial development of businesses and industrial zones and for infrastructure projects. Investors in Ethiopia are advised to conduct a thorough due diligence of land titles and consultations with local communities and at the provincial and federal levels regarding planned land use. In some regions, violent conflicts over land use rights between local people and investors have already been observed. The continuing shortage of foreign exchange and limited access reduce the country's import capacity and access to international goods. Furthermore, Ethiopia has not yet joined the WTO, but membership is being sought.

Table 1: Investment climate in Ethiopia (indicators)

Indicators	Rank
Political stability - Rank (2018)	191 of 211
Property Rights Index - Rank (2019)	111 of 129
Ease of Doing Business - Rank (2020)	159 of 190

Source: PRA 2019, World Bank 2020

Figure 2: International Property Rights Index 2019



Source: PRA 2019

1.3 Meat Market

1.3.1 Meat consumption

Ethiopia consumes beef, sheep and goat meat, camel meat, poultry meat, game and, to a very limited extent, pig meat. The per capita consumption of farm animal meat has changed only slightly in recent years and is estimated at around 6 kg. About 60% of consumption is beef (3.6 kg) and about another 20% is sheep and goat meat (1.2 kg). Poultry meat has slightly increased its share and now makes up a share of about 10-15%. The consumption of camel meat is estimated at approx. 0.3 kg per head and year, although there are large regional differences. The above consumption figures are approximate values which can be derived from different information from international (OECD, FAO, BMG) and national statistics. There is, however, a broad consensus that consumption is stagnating at this level and that rising production is largely being absorbed by population growth. The population rose from around 95.4 million in 2013 to 109.2 million in 2018.

The consumption of meat products shows clear differences between urban and rural populations. People in urban areas consume more meat due to the higher standard of living as well as the better accessibility of meat products in supermarkets. This is particularly true for the consumption of beef and poultry meat. In

rural areas, meat is not part of the daily diet and is only consumed on religious holidays. In addition to the necessary household income, there is a lack of opportunities to buy meat products at any time.
In urban areas, consumers buy meat and meat products mainly in butchers' shops and supermarkets. In rural areas, on the other hand, live animals are handed in for slaughter and distribution within family and friends. Processed meat products such as corned beef, sausages, etc. are usually only in demand by foreign consumers. The market volume for processed meat products can therefore be considered marginal on a national average.

While beef, sheep and goat meat is consumed throughout the country, camel meat, for example, is consumed more in the eastern and south-eastern regions and predominantly by people of Muslim faith.

In Ethiopia, meat or edible offal is usually sold as unprocessed raw material via local butchers or supermarkets, often with complete animal halves or slaughter pieces being presented to customers on open counters. The customers then decide which cuts they would like to have. The meat is then cut into standard household portions and given to the customer.

The consumption of eggs is estimated at 0.4 to 0.5 kg per head and year. This corresponds to a consumption of about 10 eggs per head and year. It is also to be expected that consumption of eggs will be significantly higher in urban areas.

1.3.2 Market supply of meat and eggs

The Ethiopian market supply of meat is defined by a comparatively low per capita consumption and a high degree of self-sufficiency. The current supply is almost exclusively covered by domestic production; imports play only a minor role and contribute less than 1% to the market supply. In 2019, the FAO stated that imports consisted of 1,000 t of poultry meat and 3,541 t of sheep and goat meat in 2017 (see also Table 5 with the FAO and ITC figures from 2020 for the same year, which show slightly different values). Since meat exports also accounted for less than 20,000 t, Ethiopian meat production accounts for 97 % of domestic supply. However, live animal exports (formal and informal) are not included in this calculation.

Table 2: Market supply of meat

Meat type	Production 2017 (in t)	Import 2017 (in t)	Exports 2017 (in t)
Poultry meat	71,129	1,000	-
Pork	2,026		
Beef	401,219	-	258
Sheep & goat meat	193,128	3,541	18,873
Camel meat	29,000	-	-
Game	85,969		
Meat (total)	782,472	4,541	19,131
Eggs	55,000		

Source: FAO 2019

In addition to the production of farmed meat, some 85,000 tonnes of game meat is also produced and consumed in the country. This corresponds to a per capita consumption of another 0.75 kg.

The market supply of eggs is ensured by the domestic production of 55,000 tonnes of eggs.

1.3.3 Meat production

Meat production has increased slightly in all categories in recent years. A total of around 788,000 tonnes of meat were produced in 2018, which means that the volume grew by 4.9 per cent from 2014 to 2018. Poultry meat production recorded the largest increase in the reference period (2014 to 2018) at 8.2 percent, followed by beef (5.6 percent), pork (5.5 percent), camel meat (3.8 percent) and sheep and goat meat (4.2 percent).

Table 3: Meat production (in t) 2014 - 2018

	2014	2015	2016	2017	2018
Poultry meat	61,840	68,353	72,745	71,563	71,129
Beef	385,651	372,864	385,995	401,219	407,301
Sheep & goat meat	181,927	179,650	184,824	193,128	189,524
Camel meat	28,050	28,050	28,050	28,050	29,000
Pork	1,875	1,949	1,989	2,002	2,026
Game	85,000	85,033	85,566	85,775	85,969
Meat (total)	750,963	740,864	758,209	782,471	788,102

Source: FAO 2020

Just over half (51.7 per cent) of Ethiopia's meat production is beef, while sheep and goat meat accounts for another 24 per cent. Thus red meat (excluding game) already covers around three quarters of the total volume and is the most important type of meat. Game, with a share of 10.9 per cent, currently plays another important role in supplying the country with animal proteins, ahead of poultry with 9.4 per cent.

Despite the enormous livestock of ruminants in Ethiopia (ranked 10th in the world), actual output and meat production are relatively low, accounting for only about 0.2 percent of global meat production. The main reasons for the low production in Ethiopia are the low offtake rate and the fact that many animals are not produced in commercial systems, but in small households that sell their animals when money is needed. Furthermore, a relatively large cattle population is used as draught animals in the highlands.

1.4 Dairy market

1.4.1 Milk consumption

Milk and dairy products are part of the daily diet of many people in Ethiopia. The importance of people's milk consumption is based on the prevailing socio-cultural environment and agricultural production systems and shows considerable regional differences. In the lowlands, especially where livestock farming is the main source of income for the rural population, milk is consumed by all social groups. In the highlands, on the other hand, people maintain a diet based mainly on cereal products as sedentary farmers who both keep livestock and grow cereals. In addition, milk consumption and the consumption of dairy products also varies greatly according to the season and the period of fasting (especially for followers of Orthodox Christianity). Fresh milk or whey, Ethiopian cottage cheese (Ayib) and traditional butter are the most commonly produced and consumed dairy products in the different parts of the country. About half of the marketable milk in Ethiopia is consumed as fresh drinking milk or in fermented form (e.g. whey drink, drinking yoghurt etc.). A further 40 percent is used to make butter and 9 percent for cheese.

The capital Addis Ababa has the highest per capita consumption in the country, averaging around 52 litres per year, while other (smaller) cities such as Bahir Dar, Hawassa and Dire Dawa consume less than 30 litres on average. The upland regions also consume less. Overall, the average per capita consumption of milk in

Ethiopia is around 30 kg of milk equivalent (ME). In general, Ethiopia consumes mainly cow's milk, but also camel, sheep and goat milk.

1.4.2 Market supply of dairy products

Demand for milk and dairy products is currently met mainly through local production, supplemented by small imports of processed dairy products. Although Ethiopia produced just under 4 million tonnes of milk in 2017, more than about 25% of this was lost as so-called production losses. Furthermore, only a fraction of the produced and marketable milk volume reaches the market through formal production and marketing channels. Depending on the region and production system, between 78 and 90 per cent of the (marketable) milk volume is absorbed by informal structures and reaches the final customer directly via these structures. The remainder reaches consumers via formal structures and further processing. In the informal supply chains, marketing by food service providers such as milk collectors and the sale of their milk directly to local consumers accounts for about 50 percent of milk.

Milk is also exported formally and informally to neighbouring countries (Somaliland and Kenya) on cross-border markets. The quality of the milk is low. Vendors use plastic canisters that are difficult to wash; there are no collection and refrigeration centres, and the traditional transport system exposes the milk to direct sunlight.

Camel milk is traded in traditional supply chains. In contrast to cow's milk, the largest share (approx. 58 percent) of camel milk reaches consumers via (intermediate) traders on markets and not via direct marketing by milk collectors. About 40.5 percent of the milk is marketed directly via milk collectors. Only about 1.5 percent of camel milk is exported across borders to neighbouring countries by (intermediate) traders.

1.4.3 Milk production

Milk production in Ethiopia takes place mainly in small-scale farming structures. According to FAO & OECD figures, there are currently around 16.2 million dairy cows and 354,000 milking camels, as well as an unknown number of milked sheep and goats in the country. Together, all animals produce a total milk quantity of about 3.9 million tonnes, with cow's milk (3.6 million tonnes) being the largest share, followed by camel milk (169,724 tonnes). Sheep's and goat's milk played a lesser role with about 79,000 and 82,000 tonnes respectively.

The data situation for milk production in Ethiopia is in part very patchy and contradictory. According to figures from the International Livestock Research Institute (ILRI), 5.2 million tonnes of milk are produced in Ethiopia. Cow's and camel milk together account for 5.03 million tonnes. 80 percent of this amount comes from cow's milk farming, while the remaining 20 percent is attributed to camel farming (see also Livestock Sector Study, 2017).

There is also different information on the production of camel milk. For example, the FAO reports a total volume of camel milk production of around 170,000 tonnes (for 2017), while the CSA states over 300,000 tonnes. The Ethiopian Statistical Office's (CSA) nationwide surveys and samples may be incomplete or unrepresentative. Furthermore, production and consumption in the informal sector can only be estimated.

Table 4: Milk production (in t) 2013 - 2017

	2013	2014	2015	2016	2017
Cow's milk	3,833,030	3,699,370	3,650,000	3,600,000	3,558,000
Camel milk	158,505	164,906	254,093	179,659	169,724
Goat's milk	86,104	76,452	77,424	78,237	79,128
Sheep's milk	79,652	77,472	76,790	79,714	81,854
Milk (total)	4,157,291	4,018,200	4,058,307	3,937,610	3,888,706

Source: FAO 2020, FAO & OECD 2019

In retrospect, Ethiopia's milk production has increased significantly, especially since 2000, rising from around 1.06 million tonnes of milk in 2000 to its current peak of 4.47 million tonnes in 2012. Since then, according to FAO figures, the total volume of milk produced has declined slightly, especially for cow's milk.

1.5 Significance of the meat and milk sector

Despite widespread animal husbandry in Ethiopia, its contribution to food supply and daily nutrition is comparatively small. In 2017, a person residing in Ethiopia consumed about 65.7 g of protein per day, just under 6 g was of animal origin and only slightly more than 2 g of this came from meat consumption. Although the total protein intake has improved by an average of around 11 per cent between 1980 and 2017, the proportion of animal protein in the national average diet fell by 33 per cent over the same period.

However, the livestock sector in Ethiopia makes an enormous contribution to the country's overall economy. It accounts for around 19 percent of the country's gross domestic product (GDP), 35 percent of agricultural GDP and 16-19 percent of foreign exchange earnings (MoA 2012). The share of foreign exchange revenues is due to the high level of live cattle exports, which 8 to 10 years ago could have amounted to up to 500,000 cattle via formal export channels. According to the Ethiopian Veterinary Service, these exports have declined significantly in recent years and accounted for less than 10 % of the previous record levels. Yet at the same time, the informal export route has become more important in recent years. Here, live cattle are taken to neighbouring countries and marketed as live animals to the Arabian Peninsula. There is no reliable information on this export route and can only be estimated on the live animal exports of neighbouring countries that resell the Ethiopian animals. The value of informal exports could be more than 300 million US dollars annually.

The livestock sector also makes an important contribution to poverty reduction by improving the livelihoods of the rural population. About 79.2 percent of the population of Ethiopia live in rural areas and 11.4 million households earn part of their livelihood from animal husbandry. Cattle can be found on 70 to 90 percent of farms. Small ruminants are often the only source of income for poor, resource-poor small farmers. Animal husbandry fulfils several functions in rural regions. In addition to employment, livestock farming provides protein-rich food, generates income for everyday expenses and social obligations and serves as a stockpile of assets which can be quickly liquidated. Fertiliser production and the function as a means of transport are also important advantages of local livestock farming. Livestock farming therefore provides the basis of livelihood for many people, especially in lowland areas where there are few alternative livelihoods.

1.6 Support programmes

HEARD

Veterinary services in Ethiopia are primarily provided by the public sector, with clinics in each district and health posts in almost all Kebeles (communities). Nevertheless, there is no comprehensive and efficient veterinary care. Private sector involvement is very limited due to limited political support.

In order to increase private sector involvement in the field of veterinary services, the Veterinary Service Rationalization Road Map was developed and is currently being implemented under the name HEARD (Health of Ethiopian Animals for Rural Development) by ILRI (International Livestock Research Institute) and the Ethiopian Veterinary Association (EVA). The declared aim is to promote the strengthening of the veterinary sector and capacity building through public-private partnerships (PPP).

Livestock Master Plan

The Livestock Master Plan is currently the most significant and comprehensive project of the Ethiopian authorities in the livestock sector. It was based on a sector study by the Bill & Melinda Gates Foundation "Ethiopian livestock sector analysis", which was prepared in 2017, and the "Ethiopian livestock master plan (roadmap for growth and transformation)", which was published in 2015. The project comprises a series of five-year development plans (2015/16 - 2019/20) focusing on animal value chains and production systems. The plan supports the development of the livestock sector, in particular small-scale livestock production systems. The plan aims to strengthen individual production systems through improved feed supply, animal genetics and animal health. The project will encourage the selection and breeding of more productive (local) animal breeds and make them available to livestock farmers. To this end, breeding stations will be set up throughout the country, which - with the aid of artificial insemination - will improve the livestock population throughout the country. In addition, the transfer of knowledge to livestock farmers will be strengthened through training and further training opportunities.

2. Analysis & evaluation of potentials in the meat industry

2.1 Development of demand for meat and meat products

With a rapidly growing population, increasing urbanisation and rising incomes, domestic demand for red meat and eggs is expected to continue to grow in the near future and per capita consumption is expected to increase significantly, especially in urban areas. As the population continues to grow, the country's overall demand will grow disproportionately. Poultry meat is expected to be particularly dynamic in this context, as it can be produced at higher production volumes in a relatively short time in order to supply the domestic market.

In general, meat consumption in Ethiopia is defined by three main aspects:

- Affordability of the products: Despite strong economic growth, average wages in Ethiopia remain at a low level. At the same time, prices for meat products have risen in recent years, so that parts of the population are denied access to higher meat consumption for cost reasons alone.
- Traditional and cultural food preferences: Many Ethiopian livestock owners keep farm animals as a financial and security reserve rather than for food supply. The marketing of live animals is often done through informal distribution channels and is not intended for local use.
- Religion: Due to the strong religious orientation of the Ethiopian population, there is a strong increase in demand for meat consumption during the holidays.

About 34 percent of Ethiopia's population are Muslims (Sunnis), while 63 percent profess the Christian faith. 43 percent of Christians belong to the Orthodox faith and about 19 percent to the Protestant faith. The Ethiopian Christian Orthodox denomination follows certain dietary rules similar to those of the Jewish and Muslim denominations and therefore does not consume pork.

Another important factor influencing the development of demand for Ethiopian meat products is the development of foreign demand for red meat. Here, developments on the Arabian Peninsula are of particular importance, as this region is the most important sales market for Ethiopian live cattle and meat products. As the population there is developing very dynamically, as in Ethiopia, and the purchasing power there is far above that of Ethiopia, the demand for live animals is expected to remain high. Many countries on the Arabian Peninsula have also abandoned the primacy of self-sufficiency and are specifically asking for imports. However, it is currently not clear whether Arab importing countries will accept the import of live cattle and sheep via informal trade channels on a permanent basis, or whether they will demand more official guarantees on animal health and origin. If so, the formal route would regain importance and the actors involved (livestock traders and feedlot operators) could benefit from this development. Export slaughterhouses would also be able to improve their capacity utilisation significantly.

2.2 Development of self-sufficiency, import and export

Ethiopia's livestock farming sector is an enormous resource whose potential for value creation is only utilised to a limited extent. The current market is characterised by low per-capita consumption, declining exports of live animals and meat via the formal export route and substantial but difficult to capture exports of live animals via the informal export route. At the same time, livestock farmers complain about a lack of structures and non-transparent trade practices. As a result, producer prices are often very low and the main added value is only achieved in the subsequent stages of trade. Therefore, there are few incentives for producers to improve or expand production.

Imports are very small (see Table 5), with more than 90 percent of the imported goods (2017) being poultry meat from Brazil. Imports of meat and meat products have increased somewhat, but only at a very low level, largely following the establishment of luxury hotels and supermarkets in the capital city, which aim to meet the specific taste and quality requirements of foreign guests.

Table 5: Market supply 2013 - 2017 - meat

	Production (in t)	Imports (in t)	Exports (in t)
2017	782,472	276	18,873
2016	758,208	239	18,219
2015	740,863	71	18,377
2014	749,963	30	16,475
2013	678,965	24	14,597

Source: FAO 2020, ITC 2020

Over the last two decades, Ethiopia has mainly focused on red meat exports. The quantity of meat exported rose by 29.3 percent to around 18,900 tonnes in the period from 2013 to 2017. Currently, meat products worth around 97 million USD are exported. Goat meat is the most exported type of meat with an export value of around 88 million USD, ahead of beef at 6.2 million USD and offal at 2.3 million USD.

Table 6: Meat exports (in t) 2013 - 2017

	2013	2014	2015	2016	2017
Sheep and goat meat	13,305	15,267	17,404	16,583	16,009
Beef and veal	8	5	51	923	1,700
Offal	1,282	1,185	899	706	1,063
Other	2	18	23	7	101
Total	14,597	16,475	18,377	18,219	18,873

Source: ITC 2020

The Arabian Peninsula is currently the largest sales market for meat products. The United Arab Emirates (UAE) alone imports around 10,000 tonnes of Ethiopian meat, ahead of Saudi Arabia with 6,400 tonnes and Bahrain (960 tonnes), see Table 7.

Table 7: Top 5 markets for Ethiopian meat exports (in t) 2013 -2017

	2013	2014	2015	2016	2017
UAE	8,304	10,298	11,467	10,585	10,125
Saudi Arabia	5,103	5,160	6,195	6,113	6,377
Vietnam		99	451	680	1,039
Bahrain	180	29	8	570	960
Bangladesh					132

Source: ITC 2020

Exports of red meat (poultry meat is practically not exported) are still at a low level despite all efforts and do not even reach 3% of domestic production. In the case of beef, Ethiopia has made various attempts to maintain the substantial added value in the country through domestic slaughter and export marketing of the carcasses. This has led to the establishment of specialised export slaughterhouses, some of which are now closed again or are producing at low capacity. It is apparent that the informal export route has established itself as more flexible and efficient and is not subject to official control. Goats are less suitable for live marketing, so that slaughter in the country has become established as an advantage.

More important than the trade in meat and meat products is the marketing and export of live animals for Ethiopia. In addition to important export earnings, it also provides access to foreign exchange, which is critical for Ethiopian economic development. In recent years, the export of live animals has been subject to strong fluctuations and informal export has gained in importance compared to formal export channels. For formal exports, an export value of around USD 62 million is estimated for 2017. In another publication, the value of formal exports is given as USD 190 million.

Ethiopia is thus an important supplier of live animals to Somalia, Djibouti, Kenya and Sudan, as well as Saudi Arabia, particularly through informal trade channels. It is assumed that the total value of the informal export channel significantly exceeds the value of the formal export channel and could be three or four times higher.

Overall, Ethiopia has not yet succeeded in taking advantage of the dual opportunities of, on the one hand, a better supply of red meat for the domestic population, and on the other hand, better export marketing in the red meat sector, where a high added value remains in the country. The following points are cited as the main reasons for this:

- Subsistence farming of many livestock farmers (not commercially oriented)
- Inefficient and non-transparent livestock marketing systems
- Illegal cross-border trade in livestock
- The lack of a stable and competitive supply of animals for slaughter which meets the quality requirements of the export market
- Lack of raw material supply to cattle slaughterhouses in maintaining the cold chain, processing and packaging of meat and meat products of export quality
- The absence of a traceability and registration system and effective animal disease control, which would allow a sustainable reduction in animal losses
- Limited compliance with the requirements (hygiene, animal health, etc.) of the international market

In order to achieve greater sales and exports, the above-mentioned weaknesses must be addressed. Most of the recommended measures are aimed both at export marketing and at improving the satisfaction of domestic demand.

2.3 Price trends for meat and meat products

The rising prices for live animals are also reflected in meat prices. According to CSA surveys, retail prices for beef in Addis Ababa have risen by 50 percent over the last five years.

2.4 Market regulation

For years, Ethiopia has implemented a comparatively simple market regulation system to protect its domestic meat production. Imports of live animals such as cattle, goats, sheep and day-old chicks are subject to a 5 percent duty, while animal halves or higher-quality processed meat products of all kinds are subject to a 30 percent duty. This means that meat products are subject to the country's second-highest customs clearance class. Special import quotas for individual product groups are also possible. Meat products of all kinds are also subject to the general VAT (value added tax) rate of 15 percent in Ethiopia.

Depending on the import class of the goods, importers of live animals and meat products require permits from various authorities. For the import of live animals a licence from the Ministry of Agriculture (MOA) is required. Imports of processed meat products are subject to the Ministry of Health (MOH) and must be authorised by it.

2.5 Production systems for meat production

Red meat

Ethiopia has two primary systems of livestock production, namely small-scale mixed farming in the highlands with integrated arable farming and livestock grazing in the lowlands. The highland system accounts for about 80 percent of the total livestock. Cattle are mainly kept for work activities as draught animals and for dual use for milk and meat production, with meat production being rather secondary in these systems. Sheep and goats, on the other hand, are mainly kept for meat production.

The remaining 20 percent of Ethiopia's current livestock is located in the pastoral lowland systems in the country. The approximately 10 million livestock farmers are mainly nomadic communities and settled agro-pastoralists. The herd size for cattle is typically 10-15 animals, while sheep and goats have a herd size of about 7 animals. Interactions between the two production regions are mainly limited to the sale of male calves from the lowlands to the highlands for the necessary draught work provided by the animals.

An important factor in both systems is the low productivity and profitability of animal breeding and husbandry, as many farmers suddenly have to sell their animals when drought or other financial needs arise (e.g. disease). Farmers do not orient their working methods towards economic efficiency and often do not consider trade in live animals to be profitable in terms of a production system. This sometimes results in poor husbandry conditions which do not increase the value of the livestock, as well as in disproportionately high rates of animal disposal and losses. A further trend is the decline of pastureland due to the expansion of arable land, which leads to an increasing dependence of animals on crop residues. Forage stockpiling through silage has not been widespread so far, which means that there may be seasonal feed shortages during which the animals are particularly susceptible to diseases and epidemics. Both systems are characterised by low input use and low production output.

Commercial beef fattening for concerted meat production (feedlot) is not widespread. An exception is feedlots, fattening farms which keep and fatten cattle mainly for export or for export-oriented slaughterhouses. Well-developed young animals are more likely to be used for export, while older animals are more likely to be fattened for the local market. This system mainly uses cattle of the Boran breed. This breed is suitable for export to the Arabian Peninsula. The feedlots are located in the immediate vicinity of large urban centres, such as Addis Ababa. There are around 300 feedlots in this region around Adama. The

animals are fattened for a period of 3-6 months. The average number of animals kept per farm varies between 100 and 1,500. The feed consists of agro-industrial by-products and maize silage. This production system could absorb up to one percent of Ethiopia's cattle population, but is currently underutilised.

The Statistical Office is expecting a further increase in livestock numbers. However, there has been no livestock census in recent years and the data available is based on samples taken by the Statistical Office. There may also be fewer livestock available, as the volume of animals available for formal marketing is estimated by many Ethiopian experts to be declining. The proportion of working steers is also interesting. Older figures from the 1990s assumed that around 10 million cattle were used as working oxen and that they plough 2/3 of the arable land. This number is probably somewhat lower today, but a substantial number can still be assumed.

Table 8: Trend in livestock numbers (in units) 2014 - 2018

	Cattle	Sheep	Goats	Pigs	Poultry	Camels
2018	62,599,736	31,688,157	33,048,456	35,950	61,482,000	1,261,785
2017	61,002,030	32,039,974	30,747,916	35,388	59,158,000	1,205,031
2016	59,486,667	30,697,942	30,200,226	35,031	59,495,000	1,209,321
2015	57,829,953	28,892,380	29,704,958	34,718	60,506,000	1,228,023
2014	56,706,389	29,332,382	29,112,963	34,000	56,867,000	1,164,100

Source: FAO 2020

Poultry meat & eggs

In Ethiopia, poultry meat is almost exclusively understood as the consumption of chicken meat. Other types of poultry such as guinea fowl, geese, turkeys and ducks are not common in the country. More than 50 percent of Ethiopian households have poultry farms with varying stock sizes. However, about 80 percent of poultry households keep between one and nine chickens in the form of free-range or backyard systems, using either indigenous breeds or crossbreeds. It is on these farms, with the primary purpose of self-sufficiency or micro marketing, that most of the poultry meat and eggs consumed in Ethiopia are produced.

Ethiopia's few actual (commercial) poultry production systems can be divided into commercial farms and family-run small farms, depending on their orientation. Commercial farms are mainly found in peri-urban and urban areas, while family-run farms are more established in rural areas.
There are an estimated 350 commercial chicken farms in the country, many of which are located in a 100-kilometre corridor south of Addis Ababa. The farms are specifically located in this corridor to gain better access to feed, veterinary medicines, other inputs and market outlets in Addis Ababa. Commercial fattening farms typically have a stock of more than 1,000 fattening hens, while commercial laying hen farms keep more than 500 hens. In the whole country, there are about 35 to 40 farms which keep more than 1,000 broilers. Farms with 10,000 animals or more are very rare and exist only in close proximity to large urban areas. These commercial farms have modern poultry breeds and practice modern fattening, feeding and hygiene management. The day-old chicks required are sourced from domestic hatcheries, which usually provide ISA, Cobb or Lohmann breeds. Some of the largest poultry companies, such as Alema Farms and ELFORA Agro-Industries PLC have their own slaughterhouses where broilers are slaughtered and processed directly. Feed production is integrated into many of these larger farms, while companies with stocks of around 1,000 animals buy compound feed instead of producing it.

Family-run small farms keep between 50 and in some cases over 200 broilers or over 100 laying hens on the corresponding farms. They also have modern poultry breeds or corresponding commercial crossbreeds. The quality of the barns in this system can vary greatly, as can the mortality rate of the animals in the flocks (<20 to >50 percent), due to limited stable hygiene, animal health and feeding systems.

2.6 Collection of animals for slaughter, meat processing and marketing

The main actors in the meat value chain are breeders, intermediaries, state slaughterhouses, private export slaughterhouses, butchers, supermarkets and hotels.

Red meat

In general, cattle, goats and sheep are sold by producers in the rural areas to intermediaries. They drive or transport the animals to urban areas where local cattle markets are located. These livestock markets can be of a formal nature (designated area within a municipality or town). However, they may also be a collection of several cattle dealers along major roads (motorways) close to towns and cities. In peri-urban areas, the animals (usually small ruminants) are often displayed on the central green strips of two road lanes and can be purchased directly there.

Local private households and butchers supply themselves with animals for slaughter either at these informal livestock markets near the cities or at formal livestock markets in the cities. Many private households slaughter their animals themselves for personal consumption for festivities or for other traditional consumption practices. Butchers do not usually slaughter animals themselves, but commission the slaughter at a slaughterhouse.

There are two types of slaughterhouses in Ethiopia: public and private, the latter mostly with an export orientation. State slaughterhouses are spread across the country and are designed to enable the many livestock farmers to slaughter animals under acceptable conditions of hygiene and animal welfare. Slaughterhouses producing for the domestic market are managed by local municipalities and offer their services to butchers and private individuals. The number and capacity of state slaughterhouses vary from region to region.

The average carcass weights are very low. Thus, cattle reach on average only 110 kg, sheep 10 kg and goats 8 kg per animal. Export-oriented slaughterhouses mainly buy animals for slaughter from feedlots, which provide animals with higher weights. These private fattening farms are mainly designed to export live animals and to supply the export slaughterhouses. Some operate under the generally accepted SPS (Sanitary and Phytosanitary Measures) requirements, rules and regulations for animal quarantine, while others do so less. Feedlots generally buy livestock, either through their own buyers (agents) who collect the animals or directly from traders; occasionally they buy from co-operatives. The shortage of young animals and higher quality Boran animals, which are most in demand by processors, especially for the export market, currently prevents many feedlots and export slaughterhouses from fully utilising their processing capacity.

Most export slaughterhouses within the value chain are located in the centre of the country in peri-urban to urban areas. Although these mostly privately managed farms were established with the aim of providing meat and meat products for export, they now produce more for the local market when the price cost advantage does not allow for export. Animals in this system are provided by fattening farms or feedlots in the immediate vicinity.

When the animals arrive at the better export slaughterhouses, they are physically inspected and kept for two to three days in an area where they are given feed and water. During their stay in the barn, the animals undergo a preliminary examination before slaughter. Animals that pass this examination are slaughtered using the Halal method. The carcass is then chilled for 24 hours at between -2 and 2 degrees Celsius. In most cases, slaughter takes place when the slaughterhouses receive orders from their customers. The only processing carried out by local slaughterhouses is the placing of the carcass in cold stores for dispatch.

Depending on demand and availability of meat, the carcasses are loaded onto trucks equipped with refrigerators and transported to the airport. All export slaughterhouses have their own trucks which they use for transport. The slaughterhouses in Ethiopia sell both meat and meat by-products.

Smaller slaughterhouses process meat mainly for local consumption. They work completely manually with little technology and automation. Most of these slaughterhouses are outdated, in need of renovation, poorly organised and sometimes do not have a constant supply of electricity and water. The processed meat is delivered to butchers, hotels, restaurants, universities and private individuals.

The official slaughter figures are very low. It is clear that only a fraction of Ethiopian farm animals is slaughtered in approved establishments.

Table 9: Official slaughters in Ethiopia 2017/2018

Animal	Number of animals for slaughter
Cattle	434,514
Sheep	4,520,293
Goats	2,828,561
Camels	6,742
Poultry	16,905,458
Total	24,695,568

Source: CSA 2019

Butchers sell meat and edible offal directly to final customers on a retail basis, both as raw meat and in the form of processed or cut meat. In addition, meat may also be offered there in a ready-to-eat state, for example as roasted cuts, meat skewers or similar.

There are only a few supermarkets with an integrated butchery or meat product department in designated districts of Addis Ababa. These supermarkets process and package meat on their own premises. For this reason, they have suitable cold stores, processing and packaging facilities. However, most meat consumers in Ethiopia are not in the habit of buying packaged or processed meat in supermarkets. Therefore, the purchase level of meat products in supermarkets by society in general is very low.

According to official figures, there are 1,369 butchers' shops and 120 supermarkets processing and selling meat and meat by-products in major cities such as Addis Ababa. In the surrounding cities (Modjo, Adama, Bishoftu, Dukem) there are a further 163 butchers. Outside of supermarkets, meat products in Ethiopia are mainly freshly cut and sold without packaging. This means that branding is not possible for producers of these products and drastically increases the risk of pathogen transmission. There is no strict legal requirement for the packaging of meat products.

Poultry meat

Most of the poultry consumed in Ethiopia comes from domestic production and is slaughtered and consumed directly by the producers. The average age at slaughter for local breeds of chicken is generally between 8 and 12 months, while the average slaughter weight for both local and exotic breeds is around 1.0 and 1.3 kg. Some poultry farmers sell live animals to intermediaries who, depending on the organisational structure, slaughter the animals themselves and sell them to the final consumers at markets or to supermarkets.

Modern fattening farms in Ethiopia usually have their own integrated slaughterhouses or slaughter lines. Chickens are slaughtered, processed and packed on site. These slaughterhouses carry out an on-farm carcass inspection and follow modern hygiene measures, although only a few of them have a modern hygiene concept such as HACCP or ISO 22000. For the poultry breeds used in this system, the slaughter age is between 40 and 45 days. The poultry meat is then usually sold to wholesalers, who in turn market the goods to supermarkets or large customers.

3. Analysis & evaluation of the potential of the dairy industry

3.1 Development of demand for dairy products

In general, demand for milk and dairy products is growing, especially in urban areas where there is high population pressure. In addition to rising incomes and population growth, the current internationalisation in the form of new hotels and more international guests is creating a stronger demand for safer and processed dairy products.

Due to the statistical differences between FAO & OECD, CSA and other institutes, a wide range of development scenarios are forecast for Ethiopia in terms of expected demand. However, despite different statements on domestic production volumes, all of them point to a steady increase in the consumption of milk and dairy products. It should be taken into account that the current supply level of 30 kg per capita and year on average is not sufficient to improve the malnutrition prevalent in the country, especially among children and young people.

3.2 Development of self-sufficiency, import and export

Although the government is making efforts to develop the country's dairy sector, it is questionable whether the country will be able to secure its milk supply largely through domestic production in the future. Despite conflicting data on the country's milk consumption and per capita consumption by international and local institutes, consumption and thus demand for safe dairy products will increase. The current population growth of 2.5 to 2.7 percent will pose major challenges for the country and its supply chains. These can only be solved by establishing formal structures for milk collection and processing and the associated increase in food and supply security.

Although Ethiopia currently produces around 3.9 million tonnes of milk, these production figures must be seen in the context of an extremely high rate of loss of more than 25 percent, so that the current volume of milk marketable or available for consumption probably only reaches just over 3 million tonnes. The inadequate organisation of the collection, transport and temporary storage of raw milk at milk collection points is cited as one of the main causes. In addition, there are often no regulated and stable business relationships between milk producers, traders and collection points, so that raw milk reaches the processing plant or consumers in poor or spoiled form. Ethiopia is therefore unable to meet its current demand for milk and dairy products. As a result, imports of dairy products are rising in relation to demand. However, the high price level of imported dairy products and the chronic shortage of foreign exchange mean that imports are only increasing slowly.

Table 10: Development of market supply of milk 2013 - 2017

	Consumption (in t)	Production (in t)	Imports (in t ME)	Exports (in t ME)
2017	3,283,502	3,888,706	23,593	9,564
2016	3,312,203	3,937,610	19,067	9,464
2015	3,441,514	4,058,307	22,234	8,814
2014	3,461,747	4,018,200	18,728	9,945
2013	4,210,329	4,157,291	17,217	4,704

Source: FAO & OECD 2019, FAO 2018

Imports of dairy products are currently showing a slight upward trend again, following a sharp drop in import volumes in 2014/15. Over the last five years, the country has imported an average of almost USD 10 million worth of dairy products, with the main share coming from expenditure on milk and whey powder. Most of the imports are milk and whey powder and butter from Switzerland, the Netherlands, France and New Zealand, but more sophisticated products such as cheese and curd cheese come from Turkey and Egypt.

Table 11: Imports of dairy products (in USD 1,000) 2012 - 2017

Product	2013	2014	2015	2016	2017
Milk and cream, thickened (powder)	8,852	4,428	5,408	7,036	9,159
Cheese and curd	497	665	1,102	928	1,193
Butter	55	52	433	162	105
Whey powder	20	21	25	592	784
Milk and cream	337	381	440	329	292
Buttermilk, curdled milk, yoghurt, other fermented/acidified milk	180	59	177	128	135

Source: ITC 2020

Due to its geographical location, Ethiopia serves as a transit country for many goods that arrive in East Africa via the port of Djibouti or Mombasa in Kenya. Milk powder is delivered to the neighbouring countries Somalia and Sudan.

3.3 Market regulation

Just like imports of meat products, imports of dairy products are also subject to customs duties. The level of the duty rate depends on the degree of processing and the import volume. Dairy products such as drinking milk, butter and cheese are generally subject to a duty rate of 30 per cent, but drinking milk is exempt from VAT, while cheese and butter are also subject to the usual rate of 15 per cent as VAT.

Milk and whey powder are subject to 20 percent customs duty and no value added tax. However, if processing companies import milk and whey powder for the purpose of industrial refinement or further processing, the corresponding duty rate is reduced to 10 percent.

3.4 Production systems for milk production

Ethiopia's cow's milk production depends mainly on the genetic resources of local cattle breeding, which is dominated by small farmers. At present, around 16.2 million (dairy) cows produce almost 4 million tonnes of milk, which means that the animals produce on average between 1.2 and 1.6 litres per cow and day over a lactation period of 180 days.

Milk production systems in Ethiopia can generally be divided into three categories, namely rural, peri-urban and urban/commercial production systems. All systems mainly produce cow's milk, but camel milk production also plays a role in some regions of the country. Sheep and goat milk, although also produced in Ethiopia, is almost exclusively consumed by the producers themselves, so that there are no significant market and processing structures in place.

Rural milk production systems are part of local subsistence farming and are estimated to contribute more than 80 percent to national milk production. This system includes pastoralists, agro-pastoralists and mixed farms whose production system is based on the keeping of indigenous zebu breeds. Most livestock farmers in this system keep about two dairy cows which they milk by hand. The animals are kept under traditional farming conditions and receive most of their feed from indigenous vegetation and crop residues. Due to the simple husbandry conditions and the animal breeds used, the milk yield of the animals kept is around 190 litres per cow per year. The system is not market-oriented and most of the milk produced is kept for own consumption. The surplus is mainly processed using traditional processing techniques. Processed dairy products such as butter, ghee and ayib are usually sold on the informal market after households have covered their needs.

Peri-urban and urban milk production, on the other hand, includes small owner-managed farms and commercial dairy farmers near Addis Ababa and other major urban areas with high demand for milk and dairy products. Most of the country's improved dairy herd is used for this type of milk production. In these systems, daily milk yields of up to 20 litres per day can be achieved and livestock farmers can keep up to over 100 animals. Farmers use part or all of their land to grow fodder crops. The animals are kept solely for the purpose of milk production and are not used for dual purpose as in rural production systems. Peri-urban and urban farms also have improved access to inputs and services (e.g. feed, animal health and artificial insemination) provided by both state and private structures.

In order to promote nationwide milk production and the urban supply of milk and dairy products, production facilities are currently being specifically placed around the urban areas. For example, nine major milk production units (>100 animals) with the best potential for value chain and dairy sector development have recently been established in the country's major cities (Adama-Asella ADA/Bishoftu, Great Addis, Ambo-Woliso, Humera, Jimma, Bahir Dar-Gondar, HawassaShashemene, Makelle and Dire-Dawa).

Commercial camel milk production, on the other hand, is only practised in a few provinces, with the regions of Oromia, Afar and Somalia playing the most important role (see Table 12). In Ethiopia there are about 345,000 camels used for milk production. As with dairy cows, there is widespread dual use of meat and milk, so that pure milk-producing herds are rarely found.

Table 12: Dairy cow herds, camel milk herds & milk yield by region in 2013

Region	Number of dairy cows	Ø Daily milk output (in l)	Year. Cow's milk production (in l)	Number of milk camels	Ø Daily milk yield (in l)	Year. Camel milk production (in l)
Tigray	884,000	1.27	207,849,000			
Afar	394,000	2.01	151,861,000	146,000	4.0	141,943,000
Amhara	2,914,000	1.19	642,247,000			
Oromia	4,998,000	1.48	1,473,195,000	155,000	3.91	148,332,000
Somalia	150,000	1.93	45,214,000	44,000	3.61	35,830,000
Benshangul-Gumuz	177,000	1.21	45,077,000			
SNNP	2,780,000	1.37	721,021,000			
Gambela	66,000	1.61	20,743,000			
Harari	17,000	1.97	6,080,000			
Dire Dawa	14,000	1.58	3,399,000			

Source: CSA 2018

3.5 Milk collection, processing and marketing

Modern milk collection, processing and marketing is still in its infancy in Ethiopia. The reason for this is the predominance of the informal sector, which is only very slowly being replaced by formal structures. As a result, less than 20% of the milk produced ends up in modern or formal market structures at all.

Informal sector

In general, the milk VC (value chain) in the informal sector consists of producers, milk collectors, intermediaries and end consumers, while in formal structures dairies and modern milk processors are intermediaries.

In the informal system, raw milk or processed dairy products are either distributed directly from producers to final consumers or reach consumers through a network of collectors and intermediaries (usually at two or more levels) via simple sales outlets or markets. Cafés, food retailers and restaurants are usually supplied with milk, cheese or yoghurt through intermediaries and not directly by the producers. Milk collection is usually carried out by private entrepreneurs using simple containers (plastic buckets or barrels) without any form of quality control such as cell count etc. and without a cooling/chill chain. The milk is transported by means of pack animals, animal carts or pick-ups.

Table 13: Milk prices in the milk VC

	Average raw milk prices (ETB/l)
Producer	7.5
Milk collector	15
Wholesaler / Market	20
Supermarket (formal)	25 to 32

Source: Guya, M.; Adugna M.; Mumed, Y. 2018, Tesfaye et. Al. (2019)

The processing of raw milk into cheese etc. is usually either carried out by the producers themselves or is done by the households which purchase the raw milk and then process it themselves for their own consumption. End-consumer prices of raw milk are highly dependent on location and in the informal sector range between 7.5 and 20 ETB, depending on consumers' access to the dairy value chain, while in formal structures up to 32 ETB are paid for a litre of drinking milk.

The informal supply and market structures are characterised mainly by the absence of marketing licences and low operating costs, but high retail prices. The entire value chain continues to suffer from major hygiene and food safety challenges. In addition to the inadequate or absence of the cold chain and generally poor sanitary production conditions, the storage and packaging materials of the final products are also critical points. Although there are official guidelines on the quality and hygiene of milk, official controls on compliance with these guidelines along the entire informal milk value chain are very limited. In Ethiopia, there is no mandatory certification, regular inspection or quality control in this sector.

Formal sector

Formal processing and marketing structures are not very well developed in Ethiopia. There are between 32 and 35 officially registered milk processing establishments throughout the country, depending on the source. About half of all processing plants are located in the area around Addis Ababa. Processors collect raw milk from dairy farms, private milk collectors, cooperatives and producer groups using refrigerated trucks. Producers are paid for their raw milk partly on the basis of quality parameters such as water content, but this is highly dependent on the production systems supplying the processors. After collection, the raw milk is transported to the processing plant and usually processed into pasteurised milk, cheese, butter and yoghurt. Formal establishments follow their own quality management system and are able to guarantee good food quality.

The finished products are either marketed to end consumers through their own market structures (factory outlets, sales outlets) or delivered to supermarkets, hotels or cafés. Retail prices for drinking milk in the formal sector are around 30 ETB per litre.

4. Supply of equipment and technology

4.1 Animal feed

Ethiopia currently has a total annual potential of about 144.5 million tonnes of available biomass for feeding purposes. Pastures, crops, and crop residues are the main sources of feed, followed by permanent crops. In addition to these sources, Ethiopian livestock farmers have access to a wide range of other feedstuffs. Besides basic and roughage, producers also use concentrated feed.

The main sources of concentrated feed are agro-industrial by-products, mainly mill by-products, oilcake and by-products of sugar production. Mill by-products include wheat and rice bran, hulling bran, semolina bran and possibly post-mill meals. Although most grain mills are operating below full capacity due to shortages and high input prices, it is estimated that currently some 2 million tonnes of mill by-products are produced from cereals and a further 488,000 tonnes from pulses.

In addition, oilcake from the extraction of oilseeds, such as noug or linseed, is available in the country, albeit in limited quantities. Brewery by-products such as DDGS (Dried Distillers Grains with Solubles) and spent grains are mainly available to peri-urban and urban livestock farmers as animal feed.

In Ethiopia there is also additional feed available from the sugar value chain. For example, in addition to the actual molasses from the refining of sugar, sugar cane tips and bagasse are also produced during harvesting and processing. These are available to farmers as a whole or in crushed form as possible energy sources.

Table 14: Potential supply of feed (in million tonnes)

Food from cultivated plants	Permanent cultures	Willows	Oil Cake	Mill by-products from grain	Mill by-products from legumes	Sugar cane tips & bagasse
52.7	1.72	57.09	0.567	2.041	0.488	0.2336

Source: FAO 2018

In addition to the country's natural resources, over 80 feed manufacturers and importers provide compound feed and feed supplements. The dominant companies are compound feed mills owned by private companies and farmers' associations, followed by importers or manufacturers of supplements (premixes, feed additives, etc.) and of feed processing machinery/equipment, and suppliers of feed seeds. Most of these companies are located in the Oromia and Addis Ababa regions. Most of the feed producers are currently operating below their actual capacity, mainly due to low product demand, shortage of raw materials and uneven electricity supply. Seasonal demand and comparatively high raw material costs continue to pose massive challenges for a sustainable and affordable supply of compound feed.

Table 15: Evolution of raw material prices (in ETB) for animal feed 2010/11 - 2018/19

	2010/11	2015/16	2018/19
Maize	4,000	5,100	8,430
Wheat bran	2,800	4,170	8,350
Wheat semolina bran	3,000	4,200	9,130
Noug cake	3,000	4,800	8,930
Rape cake	1,300	2,900	8,250
Soybean meal	7,500	12,000	14,700
Cotton seed cake	4,450	5,000	10,970

Source: ILRI 2019

The cost of (mixed) feed components has risen sharply in recent years (see Table 15). Prices for raw materials have doubled in some cases between 2010/11 and 2018/19. Prices for important protein suppliers such as soya meal, wheat semolina bran and nougat cake have risen by 535, 204 and 198 percent respectively in the reference period, putting enormous pressure on the competitiveness of Ethiopian livestock farming.

4.2 Genetics and veterinary medicinal products

Genetics

Ethiopia is home to a great variety of genetic resources for cattle due to its diverse agroecology, topography and proximity to Asia. Currently, 28 different breeds of cattle are kept in Ethiopia. Non-native (exotic) cattle breeds are mainly found in milk production. Imported are mainly dairy breeds, such as Holstein-Friesian, Jersey and Simmental. Crosses between indigenous and these exotic breeds are used in medium input production systems, with crosses between indigenous breeds and Holstein-Friesian being most common.

Controlled pure breeding or crossbreeding has been and still is limited in most regions of the country, so that a clear differentiation of breeds is not always easy. Thus, the supply of suitable genetics remains very difficult, especially in milk production.

However, the Ethiopian state has set itself the goal of increasing the number of improved and adapted cattle crosses as part of the Growth and Transformation Plan II (GTP II). The aim is to provide improved cattle breeds to dairy cattle households, which account for the largest share of Ethiopian milk production. According to the plan, the proportion of crosses is to be increased by 793 percent between 2014/15 and 2019/20, while at the same time the proportion in specialised dairy farms is to be increased by 163 percent.

Table 16: Planned development of crossbreeding herds in the dairy sector (in 1,000 animals) according to GTP II

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Dairy farming households	453	777	1,296	2,006	2,920	4,044
Commercial dairy farms	326,147	393,177	477,471	580,133	705,207	857,634

Source: ILRI 2015

The planned nationwide supply of improved dairy cattle breeds is very ambitious. It therefore remains to be seen whether the breeding programme will be fully implemented and whether the desired effect can be achieved. Although artificial insemination for cattle was introduced in Ethiopia over 35 years ago, little progress has been made in recent years. With the implementation of GTP I & II, more attention has been paid to this technique again. The current National Artificial Insemination Centre (NAIC) has the task of managing and coordinating artificial insemination at the national level. Among the main limitations related to AI in Ethiopia are a lack of structural cooperation between the AI centre and the service providing units, and the lack of cooperation and regular communication between the NAIC and stakeholders. There is also a lack of a well-coordinated breeding policy and herd registration system, sufficient resources in terms of inputs and facilities, and incentives and reward systems to motivate the relevant technicians and producers.

Poultry sector

Just like the dairy sector, the poultry sector will be supplied with improved genetics. The GTP II will provide day-old chicks to private households and commercial fattening and laying hen farms, thus improving the performance of the whole sector. The focus here is on expanding the supply of market-oriented (commercial) poultry farms with suitable day-old chicks for laying and fattening.

Currently, most of the day-old chicks used in Ethiopia are locally hatched and bred, but the country does not currently have its own sustainable and stable parent stock, either for the laying hen or fattening lines.

Most of the parent animals are not bred in Ethiopia, but are sourced from multiplication centres in other countries, such as the Netherlands, South Africa, Saudi Arabia or Egypt. Larger poultry farms have their own breeding facilities. In general, knowledge about breeding and hatching day-old chicks in Ethiopia is low and management standards in most hatcheries are low. This leads to low hatching rates in many of the hatcheries in Ethiopia. Hatching results are influenced both by the management of the parent stock and by the organisation of the hatchery itself. Parent stock management (especially feeding) is of particular importance as it is much more sensitive and difficult than the actual rearing of laying hens or broilers.

Inadequate training, equipment, site conditions and the resulting low level of operational management mean that current Ethiopian hatcheries cannot fully supply the domestic market. This leads to long waiting lists for poultry farms and empty, unoccupied barns for periods of sometimes up to 7 months or longer. This makes poultry production a risky venture and as a result many people give up poultry farming and turn to other sources of income.

Table 17: Planned development of cross-breeding populations in the commercial poultry sector (in million birds) according to GTP II

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Commercial laying hen farms	0.145	3.0	6.0	9.0	12.0	15.0
Commercial fattening farms	0.193	17.0	34.0	51.0	68.0	85.0

Source: ILRI 2015

Veterinary products

The Ethiopian Veterinary Institute (NVI) and PANVAC (Pan-African Veterinary Vaccine Centre) in Debre Zeit produce a range of vaccines for poultry, including Newcastle Disease, IBD, fowlpox and avian influenza. Other key vaccines are not available from local manufacturers. Only East African Pharmaceuticals PLC produces some veterinary medicines itself. Currently, the Ethiopian government is registering more veterinary medicines and vaccines, facilitating commercial livestock production. Currently the main suppliers of veterinary products are Equatorial Business Group, East African Pharmaceuticals, Rangvet PLC and Gasco Trading.

In Ethiopia, the government is the main provider of animal health services, with clinics in each district and health posts in almost all kebeles (communities). However, the current services offered to animal owners are not satisfactory. The private sector and NGOs are also involved to a limited extent in providing medicines and veterinary services. Some years ago, there were attempts to promote privatised veterinary services, but these have not been effectively implemented. The wide spread of fatal diseases, limited accessibility of veterinary services and medicines, cross-border animal transport, the lack of adequate infrastructure and the dominance of informal markets currently pose major challenges to animal health services. According to a survey in 40 municipalities, veterinary surgeries and treatment centres are mainly state-run, while the sales outlets for veterinary products are almost exclusively privately owned.

Table 18: Number of veterinary practices and sales outlets in 40 municipalities

Sector	Veterinary surgeries & treatment stations	Sales outlets for veterinary medicinal products
State	318	0
Private	47	139

Source: Boere, A. et al., 2015

4.3 Technical equipment

Cattle, goat and sheep farming

Since the majority of red meat produced in Ethiopia is produced in pastoral systems, there is virtually no technical equipment available. Most animals are kept in open areas and either driven to natural water sources or led to boreholes with simple drinking troughs. An exception, however, are the export-oriented feedlots, which have simple mechanised drinking systems, but do not have a high demand for mechanised housing systems elsewhere.

Dairy farming

In Ethiopia, only the few large commercial dairy farms (> 50 animals) have milking and/or cooling facilities. Due to the oversupply of cheap labour, many producers do not use technology for milking. In contrast, the few dedicated commercial farms around Addis Ababa have automated milking equipment from European, Indian or Chinese manufacturers.

Poultry farming

Equipment for poultry farms is available in Ethiopia through various distributors of agricultural inputs and equipment. These distributors usually have close relationships with several companies abroad (based in Belgium, Italy, the Netherlands, India, China, etc.). Customers are farmers of all farm sizes and types. Small and medium-sized farmers in particular buy drinking and feeding equipment, while large farmers need more comprehensive solutions including hatcheries and air conditioning systems. The main importers and suppliers of poultry farming systems in Ethiopia are Gasco Trading, Wiseteam PLC and Friendship Agro-Industries, which sell equipment made in-house, particularly in-house designed cages.

5. Quality and safety of animal products

5.1 Meat and carcass quality

At present, no legal rules on the classification of carcasses apply. There are also no other programmes or procedures in place to determine the quality of meat or to classify it according to a standard. Some slaughterhouses carry out their own inspections, but these are not required by law.

The weight and meat quality of the Ethiopian carcasses will depend on the prevailing conditions at the slaughterhouse, the season and the age and breed of the slaughtered animal. In general, animals of all ages, from two to nine years, are slaughtered. In general, Ethiopian carcasses are characterised by a low meat and fat content. In export slaughterhouses, cattle reach slaughter weights of 130 to 150 kilograms, although the slaughter weights are highly seasonal. While slaughter weights of around 155 kg are achieved in the rainy season, animals in the dry season only reach around 120 kg.

Questions about meat quality, improper handling before and after slaughter and poor cold chain management have severely damaged the reputation of Ethiopian meat products, particularly in export markets such as Egypt, the UAE and Angola. For all export markets in the Middle East and North Africa, animals must be "halal" certified. Certification is carried out by private service providers, who must be a product certification body certified according to ISO/IEC 17065.

5.2 Quality of raw milk and dairy products

The poor hygienic condition of the milking environment and milk containers, lack of udder and teat cleaning practices, non-use of towels for washing and drying the udder and poor personal hygiene of the milkers result in poor microbial quality of the milk of many producers. Furthermore, the low price of raw milk tempts many producers to stretch the milk with water, which causes problems especially in cheese production.

5.3 Animal health and food safety

Common animal diseases of economic importance for livestock production and trade include rift valley fever, foot-and-mouth disease (FMD), contagious bovine pleuropneumonia (CBPP), caprine pleuropneumonia (CCPP), small ruminant plague (PPR), ruminant brucellosis and skin nodule disease (LSD).

For some diseases such as anthrax, blackleg, haemorrhagic septicaemia, pleuro-pneumonia and pasteurellosis in small ruminants, vaccination campaigns are being carried out by the government and private veterinary services. Nevertheless, the provision of adequate veterinary care for Ethiopian livestock remains a mammoth task at present. Due to poor biosecurity, there is a high incidence of poultry diseases such as Newcastle disease and infectious bursitis, which in the absence of vaccination can lead to high animal losses in the flocks.

Most slaughterhouses or meat processing plants in Ethiopia do not have European-style hygiene certification, especially those producing for the local market. However, most export slaughterhouses are organised in the Ethiopian Meat Producer-Exporters Association. This association is striving for a nationwide certification according to HACCP as well as ISO22000 and ISO 9000 for all its members. Currently, most of these companies are HACCP certified.

6. Availability and consumption of natural resources

Ethiopia is a landlocked country and shares borders with Eritrea to the north and northeast, Djibouti to the east, Somalia to the east and southeast, Kenya to the south and Southern Sudan and Sudan to the west. Ethiopia's topographical diversity includes high mountains and flat plateaus surrounded by lowlands and deep gorges with rivers and gentle plains at altitudes ranging from 110 m below sea level to over 4600 m above sea level in the northeast.

Ethiopia can be divided into three climate zones: a cool zone consisting of the western and eastern parts of the plateaus, a temperate zone between 1500 m and 2400 m above sea level and the hot lowlands below 1500 m. The average annual temperature varies between 7-12°C in the cool zone and over 25°C in the hot lowlands. The average annual rainfall of the country is 848 mm. Precipitation varies from 2000 mm in some areas in southwestern Ethiopia and less than 100 mm in the lowlands in the northeast of the country. Rainfall in large parts of Ethiopia is very irregular, resulting in a very high risk of seasonal drought. Taking into account the water balance and the length of growing seasons, Ethiopia can therefore be divided into three major agro-climatic zones:

- Areas without a significant growth period with little or no rainfall (eastern, north-eastern, south-eastern, southern and northern lowlands)
- Areas with a single growing season and a rainy season from February / March to October / November covering the western half of the country. The rainy season decreases from south to north.
- Areas with a double growing season and two rainy seasons (Meher and Belg). There is an area in the east of the country with a small rain peak in April and a large one in August, and the lowlands in the south and southeast, which have two distinct rainy seasons from February to April and June to September, interrupted by two dry seasons.

Climate models predict a 1.8°C increase in the monthly temperature in Ethiopia by 2050. The variability of precipitation will increase considerably. In central and southern parts of the country, precipitation is likely to decrease, while an increase is expected in southwestern and southeastern areas. In the northern areas, a general decrease in precipitation is expected almost uniformly.

Ethiopia has a considerable amount of water resources. The country has twelve major river basins, forming four main drainage systems. About 70 percent of total runoff takes place between June and September. Ethiopia has many small, medium and large dams built for hydropower generation, irrigation and drinking water supply. Capacity has been significantly increased in all categories in recent years. Groundwater is mainly used for drinking water supply.

Agriculture is the largest consumer of water. According to the FAO, agricultural water extraction is estimated to be at least 9 billion m^3 and is mainly used for irrigation. Irrigation areas along the Omo River threaten the existence of Lake Turkana. Direct livestock water consumption reaches about 7% of the country's total (water) consumption, almost the same level as the municipal water supply.

Water availability is crucial for Ethiopian livestock farming in the lowlands. For most of the year, animals have to travel long distances in search of water. Water scarcity is also severe in some highland areas of the country. Growing population pressure and irregular or lack of rainfall aggravate the situation. As a result, livestock farmers are unable to provide their livestock with sufficient drinking water, particularly during the dry periods. Pastoral livestock farmers therefore prefer heat-tolerant animal species and breeds that are better able to adapt to the lack of water and feed (e.g. camels, goats), which are particularly common in the lowlands.

In view of the use and strain on natural resources on the one hand and rising consumer expectations on the other, the public debate on the orientation and further development of Ethiopian livestock farming is becoming increasingly controversial. For example, in its strategy of the "Climate Resilient Green Economy" (CRGE), the Ministry of Environment, Forests and Climate Change (MoEFCC) focuses on reducing the stock of ruminants, especially cattle. As a consequence of climate change, this is intended on the one hand to respond to the increased vulnerability of Ethiopian cattle farming (reduced feed supply, increased spread of infectious diseases, reduced growth and reproduction rates). On the other hand, the productivity of farm animals is to be significantly improved. For farm animals, improved breeding and feeding systems and improved pasture and animal health management are recommended. Various projects are working on adapting agricultural technology to reduce the very large number of working oxen in Ethiopia (e.g. KfW in Arsi Zone in Oromia).

7. Opportunities for investments along the VC Meat and Milk

In Ethiopia, there are various starting points for investments in the meat and milk value chains which can contribute to modernising and increasing productivity and resource efficiency in the value chain and improve the climate and environmental compatibility of production systems. The aim is to improve the use of existing natural resources. In terms of climate compatibility, the investments should both contribute to a reduction of GHG emissions per kg of milk and meat and not further increase the overall emissions of climate-damaging gases in Ethiopia. In this way, the contribution of the dairy and meat industry to a needs-based nutrition and protein supply for the Ethiopian population could be improved. It should be taken into account that the current supply level of milk and meat is not sufficient to reduce the regionally widespread malnutrition in the country, especially among children and young people.

Technical priorities

Ethiopia's geographical position as a landlocked country makes it difficult for it to develop internationally competitive livestock farming or to participate in international trade in animal products. A major reason for this is the higher transport costs for both imported animal feed and exported beef and goat meat. In addition, customs duties are levied on imported feed and food.

Although cattle, sheep and goat farming is widespread in Ethiopia and the country has large livestock populations, productivity per animal for meat and dairy production is relatively low. Cattle are also used as draft animals. There could be a significant reduction in cattle numbers if mechanisation becomes more widespread in the arable sector. The production of red meat is largely limited by the existing pastureland, in addition to the increasingly scarce resources of water and agricultural land which can be used to produce fodder for livestock. For the latter, fodder production competes with food production. Fodder legumes in mixed cultivation with cereals would improve animal nutrition. A gradual increase in productivity per individual animal while limiting existing livestock is necessary (sustainable intensification).

The starting points here are better animal genetics and better feed and husbandry management. In addition, animal health surveillance would have to be improved to reduce the number of animals lost due to disease. An animal identification and traceability system currently being prepared by the Ethiopian veterinary service could also contribute to this. Out-grower farms could also significantly improve the productivity of cattle, sheep and goat farming by taking advantage of compensatory growth and fattening the animals. The Luna slaughterhouse is currently supporting the development of such farms in the Dhafar region and intends to operate this facility in close co-operation with livestock farmers in the region.

In the beef value chain, there has been a shift in recent years from the export marketing of beef slaughtered in Ethiopian slaughterhouses to the marketing of live animals via the neighbouring countries of Djibouti and Somaliland. Many cattle feedlots in Ethiopia have also ceased their activities. In this respect, it seems justified to focus beef marketing more on supplying the growing domestic demand. In general, it should be examined to what extent the informal marketing channels should be subject to greater state control in order to increase acceptance of formal marketing channels. This could also improve the reputation of Ethiopian livestock and meat products on international markets. On the other hand, local investment approaches such as the "Livestock Business Hub", which is currently being tested by the FAO and Veterinarians without Borders (VwB) in Ethiopia, could make a contribution by improving regional value creation and at the same time the supply of the rural population through local slaughtering and processing of goat, sheep and beef.

In the sheep and goat meat value chain, the production and consumption is mainly in Ethiopia. In addition to the informal export of live sheep, goat meat of up to 20,000 t per year is exported through official channels. This currently represents about 90% of Ethiopian meat exports, mainly to Saudi Arabia and UAE. Goats from the eastern regions are preferred, as the meat has a lighter colour. Here, too, a sustainable intensification of the production system of goat farming through improved breeding, the establishment of fattening farms and the development of structured marketing channels could generate more added value for livestock farmers.

Poultry meat is not yet a typical national meat product and per capita consumption is less than 1 kg. Nevertheless, demand in the consumer centres has increased significantly in recent years, resulting in a significant increase in local production. A bottleneck is the availability of high quality feed. Soybean cultivation is possible in Ethiopia but is only just being established. Ethiochicken is already very well positioned in the market as a local supplier of day-old chicks for poultry meat and egg production. However, due to the expected strong growth, there is room here for additional suppliers of both day-old chicks and feed mills. In a current project, the World Bank is promoting the establishment of broiler fattening farms with 5,000 fattening barns, which will be taken over by Ethiopian family farms. In the egg VC, the population is supplied almost exclusively from domestic production, which has expanded significantly in recent years. The import of eggs is only possible to a limited extent, so domestic production has locational advantages.

The prospects for the milk VC are assessed as good and offer excellent opportunities for additional value creation and employment. Currently less than 20% of the cow's milk produced in the country reaches the formal processing sector. In the informal sector, milk production is mainly for self-sufficiency or local resale. Accordingly, the processing level is low. In order to expand the formal sector, it is necessary to collect raw milk from small producers. Here, larger milk collection points of at least 1 t milk/day are preferable because they offer more options for milk cooling and marketing the milk. For potential investors and operators, different organisational models can be considered here. Milk collection centres can be operated by milk cooperatives, independent private operators or milk processors.

A dynamic increase in the processing of milk into higher value dairy products such as butter, cheese, yoghurt and cream is expected in the coming years. There are investment opportunities in small, medium-sized and larger milk processing companies with a daily milk volume of 0.5 - 400 tonnes. The wide range is explained by the different processing depths (pasteurisation only to a broad portfolio of dairy products) and the market orientation from local sales to marketing in urban centres. When investing in larger milk processing plants, care should be taken to ensure a sufficient raw material base and, if necessary, this should be taken into account in investment planning.

On the production side, there is an increasing number of livestock farmers specialising in milk production who, as cattle farmers, are developing from a self-sufficient economy to market-oriented milk production. This development is particularly noticeable in regions close to urban centres. Even if the quantities of milk delivered per farm are often small at the beginning, many livestock farmers recognise the advantages of milk production, which can provide them with a regular income. Some of these farms are developing rapidly as they make their expansion investments from their regular earnings. These help to increase the absolute milk volume and productivity per animal. This includes improvements in all areas of fodder production, grazing, husbandry, animal genetics, animal health and feed and production management. Milk producers must be supported in this process by a technical infrastructure for milk collection that allows continuous market access. Furthermore, appropriate technical services and advisory systems must support milk producers in their development. Complementary public investment is also needed in animal health programmes and in the development of overarching systems for the safety, quality and traceability of animal products.

Investment opportunities

The following table provides an overview of potential investment opportunities in the milk and meat value chains in Ethiopia. This is done from the perspective of a private investor who wishes to invest in the milk or meat value chain. Necessary preconditions or complementary public investments and programmes are also listed under the conditions. The ranking was made according to the appeal of the investment from the perspective of a private investor. This means that the table gives first place to those investment opportunities which are expected to be highly profitable and whose implementation is largely within the investor's sphere of influence and is not dependent on further conditions or contributions.

The table also lists in a separate section B public investments that have a systemic relevance for the economic development and value creation of the dairy and meat industry and whose successful implementation is a prerequisite for private actors to develop a willingness to invest. Examples include programmes for animal disease control, traceability and food safety. Other areas would include the development of advanced laboratory diagnostics, the establishment of special border inspection posts for international animal traffic and better control of the use of veterinary medicines and antibiotics. This will help both to better protect consumer health in a One Health approach and to improve access to foreign markets. In addition, the provision of a functioning public infrastructure (road network, energy, water, sanitation, communication, etc.) would also be an important contribution to encourage private operators to invest.

In particular, the following parameters are used to characterise the investment opportunities:

Investment object: short description and classification of the investment object in the relevant value chain milk and meat

Investment costs: Indication of the investment costs of the key investment in € for an investor.

Investor (number): Investors may include various actors, suppliers of production equipment and service providers in the milk and meat value chains. Potential actors are thus also livestock farmers in Ethiopia who want to modernise or expand their production systems. For foreign investors, the investment conditions are currently still relatively difficult to assess. The potential number of investments of the same type is also indicated.

Auxiliary conditions / contributions from third parties: Here, conditions and requirements are stated which are necessary for the successful realisation of the investment. These can be professional/technical conditions (such as the availability of liquid nitrogen for carrying out artificial insemination), market-related conditions (such as the regulation of market access for operating and feeding stuffs) and financial contributions in the form of financing or grants for the investment project. Some investment projects cannot be realised under normal market conditions for lending (interest rate, securities). In this respect, additional financing or even grant schemes are necessary to realise the investment.

Benefit: The main economic effects of the investment are listed here. The socio-economic effects of an investment in the milk and meat value chains are manifold and can both create additional income and jobs and contribute to an improved sector structure and its competitiveness, e.g. when it comes to meeting the requirements of international market partners in meat exports.

Return on investment: The return or viability of the investment project is estimated on the basis of the expected profit on the private investor's long-term capital. It is categorised in five steps based on experience from comparable investment projects.

Risk: The assessment of risk refers to possible fluctuations in costs and product prices and the vulnerability of the investment project to animal disease outbreaks or problems in product safety and quality.

Furthermore, for each investment it must be examined to what extent the respective investment leads to an additional burden and overuse of natural resources, especially water. The concrete burden must be determined on a case-by-case basis for each spatial zone or investment project. In Ethiopia, there are already considerable differences within the country in terms of water availability and the amount of annual precipitation.

Furthermore, an environmentally and climate-friendly orientation of livestock farming systems should be an essential part of a sustainable development strategy for the dairy and meat industry in Ethiopia.

Table 19: Potential intervention options

A. Private investment

Investment property	Investment costs Investor (number)	Auxiliary conditions / third party contributions	Benefits	Return	Risk
				1 very low - 5 very high	
VC Milk - Investment in milk processing technology of larger dairies to expand the product portfolio (5-50 t / day)	200,000 - 1,000,000 Milk processors (3-5)	Raw milk is available in sufficient quantities and of sufficient quality; Purchasing power remains constant or is rising; Funding	Higher added value; Workstations	5	2
VC Milk - Investment in equipment for small dairies (up to 2 t / day)	20,000 – 100,000 Small dairies (25)	Purchasing power remains constant or is rising; Training of skilled workers; Grant and financing	Higher milk quality and better milk hygiene; Higher value added / formal market access; Workstations	4	3
VC Poultry - Investment in the construction and initial equipment of new broiler farms	20,000 - 50,000 poultry farmers (500)	Grant and financing	Food supply with high-quality protein	4	2
VC Poultry - Investments in the construction and initial equipment of new laying hen farms	20,000 – 50,000 Poultry farmers (500)	Grant and financing	Food supply with high-quality protein	4	2
VC Milk - Improving bovine genetics for milk production	10 € Dairy farmers (100,000)	Construction/improvement of the infrastructure for the implementation of the AI (AI station, logistics) Training of the AI technicians	Production of cross-bred animals more suitable for milk production	4	2

A. Private investment

Investment property	Investment costs Investor (number)	Auxiliary conditions / third party contributions	Benefits	Return	Risk
				1 very low - 5 very high	
VC Milk - Modernisation of dairy farms with milking, milk cooling and husbandry technology	2,000 – 50,000 Dairy farmers (2,000)	Consultation and further training; subsidy and financing	improving productivity and animal welfare; improving the quality of work for livestock farmers	4	2
VC Milk - Improvement of basic fodder production and fodder preservation by purchasing better agricultural technology for field fodder production	10,000 - 30,000 dairy farm; Specialised forage growing farm (1,000)	Consultation and further training; subsidy and financing	Improving productivity	3	2
VC Poultry - Setting up hatcheries	100,000 – 500,000 Poultry farmers (1-3)	Cooperation with foreign breeding companies; Grant and financing	Provision of efficient day-old chicks	3	3
VC Red Meat - Development of regional / local service facilities for cattle, sheep and goat farming (e.g. livestock business hub with slaughter facilities)	5,000 - 100,000 cooperatives or municipal operators (100)	Identification and development of suitable institutions Financing and start-up grant	Better slaughter hygiene; improvement of food supply in rural areas	2	4
VC Milk - building and modernising milk collection by investing in transport, weighing and cooling equipment (2-10 t / day)	10,000 – 80,000 Operators of milk collection centres (250)	Align and enforce legislation in the field of dairy hygiene; Grant and financing	Increase formal market access; Higher milk quality and better milk hygiene; Workstations	2	2

B. Public investment

Investment property	Investment costs Investor (number)	Auxiliary conditions / third party contributions	Benefits	Return	Risk
				1 very low - 5 very high	
VC Red Meat - Improving livestock health (vaccination programmes, laboratory equipment, traceability)	> 3,000,000 Ministry of Agriculture All cattle farms	Government programmes and funding; Farms' own precautions (biosecurity)	Reduction of animal losses; Increasing the overall productivity of the livestock	2	2
VC Red Meat - Equipment of border inspection posts for international animal traffic	1,000,000 Ministry of Agriculture	Enforcement of legislation in the management of animal deliveries to neighbouring countries	Strengthening the formal animal trade	1	1

Innovative approaches

The investment opportunities and areas mentioned above can be further optimised by using innovative technologies or processes. This will not only increase resource and production efficiency, but also help to achieve other objectives such as improving product quality and safety, climate and environmental compatibility and animal welfare. Corresponding innovations can be implemented on the private investor's own initiative or can be demanded by defined criteria when approving or granting financing and subsidies.

The following innovative approaches could be applied in Ethiopia:

- Production of mixed milk drinks with fruit flavour and/or added fruit
- Innovative methods of fodder storage (ensiling in earth piles or silage sacks)
- Use of agro-industrial by-products in animal feed
- Use of small biogas plants in dairy farms for local energy supply
- Composting of residues from animal husbandry and their targeted use in arable farming
- Use of photovoltaics for the operation of milk collection points and milk cooling
- Use of digital applications to record the quantity and quality of milk delivered
- Use of photovoltaics on dairy farms for water pumping, milking machines and local milk cooling
- Use of digital market platforms (B2B) for equipment and technological components
- Use of mobile, digital applications for herd management and inventory control
- Establishment of digital platforms for the marketing of livestock
- Digital information systems for traceability, animal disease control and food safety
- Use of biogas plants for composting slaughterhouse waste (category 2)

Annex 1 - Further Information for Investors

ATA - Agricultural Transformation Agency, Ministry of Agriculture: http://www.ata.gov.et/investment-opportunities/

EDBI - Ease of Doing Business Index: information portal on the ease of doing business and investing ((https://www.doingbusiness.org/en/rankings)

EMDIDI - Ethiopian Meat and Dairy Industry Development Institute: https://emdidi.org/

Ethiochicken - https://www.ethiochicken.com/

EIV - Ethiopian Investment Commission - Agency for Investment Promotion ((http://www.investethiopia.gov.et/)

FAO - Information portal on water availability and water use: http://www.fao.org/aquastat

GIZ - Society for International Cooperation: https://www.giz.de/de/weltweit/336.html

GTAI - Germany Trade & Invest: information portal on economic development and investment conditions in a large number of countries around the world (www.gtai.de)

ILRI - International Livestock Research Institute https://www.ilri.org/

ITC - International Trade Centre: information portal for trade restrictions and trade data (https://www.trademap.org/Index.aspx)

KfW - Kreditanstalt für Wiederaufbau: https://www.kfw-entwicklungsbank.de/Internationale-Finanzierung/KfW-Entwicklungsbank/Weltweite-Pr%C3%A4senz/Subsahara-Afrika/%C3%84thiopien/

MoA - Ministry of Agriculture: http://www.moa.gov.et/web/guest/home

PSI - Political Stability Index: Information portal of the World Bank with economic data from over 200 countries (https://www.theglobaleconomy.com/rankings/wb_political_stability/)

IPRI - International Property Right Index: Informationsportal der Property Right Alliance (https://www.internationalpropertyrightsindex.org/)

World Bank: Information portal on climate change and its impacts (https://climateknowledgeportal.worldbank.org/)

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