Country Analysis Ghana

List of abbreviations

ADT	ADT Project Consulting GmbH, Bonn
APD	Animal Production Directorate
BMZ	Federal Ministry for Economic Cooperation
ECOWAS	Economic Community of West African States
EIU	Economist Intelligence Unit
EPA	Environmental Protection Agency
FDA	Ghana Food and Drug Authority
GFA	GFA Consulting Group GmbH, Hamburg
GHC	Ghanaian Cedi
GIZ	Society for International Cooperation GmbH
GSA	Ghana Standards Authority
HACCP	Hazard Analysing Critical Control Point
ME	Milk Equivalent
MoFA	Ministry of Food and Agriculture
NGO	Non-governmental Organisation
PPP	Public Private Partnership
VC	Value Chain
VSD	Veterinary Service Directorate
WAEMU	West African Economic and Monetary Union
WASH	West African Short Horn
WTO	World Trade Organisation

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Figure 1: National map of Ghana

Source: Freeworldmaps.net

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

1.1 Economic situation

For 2019 and 2020, Ghana's gross domestic product is expected to increase again by more than five percent. Current growth is mainly based on the oil and gas sector, which will continue to expand production. Individual companies have already announced increases in production. Other important sources of foreign exchange are gold and cocoa. The gold mining sector is showing increased activity again. Ghana is now the largest gold producer in Africa and has surpassed South Africa. The Obuasi mine has been reopened and Anglogold Ashanti expects production to start at the end of the year. For the cocoa sector, which has been suffering from structural problems for years, the government recently announced a USD 600 million economic stimulus package. The aim is to increase production from currently around 0.9 million tonnes to 1.6 million tonnes by 2026/27. In addition, the mining of lithium is planned for the near future.

The government is increasingly investing in infrastructure development, especially in the extension and improvement of the railway network. Major investments continue to be made in the oil sector. In February 2019, Aker Energy of Norway announced new oil discoveries in its Deepwater Tano Cape Three Points concession. In July 2019, AGM Petroleum announced new oil discoveries in the SDT block (South Deepwater Tano). There is also potential in the agricultural and food processing sectors. Both areas are being promoted by the government with various measures.

The government under President Akufo-Addo is business-friendly and pursuing important reforms. With an agenda for industrial transformation, Ghana is trying to diversify its economy more.

1.2 Investment climate

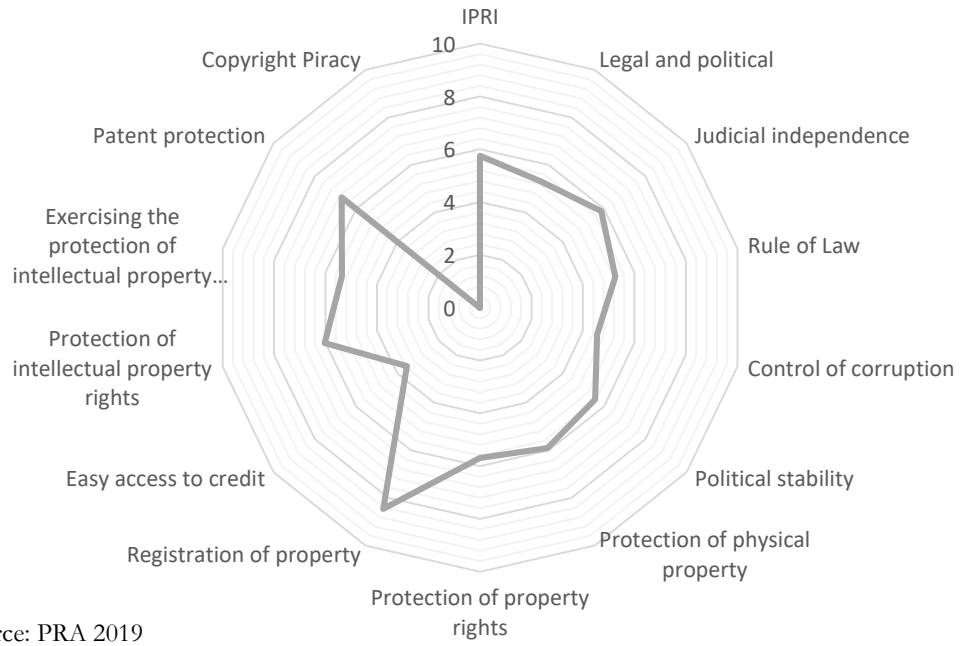
Ghana has been governed by a multi-party system for more than two decades and has made great progress in consolidating its democratic achievements. The judiciary has shown itself to be independent and has generally won the confidence of Ghanaians and many investors. The country enjoys both freedom of the press and freedom of speech. The Government aims to further increase its attractiveness to international investors and has set itself the goal of developing the country into an economic and financial hub in West Africa. There are no significant restrictions on foreign investment and there are no differences in the treatment of foreign and national investors. With its strong economic growth, Ghana is one of the fastest growing economies in Africa, it now belongs to the group of middle-income countries and is Germany's third largest trading partner in sub-Saharan Africa. Furthermore, Ghana has been a member of the WTO since 1 January 1995. The European Union and the Republic of Ghana have been applying an interim Economic Partnership Agreement since 15 December 2016. In 2019, both parties agreed on the final version of the origin protocol, which should be formally adopted in the first quarter of 2020. This will allow Ghana to start liberalising its market for EU products starting in the first quarter of 2020. Given these developments, tariff dismantling should be completed by 2029.

Table 1: Investment climate in Ghana (indicators)

Indicators	Rank
Political stability - Rank (2018)	112 of 211
Property Rights Index - Rank (2019)	58 of 129
Ease of Doing Business - Rank (2020)	118 of 190

Source: PRA 2019, World Bank 2020

Figure 2: International Property Rights Index 2019



Source: PRA 2019

Thus, the assessment of Ghana as a potential investment location is very positive. Its favourable geography, sustained economic dynamism, stable political environment and liberal economic policy make Ghana a promising location for investments from all over the world.

1.3 Meat market

1.3.1 Meat consumption

Although the Ghanaian diet is largely based on starchy roots (manioc, yams), fruits (plantains) and cereals (corn, rice), the supply of animal proteins and thus the consumption of meat is becoming increasingly important. In 2018, about 410,000 tonnes of meat were consumed in Ghana, so the annual per capita consumption in Ghana was about 16.2 kg. In general, beef, pork, sheep and goat meat as well as poultry and game are available in Ghana.

Table 2: Annual per capita consumption (in kg) - meat

Meat	2014	2015	2016	2017	2018
Poultry	6.0	6.4	5.5	7.3	8.9
Beef and veal	1.8	2.0	1.8	1.9	1.9
Sheep	0.78	0.80	0.83	0.83	0.83
Goat	0.93	0.96	1.00	1.02	1.02
Pork	1.0	1.1	1.2	1.1	1.1
Meat (total)	11.4	12.5	11.6	14.0	16.2

Source: MoFA 2018

Meat consumption in Ghana varies along geographical and religious lines and according to region. In general, urban dwellers consume more meat than the rural population due to their income level. While the population in the south of Ghana consumes more imported meat products, the people of northern Ghana tend to consume meat from domestic production. Poultry meat is currently the most consumed type of meat at the national level, followed by beef, goat and sheep meat (see Table 2).

In general, meat consumption increases significantly during religious holidays. About 70 percent of the population professes Christianity, while almost 20 percent are Muslims, most of whom reside in the north of the country. As a result, very little pork is consumed in the north of the country, whereas more beef is consumed than in the south. On religious holidays (Christmas, Easter, Ramadan, Eid ul Fitr, Eid ul Adha), the consumption of domestically produced poultry meat in particular increases. The animals are mostly purchased as living animals and then slaughtered at home according to traditional customs. During the same period, laying hens from egg production are preferred for slaughter and the animal population is also renewed at this time. On purely Muslim holidays, sheep meat is also in greater demand, while pork is more popular on Christian holidays. The demand for pork generally remains high after the Christian holidays. Processors who process pork into domedo and kebab experience a shortage of pigs for slaughter during this period, as most of the pigs available for slaughter have already been sold during the holidays.

Ghanaians are very nutrition-conscious and prefer low-fat meat. For this reason, the consumption of further processed meat products, such as bacon, is rather low, regardless of income effects and availability.

1.3.2 Market supply of meat and eggs

In Ghana, meat is usually sold fresh and unprocessed or frozen. The market share of processed products such as sausages, corned beef etc. is therefore marginal. Most meat products, such as poultry cuts or boneless beef cuts are imported, while sheep and goat meat is mainly from domestic production or slaughter. Ghana's current level of self-sufficiency reflects on the one hand the country's traditional animal husbandry, while on the other hand it underlines a changed consumer demand in the urban centres which cannot be met by national production. The degree of self-sufficiency varies considerably depending on the animal species. In 2018, Ghana was almost completely self-sufficient in meat from small ruminants such as sheep and goats (93.6 percent), followed by pork with around 90.2 percent. Beef and veal (46.7 percent) and especially poultry meat with a self-sufficiency rate of 23 percent occupy the bottom positions in this regard.

Table 3: Market supply of meat

Type of meat	Consumption in 2018 (in tonnes)	Production in 2018 (in tonnes)	Imports in 2018 (in tonnes)	Self-sufficiency rate (in %)
Poultry meat	266,250	61,496	204,754	23.1
Pork	31,474	28,392	3,082	90.2
Beef and veal	57,166	26,716	30,450	46.7
Sheep meat	55,226	22,959	3,541	93.6
Goat meat		28,727		
Total	410,118	168,291	241,872	41.0

Source: MoFA 2018

Chicken meat and cuts are mainly imported from the USA, the countries of the European Union and Brazil. In terms of the market for imported poultry meat, the USA has a market share of around 40 percent, while Germany and Brazil each hold 25 percent. Furthermore, beef and edible offal are imported from Belgium and the Netherlands. Finished processed meat products such as cold cuts, frozen products, convenience products etc. are mainly only offered in supermarkets and are almost exclusively imported from the European Union and the USA. Table eggs, on the other hand, are usually produced locally and not imported, as their import would be very challenging. Ghanaians tend to prefer fresh locally produced eggs, as they are usually offered in boxes of 30 eggs in many places. However, Ghana imports egg mass, which is used in Ghanaian confectionery and food processing.

Table 4: Market supply of eggs

	consumption in 2017 (in tonnes)	Production in 2017 (in tonnes)	Import 2017 (in tonnes)	Self-sufficiency rate (%)
Eggs	41,678	41,886		100

Source: FAO 2018

The supply of eggs fluctuates between the individual months. From December to January, the supply of eggs is particularly scarce, as many farmers rejuvenate their old stocks with new animals and sell older laying hens first. From June to July the supply situation eases again as the laying performance of young laying hens has caught up with that of older animals.

1.3.3 Meat production

Religious and regional characteristics also determine the country's meat production in many areas. Due to their cultural and social way of life, the Fulani ethnic group, traditional pastoralists, who are mainly based in the north of the country, have the most important cattle, goat and sheep herds in Ghana. Pig breeding and broiler breeding, although still very limited, is practised in the more Christian south, around the urban centres.

Sheep, goats and cattle are moved from the north to the southern urban areas for slaughter and processing. Since Ghana itself does not have sufficient livestock or the annual offtake rate is too low, live animals are brought into Ghana from neighbouring countries such as Burkina Faso and Togo via the northern borders. There are conflicting data on the volume of live animal imports from neighbouring countries. The national butchers' association assumes that more than 90 percent of the cattle slaughtered in Accra come from neighbouring countries.

In 2018, a total of 168,000 tonnes of meat were produced in the country, with domestic production focusing particularly on poultry, sheep and goat meat, pork and beef (see Table 3). Overall, the processing depth of meat in Ghana is low. Cattle and small ruminants are cut into coarse, household-sized pieces by a local butcher (depending on customer requirements) after slaughter. Unless the meat is marketed through a supermarket, it is not usually processed into minced meat, sausages or similar processed meat products.

Table 5: Meat production (in t) 2014 - 2018

Type of meat	2014	2015	2016	2017	2018
Poultry meat	54,809	57,276	59,108	60,291	61,496
Pork	22,932	24,513	26,107	27,412	28,392
Beef and veal	22,781	23,841	24,961	26,134	26,716
Sheep meat & goat meat	43,080	45,121	47,634	50,288	51,686

Source: MoFA 2019

1.4 Dairy market

1.4.1 Milk consumption

The consumption of milk (in any form) is a comparatively new phenomenon in the south and centre of Ghana, but it is becoming increasingly popular. In general, national milk consumption is still low, at around 8 to 9 kg ME per capita and year, but at the level of neighbouring countries such as Ivory Coast and Togo.

It is not traditional in Ghana to consume fresh milk or liquid milk unless it has been processed beforehand. In Ghana, mainly cow's milk is consumed and processed, sheep's and goat's milk play (almost) no role in the daily supply.

Although drinking milk (especially UHT milk) can be found in the shopping centres and other supermarkets, it is mostly an imported commodity, which is consumed mainly by foreigners. An exception is the ethnic group of the Fulani, who as traditional pastoralists regularly consume fresh milk from their own cattle. A large part of the urban population has reservations towards local milk production for hygienic reasons and therefore consumes little or no fresh milk produced in Ghana by (local) cattle herders but prefers evaporated or condensed milk.

Due to the absence of fresh milk consumption and widespread lactose intolerance, national milk consumption is based on processed dairy products such as condensed milk, yoghurt, ice cream and other milk-based drinks made from powdered milk. In addition, locally produced cheese (Wagashie) and brukina, a milk-mixed drink made from millet and milk (especially in the north of the country) are also consumed.

1.4.2 Market supply of dairy products

Modern milk production in Ghana, measured by European standards, is still in its infancy. Although around 45,000 tonnes of milk were produced in the country in 2018, this only represents a self-sufficiency rate of around 19 percent of the country. At the same time, imports of dairy products, especially milk powder, have risen sharply in recent years. Furthermore, the informal sector absorbs most of the locally produced milk, which is mostly processed in the private households of Fulani people into various traditional cheeses and yoghurts or sold locally.

Due to the lack of domestic production volumes, Ghana's market and local processors and producers of dairy products (including ice cream, baby food, chocolate milk, yoghurt and UHT milk) have adapted to the processing of milk powder, which is mainly imported from the countries of the European Union. Imported milk powder therefore also forms the basis for local product innovations, such as locally produced drinking yoghurts and whey products. Dairy products such as baby food, cheese, butter and ice cream are usually imported directly and not produced in the country. More than 80 companies currently import dairy products into Ghana, with Ireland, Denmark, Germany, the Netherlands and Belgium being the five main exporters at country level. The demand for milk and dairy products is very stable throughout the year but increases significantly with the dry season (November to March/April), when at the same time milk production in the informal sector decreases sharply.

1.4.3 Milk production

Ghana's milk production has increased slightly in recent years. In the period from 2014 to 2018 the amount of locally produced milk grew from 41,383 to 45,177 tonnes, an increase of 9.2 percent. Most of Ghana's raw milk is provided by pastoralists, while backyard farms in areas close to cities make a much smaller contribution. In general, the locally produced quantity of raw milk is far from enough to meet domestic demand (see Table 16: Development of market supply of fresh milk 2014 - 2018).

1.5 Significance of the meat and milk sector

Although the daily (total) protein intake per capita in Ghana increased from around 37 to 63 grams (+70 percent) between 1980 and 2017, the daily intake of animal proteins only increased by 19.4 percent in the same period. Thus, the share of animal proteins in the total daily intake decreased from 35 to 24 percent in the reference period. Accordingly, the average meat and milk consumption is less than 50 g or 35 ml per person per day. As Ghana wants to introduce more animal products (drinking milk, eggs and poultry meat) into the school diet in order to prevent malnutrition in childhood and adolescence, the current share of animal products in the protein supply seems to be too low. An adjustment could be achieved by increasing the supply of milk and dairy products.

As in many other African "emerging economies", animal husbandry in Ghana plays an important role in helping to secure jobs in agriculture and especially in rural areas. More than 38 percent of all Ghanaians of working age (>15 years) were employed in agriculture, forestry and fisheries in 2019.

At present, the livestock sector alone accounts for around 9 percent (in 2015) of agricultural gross domestic product and 1.7 percent of total economic gross domestic product. Although agricultural products generate around 40 percent of national export revenues, the share of animal products in this is low, as products from domestic production are almost entirely consumed in the country due to the low level of self-sufficiency.

Two groups predominate in the Ghanaian livestock sector. On the one hand, there are the pastoralists whose livelihood is based on animal husbandry. They breed and market cattle, sheep and goats and live from the dual use of their animals. On the other hand, there are also small farmers, who mainly operate arable farms and keep livestock to supplement their income and/or for food security. Livestock farming provides not only meat, milk and eggs, but also hides and skins for leather and finally bones, which are an important input for the downstream industry. Furthermore, the use of draught oxen enables farmers to cultivate larger areas of land, as agricultural mechanisation in Ghana is not yet far advanced in many regions.

1.6 Support programmes for the meat and milk sectors

The support programmes from the Ghanaian Government and the Ministry of Food and Agriculture (MoFA) have for a long time given little priority to animal husbandry. The national programme of the MoFA "Planting for Food & Jobs" (PFJ) was initially launched in 2017 without a specific animal husbandry component. In 2019, an extension aimed at animal husbandry was made. With the initiative "Rearing for Food and Jobs" (RFJ), the government wants to create new incentives for producers and investors in the livestock farming sector through support and subsidy systems. Through RFJ, the Ghanaian Government is addressing exclusively the livestock sector, with a focus on sheep & goat, pig, poultry and dairy farming and beekeeping. The aim is to increase the production capacity and intensity of animal husbandry significantly. The measures are aimed at improving animal health, increasing access to high quality feed and water and genetic improvement of the livestock. They will be implemented from 2020 onwards. The following measures are planned to achieve a reduction in the meat deficit from domestic production:

- Development of a national soybean cultivation strategy to support the poultry sector
- Reduction of conflicts between Fulani animal keepers and arable farmers (e.g. by supporting the settlement of nomadic animal keepers)
- Development of a large agricultural enterprise with 6,000 cattle (Wasawe in Afram)
- Strengthening of the national animal breeding stations by providing 50,000 breeding sheep and goats and 8,000 breeding pigs for a total of 8,000 Ghanaian livestock farmers
- Procurement of pure-bred animals for the pig breeding farm in Nungua (state farm)
- Purchase of 500 breeding animals of West African dwarf goats for the breeding station in Kintampo
- Implementation of PPP agreements for poultry production and poultry meat processing

2. Analysis & evaluation of potentials in the meat industry

2.1 Development of demand for meat and meat products

It is expected that the demand for meat (white and red meat) will continue to increase, although these developments will occur at different speeds.

Demand for poultry meat in particular will continue to expand in Ghana due to rising income levels. At present, average consumers tend to prefer low-cost, imported (processed) poultry meat products, as these give consumers a range of choices according to their income level. In addition, locally produced animal products are often perceived as being of inferior quality. A lack of hygienic conditions in local production facilities, outdated processing methods and food safety problems are viewed as critical by large sections of the population.

Measured by per capita consumption and Ghanaian consumption preferences, consumption of red meat is expected to increase much more slowly than that of white meat.

The market for table eggs in Ghana is currently growing steadily as consumers discover more ways to use eggs. This is mainly due to the general increase in income levels and nutritional preferences. The consumption of table eggs is widespread throughout society and they are also used for the preparation of many delicacies, from local products to new products imported from abroad.

2.2 Development of self-sufficiency, import and export

Due to the rapid economic growth of the country and the resulting increase in income, animal proteins are becoming increasingly popular in Ghana. However, the country's steadily growing per capita consumption in recent years stands in contrast to local production systems which currently cannot guarantee the country's supply. Although the country's meat production grew by 17.2 percent between 2014 and 2018, consumption rose from around 288,300 tonnes to (around) 410,200 tonnes over the same period, an increase of 42.3 percent. The enormous production deficit of local livestock farming is currently mitigated by imports, which increased by 67.2 percent in the reference period (2014 - 2018). In terms of the country's degree of self-sufficiency, this is currently aggravating the trend towards Ghana’s greater import dependence in the meat sector. There are no meat exports worth mentioning. One exception is bush meat, which is also traded across borders in very limited volumes (mostly informally).

Table 6: Development of market supply of meat in Ghana 2014 - 2018

Year	Consumption (in tonnes)	Production (in tonnes)	Imports (in tonnes)	Degree of self-sufficiency (in %)
2018	410,163	168,291	241,872	41.0
2017	353,832	164,124	189,708	46.4
2016	294,391	157,810	136,581	53.6
2015	315,861	150,751	165,110	47.7
2014	288,297	143,603	144,694	49.8
Change 2014 - 2018 (in %)	42.3%	17.2%	67.2%	

Source: MoFA 2018

In recent years, the production volumes of meat have also developed very dynamically in some cases. In particular, the volume of red meat produced grew quite considerably in the period from 2014 to 2018. During the reference period, the volume of pork produced increased by 23 percent, ahead of sheep and goat meat (20 percent), beef (17 percent) and poultry meat with 12 percent.

Table 7 Meat production (in t) 2014 - 2018

	2014	2015	2016	2017	2018
Poultry meat	54,809	57,276	59,108	60,291	61,496
Pork	22,932	24,513	26,107	27,412	28,392
Beef and veal	22,781	23,841	24,961	26,134	26,716
Sheep meat & goat meat	43,080	45,121	47,634	50,288	51,686

Source: MoFA 2018

In the period from 2014 to 2018, the import volumes of the various types of meat developed very differently. While the volume of imported poultry meat rose by almost 90 percent (87.9 percent) and beef by 11.7 percent, imports of sheep and goat meat developed rather modestly at 4.3 percent. This calculation does not include live animal imports from neighbouring countries. In contrast, however, the volume of imported pork fell by 34.3 percent in the reference period. Here, national production has increased significantly in recent years.

Ghana's self-sufficiency has changed in recent years (2014 to 2018) in some cases considerably (see Table 9), depending on the type of meat. While the degree of self-sufficiency of small and large ruminants has hardly changed, there have been moderate changes in the pork sector and strong changes in the poultry sector which reflect the consumption dynamics of the Ghanaian population.

Table 8: Development of meat imports (in t) 2014 - 2018

	2014	2015	2016	2017	2018
Poultry meat	108,967	121,861	96,975	151,346	204,755
Pork	4,689	6,972	8,271	5,722	3,082
Beef and veal	27,263	32,137	26,268	28,955	30,450
Sheep meat & goat meat	3,394	3,715	4,521	3,685	3,541

Source: MoFA 2018

The supply deficit for poultry is expected to widen further due to continued strong demand and weak local production, at least until additional import restrictions in the form of tariff quotas are put in place. The level of supply of beef, sheep and goat meat is expected to remain stable, as the country's supply and marketing channels have hardly changed structurally in recent years. Current trends in the self-sufficiency rate of pork are mainly accompanied by a decrease in import volumes (-34.3%, in the period 2014 - 2018) and an increase in local production (+23.8%).

Table 9: Development of self-sufficiency rates (in %) in the meat sector 2014 - 2018

	Poultry meat	Beef and veal	Sheep & goat meat	Pork
2018	23.1	46.7	93.6	90.2
2017	28.5	47.4	93.2	82.7
2016	37.9	48.7	91.3	75.9
2015	32.0	42.6	92.4	77.9
2014	33.5	45.5	92.7	83.0

Source: MoFA 2018

Although red meat production and stocks for all species have been stable in recent years, official slaughter figures show a significant decrease (see Table 10). It is therefore assumed that there is a shift towards informal slaughter and processing sites.

Table 10: Official slaughters (in pieces) 2014 - 2018

	2014	2015	2016	2017	2018	Change (2014 - 2018)
Cattle	164,554	141,144	116,056	129,694	122,083	-26%
Sheep	64,594	47,546	42,138	47,960	49,291	-24%
Goats	129,073	76,531	67,390	74,101	78,366	-39%
Pigs	21,735	13,618	11,923	13,195	15,648	-28%

Source: MoFA 2018

Furthermore, imports of live animals have increased dramatically in recent years. As local livestock farming cannot satisfy the ever increasing demand for animals for slaughter, this trend is expected to continue. In view of the sharp decline in slaughtering, it can be further assumed that most imported animals will not find their way into the formal slaughter and supply chains.

Table 11: Official imports of live animals (in pieces) 2014 - 2018

	2014	2015	2016	2017	2018	Change (2014 - 2018)
Cattle	20,948	17,968	23,575	32,249	54,566	160.5%
Sheep	22,188	15,763	13,854	47,526	65,950	197.2%
Goats	32,012	20,004	16,900	46,665	97,703	205.2%

Source: MoFA 2018

As with individual types of meat, production of eggs has been further expanded in recent years due to ever increasing demand. The production of table eggs, for example, grew by around 12 percent to around 47,000 tonnes in the period 2013 to 2017.

Table 12 Development of egg production (in 1,000 t) 2014 - 2018

	2014	2015	2016	2017	2018
Table eggs	41,195	46,157	47,412	46,500	41,886*

Source: MoFA 2018, *preliminary results

2.3 Market regulation

Ghana currently has no import quotas for animal products but applies a tariff rate of 35 percent to imports of meat products and frozen raw meat. Under the common external tariff regime of the ECOWAS countries, all West African countries levy an import duty of 35 percent on all goods that are considered particularly sensitive, including meat.

In general, no VAT (value added tax) is levied in Ghana on food produced in Ghana and sold in its raw state (e.g. rice, millet, cassava, yam, Guinea maize, plantains, vegetables, raw meat and other foodstuffs such as eggs etc.). When meat is processed into a final product such as canned food (e.g. corned beef) and sold in the formal sector such as in the registered supermarket, a VAT of 12.5 percent is levied. However, meat bought at the butcher is not subject to direct taxation.

2.4 Production systems for meat production

In general, extensive, semi-intensive and/or intensive animal husbandry systems can be found in Ghana depending on the species. However, the extensive (grazing) system is the most widespread farming method and is mainly practised in rural communities in the northern parts of Ghana. Livestock production farms are either commercially, family or individually owned. In Ghana, about 95 percent of livestock farmers keep their cattle, sheep and goats in a kraal, taking them to graze in the morning and driving them back in the evening. Livestock production in Ghana is generally characterised by a low average herd size, a low offtake rate and low reproductive output.

The highest animal density is found in the north of the country. Some 600,000 households in northern Ghana keep livestock, with the northern ecological zone accounting for some 84 percent of the country's cattle, 90 percent of sheep and 60 percent of goat populations. In fact, Northern Ghana is in principle well suited for meat production with ruminants (cattle, sheep, goats) due to its favourable climatic conditions, large pastures with enormous natural fodder resources, including the use of crop residues.

In the period from 2014 to 2018 the number of animals in all areas of animal husbandry in Ghana increased in the double-digit range. Pig herds, for example, recorded a growth of 24 percent, followed by goat (22 percent), sheep (18 percent), cattle (17 percent) and poultry with 12 percent. However, this trend cannot be observed at the slaughter level, which is declining for cattle, sheep, goats and pigs. Thus, these figures can only be understood as updated estimates, as the last official census of livestock was several decades ago.

Table 13: Trend in livestock numbers (in 1 000 head) 2014 - 2018

	2014	2015	2016	2017	2018
Poultry	68,511	71,594	73,885	75,363	76,870
Pigs	682	730	777	816	845
Cattle	1,657	1,734	1,815	1,901	1,943
Sheep	4,335	4,522	4,744	4,978	5,102
Goats	6,044	6,352	6,740	7,151	7,366

Source: MoFA 2018

Due to a lack of grazing land, many (northern) regions suffer permanent overgrazing and water shortages, forcing livestock farmers to move their herds to the southern provinces. Violent clashes between farmers and pastoralists in search of pastureland and water occur repeatedly.

Cattle farming

The highest cattle population is found in the three northern regions of Ghana, with most households keeping their own cattle. The average herd size is about 42 animals. In the south of the country, however, the average herd size is much smaller, with about 22 cattle per owner. A few owners, however, keep larger herds of about 200 cattle. In the south, shepherds can also keep animals for different owners on a contract basis and thus supervise a larger number of animals in their kraals. At the time of slaughter, the animals reach an average live weight of about 250 kg. Especially on cattle farms in the north of the country, there is no clear production orientation between beef and milk production, so dual use with meat and milk production is widespread. About 39 percent of all cattle in the country belong to the West African Short Horn (WASH) breed, in addition there are Sanga, Sokoto Guddali, White Fulani, Ndama, Ndama-WASH crosses, Ndama-Sanga crosses and a few Jersey cattle, which are, however, only kept for milk production.

Sheep and goat farming

Most households in the agricultural regions keep sheep and goats. The average flock size is about 10 animals. They are generally kept on an extensive or semi-intensive basis and are mainly for household consumption. In addition, the sale of individual live animals serves to finance short-term household needs such as school fees, medical bills or similar needs. The goats kept are mainly West African dwarf goats or Sahel goats, while the sheep are more likely to be Djallonke (West African dwarf sheep), Nungua Black Head (cross between Djallonke and Blackhead Persian) or other crosses.

Poultry farming

Poultry farming in Ghana can be divided into extensive (backyard) husbandry for household consumption and intensive husbandry for commercial production. Private households (backyard husbandry) keep poultry primarily for the purpose of meat production, while intensive farms are primarily farms with laying hens.

In rural areas, around 65 percent of households keep indigenous breeds of poultry, which they keep mainly for their own (meat) consumption (e.g. private parties, religious rituals, etc.) and not for small-scale commercial marketing. It is estimated that there are between 20 and 24 million poultry in private households, most of which are kept outdoors and account for around 80 percent of the animals primarily reserved for meat production in Ghana.

Depending on the type of poultry and the level of production system used, intensive poultry farming can be further divided into four size classes (see Table 14). These are usually exclusively for the purpose of egg production. The production facilities have a simple but solid construction of cement blocks, wire mesh and corrugated iron roofing. In addition, most plants have an automated watering system with its own well or borehole connection.

Table 14: Size classes of commercial poultry

Size class	Number of animals
Intensive large farms	>100,000
Large companies	50,000 – 100,000
Medium-sized companies	10,000 – 50,000
Small businesses	1,000 – 5,000

Source: USDA 2008

The large commercial enterprises are mostly run by wealthy private individuals and are mainly located in the peri-urban environment.

However, some farms occasionally breed (in addition to egg production) broilers, guinea fowl or turkeys as meat suppliers, especially during the holidays. Most of these (fattening) farms run their own feed mill and/or hatchery with parent stock. They are either privately owned, owned by individuals or a family and each has over 10,000 animals. Poultry farming in Ghana, with the aim of meat production, is particularly characterised by high housing costs (procurement of day-old chicks) and highly seasonal production.

As local egg production is much better established and developed than poultry meat production, due to the current import situation, most of the animals belong to the breeds of modern laying hen lines, such as Hisex Brown, ISA Brown, Lohmann Brown, Lohmann White or Bovan Brown, almost all of which are imported.

About 90 percent of all day-old chicks required for laying hen farming and broiler fattening are imported mainly from European countries via the international airport of Accra, where they are received directly by livestock owners. Local hatcheries are currently producing far below their production capacity, as there is less demand for locally produced day-old chicks. This is due to local farmers' perception that imported chicks have better development and production potential. In addition, poultry farmers perceive a higher disease resistance in imported day-old chicks, so that the use of imported animals is considered more efficient in their daily business.

Almost all feed components for poultry farming (feed raw materials, premixes, feed additives, veterinary drugs) have to be imported. The high use of these inputs makes local production comparatively expensive and also leads to a constant dependence on fluctuating exchange rates.

2.5 Registration of animals for slaughter, meat processing and marketing

In Ghana, the main actors in the beef value chain include cattle breeders, cattle dealers, intermediaries, exporters, slaughterhouse operators, butchers, meat processors, retailers, food service providers and consumers. In the northern region, small farmers in the villages sell their cattle to intermediaries who transport them from the production regions to intermediate markets in urban areas such as Kumasi, Ashaiman, Techiman, Buipe, Tamale, Yeji or Sunyani. The animals are transported with the help of lorries, and in some cases long walks are undertaken by traders. In addition to people who are fully specialised in animal transport, there are also larger livestock traders who have their own transport capacities. As a rule, truck drivers are responsible for transporting the animals to the intermediate or final markets. Other participants in the livestock trade chain are the herdsmen and shepherds, usually Fulani, who bring the livestock on foot to the market for sale. The workers at the cattle markets have the duty to brand or mark the animals after sale, so that the sold animal can be transferred to the new owner.

Intermediaries act as price brokers between traders and butchers. Knowing both parties, the traders and the butchers, provides intermediaries with a degree of trust and confidence that the negotiated prices are fair, that the animals sold are not stolen or sick, and that, in the case of sales on credit, conditions are respected and the payment will be received. Supply and demand conditions determine the prices for the cattle. Cattle prices are usually higher on festive occasions such as Christmas, Easter and Ramadan. Butchers buy cattle from brokers, commission the slaughter of the animals at a local slaughterhouse and sell the processed products to private consumers, hotels and supermarkets. Supermarkets sometimes act as wholesale agents and also sell beef to other retail agents and food salesmen.

At most cattle markets, cattle are traded and sold after a visual inspection. Prices range from 1,500 GHC to 4,000 GHC, depending on how heavy they appear to the buyer. On well-established farms, intermediaries buy cattle at 10 GHC per kilogram and sell them to retailers or butchers at 12 GHC per kilogram at local cattle markets. The latter then process and sell at 24 GHC per kg. Street food and similar operators also sell individual pieces of meat for an average of 3 GHC.

Goats and sheep

Intermediaries buy sheep and goats from producers and send them to local (village or local) intermediate markets. There, in turn, end customers or other intermediaries buy the animals and transport them by truck to the urban livestock markets. Once there, the animals are then bought as live animals by the final consumer or other intermediaries and sold to the local butchers. The butchers sell the meat as a whole to restaurants, food vendors, kebab processors and some rich end consumers or cut the meat into pieces and sell it to lower income end consumers.

The farm-gate price for goats is between 150 and 350 GHC (per animal). The intermediaries in turn sell between 250 and 450 GHC depending on size. No scales are normally used to weigh the animal. They are only sold on the basis of a visual inspection and the body condition of the animal usually determines the price. Consumers prefer to buy whole goats, especially during festive periods, whereas they normally buy partially cut goat meat from the butcher's shop. From the butcher's shop, a kilogram of goat meat costs about 30 GHC. The goat is a delicacy for most non-Muslim Ghanaians.

The trade in live animals and the marketing of red meat (beef, goat and sheep meat) by local butchers is carried out by the Muslim population in large areas of the country. Grown from the historical importance of the Muslim pastoral (Fulani) as the keepers of the country's largest livestock population, they have wide areas of animal production and marketing in the red meat sector under their responsibility. Most livestock farmers (with larger herds) and butchers are organised in nationwide associations and manage marketing channels through the association’s structure, grant sales or business licences and set sales prices that apply to all members organised in the association. Around 90 percent of the nationwide butchers in the urban areas are organised in these associations, which have only members of Muslim faith. For this reason, no pork is sold through local butchers, but only through independent (Christian) butchers, persons in the retail trade and supermarkets that are outside the associations.

Pigs

Producers sell their pigs to intermediaries who distribute them to slaughterhouses. These slaughterhouses process the whole carcass and market the cuts, organs and half-carcasses to supermarkets, where the meat is processed into local sausage, bacon etc. and sold to the final consumer.

Other food retailers buy one to five pigs directly from farms, have them slaughtered on the farm and transport the meat on ice (or without ice) to their butcher's shop. There, the raw meat is stored in freezers, processed in small quantities and sold to the consumers.

Poultry

Broilers in Ghana are usually bred for festive occasions where consumers want fresh meat instead of imported frozen chicken. The producers sell the broilers either by direct marketing or to middlemen who slaughter and process some of the animals themselves or sell them directly as live animals to the end consumers. The transport of fattening poultry to the market for live animals is done by small lorries. However, large poultry farms process their own broilers and sell the carcass as a whole through their own sales outlets.

Broilers are sold as live animals at prices between 30 and 35 GHC ex-farm. Intermediaries in turn sell them at cattle markets at 50 GHC. If demand is high, prices can also rise to 70 GHC.

Street vendors cut up the poultry carcasses, process them on site and sell cuts for GHC 4 on average. In general, however, locally produced broilers are not cut up but sold as a whole, unless they are imported. Only a few companies try to package pre-cut broilers, but generally cannot or could not compete with imported poultry meat in terms of price.

The discarded laying hens are sold between 12 and 15 GHC by the livestock farmers directly from the farm. At poultry markets, these hens are sold for 20 GHC to retail persons who in turn sell the animals for 30 GHC to the end consumer.

Eggs are usually sold for 14 GHC per carton (30 eggs) from the farm. Intermediaries buy them and sell the eggs to market women for 18 GHC (per carton). On the public market, the eggs are then sold to final consumers at 20-25 GHC, depending on size. Individual retailers also sell boiled or fried eggs to final consumers by road at between 0.6 and 1.0 GHC, and some retail outlets also sell unprocessed eggs individually at 0.8 GHC.

Slaughter

Modern slaughterhouses with appropriate facilities and equipment are rare in Ghana. Most slaughtering is carried out in state-run, public slaughterhouses. Each of the 138 district towns has basic facilities (slaughterhouse or abattoir) for slaughtering. The state also has two mechanised slaughterhouses in Tema and Kumasi with an annual slaughter capacity of 2,000 and 6,500 small ruminants and cattle respectively, but these are currently not fully utilised. There is also a private slaughterhouse (JFAMCO) in Accra with a modern slaughter and processing plant, which has a very good reputation among the local population in terms of hygiene.

In general, the technical equipment in slaughterhouses (mainly state-owned) is outdated and insufficient in terms of hygiene measures, so that even in slaughterhouses such as in Kasoa, there have been complaints and objections. However, these have not led to any reaction from the local authorities. In particular, maintaining the cold chain is a challenge for many slaughterhouses due to the lack of suitable cold storage units and (refrigerated) vehicles.

The workers in public slaughterhouses are mostly Muslim butchers, except in slaughterhouses with a pig slaughter line. Slaughterhouse operators generally charge a fee per animal slaughtered and for the veterinary inspection.

Table 15: Overview of live and slaughter weights

Animal species	Live weight at slaughter (kg)	Carcass weight (kg)	Carcass yield (in %)
Cattle	250	125	63
Sheep	25	15	60
Goat	20	13	60
Pig	70	42	60
Broiler	2,5	1,8	72

Source: VSD/ MoFA 2012

The carcass yield is quite high for all animals. This is due to the fact that fewer parts of the body (e.g. head) are removed from the carcass than is usual in Europe.

As the poultry sector is dominated by imported chickens, there are no properly registered poultry slaughterhouses. Most slaughtering of poultry takes place at farm level. As a result, hardly any poultry is sent to slaughterhouses and is not subject to veterinary inspections. The country's major poultry processing plants, Darko Farms, Asamoah and Yamoah Farms, are all located in the Ashanti region and are known for their combined processing capacity of 15,000 animals per day for the processing of locally produced chickens. Their slaughter facilities are not used by external butchers. The companies generally process what they produce. Only JFAMCO has modern facilities for slaughtering and storage for private customers.

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

3.1 Development of demand for dairy products

The rising income level of many city dwellers has also led to a rapid increase in demand for processed dairy products (yoghurt, ice cream, baby food) in Ghana in recent years. The consumption of drinking milk, however, remains low as compared with other countries, as Ghana does not have a distinctive (drinking) milk culture for historical reasons, with the exception of the Fulani (see above). Furthermore, many Ghanaians are still very sceptical about locally produced (raw) milk especially regarding hygienic production conditions, and therefore prefer products made from imported milk powder.

Nonetheless, demand for locally produced milk is also increasing due to the low production volumes of local milk producers and the steadily growing consumption of processed dairy products (despite continuing hygiene concerns).

3.2 Development of self-sufficiency, import and export

Due to the low production level of Ghana's dairy industry, the country's current level of self-sufficiency is only around 20 percent and has therefore not improved in recent years. There are thus no significant exports of milk or dairy products. Meanwhile, the production volume has changed only slightly in a positive direction in the period from 2014 to 2018. Ghana's dairy industry and milk supply is thus currently at a standstill and is still far from being able to ensure the country's self-sufficiency.

Table 16: Development of market supply of fresh milk 2014 - 2018

Year	Consumption (in t ME)	Production (in t ME)	Degree of self-sufficiency (in %)
2018	238,137	45,177	19.0
2017	232,972	45,213	19.4
2016	227,856	44,081	19.3
2015	222,794	42,707	19.2
2014	217,796	41,383	19.0

Source: FAO 2018, MoFA 2018

In order to satisfy the growing demand for dairy products, market participants continue to rely on imported goods to an increasing extent. Ghanaian milk processors and manufacturers of dairy products rely mainly on imports of milk and whey powder (see Table 17).

Table 17: Imports of dairy products (in tonnes) 2016 - 2018

Product	2016	2017	2018
Milk & cream, thickened (powder)	25,985	25,617	28,409
Whey powder	6,323	5,357	5,436
Milk and cream	2,777	5,427	4,860
Butter, including dehydrated butter and ghee	1,980	1,846	1,734
Cheese & Curd	869	979	900
Buttermilk, curdled milk, yoghurt, other fermented/acidified milk	1,693	3,066	0

Source: ITC 2020

3.3 Development of prices for raw milk and dairy products

Average retail prices for one litre of raw milk from pastoralists are currently at 3 GHC, while raw milk from specialised milk producers is sold for 5 GHC. Drinking milk (UHT milk), which is mainly bought and consumed by foreigners, is sold in modern food retail chains such as Shoprite in urban areas, depending on brand and origin, between 7 GHC (from South Africa) and 13 GHC (from Europe).

3.4 Market regulation

Ghana levies an (import) tax of 5 percent on imports of milk powder, in accordance with the ECOWAS agreements for all countries outside the common customs union. Importers of raw milk, drinking milk, butter and cheese must pay a 20% duty, and for yoghurt this becomes a 35% duty. Beyond that, however, there are no restrictions such as quotas or other limitations on import volumes. Like processed meat products, processed milk products are subject to a VAT rate of 12.5%.

3.5 Production systems for milk production

About 90 percent of the fresh milk produced in Ghana comes from pastoralists with animals that have a low milk yield of 0.5-2 kg per cow per day on average, although the milk yields of the animal species used can vary considerably (see Table 18). Pastoralists usually practice dual use of their cattle (meat & milk production), whereas the number of pure dairy cattle farms in Ghana is very small.

There are about a hundred dairy farmers who practice specialised milk production and keep between one and twenty dairy cows in their backyards in simple husbandry systems. Most of these producers are located in the Accra metropolitan area and in the eastern regions of the country around major urban centres. Usually, the milk is marketed locally directly after milking or frozen in freezers in buckets.

An important feature of the domestic milk supply in Ghana is the fact that there is usually a separation between cattle ownership and husbandry. Although cattle owners can belong to any ethnic group, they have their cattle kept and milked by herders, mainly from the Fulani tribe, who have a greater indigenous knowledge of husbandry practices. While the owners buy and sell the animals, the shepherds or ranchers collect the milk and sell it. The milk is mainly produced by herders with WASH, Sanga, N'Dama and Fulani cattle. There are also a few dairy farms with Holstein (Friesian) and Jersey crosses.

Table 18: Milk yield of dairy cattle in Ghana

Breed	Milk yield per day	Milk yield per lactation
West African Short Horn (WASH)	0.5 kg	75 kg
Sanga	1.0 kg	220 kg
Zebu	3.0 kg	825 kg
Sanga-Friesian crossing	6.5 kg	1,950 kg
Jersey	14 kg	4,480 kg

Source: MoFA 2016

Milk production in Ghana is highly seasonal with higher production during the rainy season, which lasts from May to September in the north and from April to October/November in the south. During this period, sufficient basic fodder is available to livestock farmers.

While nomadic livestock farmers in the north allow their animals to graze, commercial backyard husbandry operations near urban areas practise pure stable farming. Basic feed is collected in the immediate vicinity and made available directly to the animals. In many places, spent grains are used as supplementary and concentrated feed, depending on the availability and financial situation of the livestock farmer.

The use of barn and milking technology is not widespread in Ghana except by government research institutions. Barn equipment is built individually from available materials, depending on the financial means of the animal keepers. When building stables, insufficient attention is paid to aspects such as animal comfort and animal welfare. For example, access to sufficient and clean drinking water is not guaranteed across the board. The animals are milked exclusively by hand by the pastoralists and in the backyard stables. Due to the seasonal shortage of feed and the lack of training of the animal keepers, problems with fertility and oestrus detection occur in many places.

3.6 Milk collection, processing and marketing

Since Ghanaian milk production is still in the beginning stage and local milk processing companies have geared themselves to importing milk powder, there are no milk collection or dairy structures in Ghana according to European standards.

The very limited raw milk market in Ghana is mainly covered in rural areas by pastoralists and local farmers (backyard farming). The collection of milk from pastoralists depends mainly on milk collectors, while local farmers mostly practice direct marketing of their raw milk. Typically, raw milk is collected by local farmers directly from producers and is filled into 15-litre buckets on site and (if the technology is available) stored deep-frozen. The raw milk is then marketed directly to the final customer in frozen condition. The end customer in turn processes the raw milk into local cheese or similar products for his own consumption or for further micro-marketing.

However, the supply of milk to rural regions is ensured by milk collectors who use bicycles, animal carts or pick-ups to collect milk from pastoralists and local farmers, usually within a radius of three kilometres. The collected raw milk is then marketed to traders at local markets, family run shops or street stalls in the towns, who sell it to private households. Collection, transport and marketing of the raw milk is usually done unrefrigerated and in plastic buckets or barrels within one day. Collection and transport are characterised by major hygienic deficiencies due to a lack of cell count control, suitable transport containers and refrigeration facilities. End user prices fluctuate strongly according to availability (especially in the dry season).

In Ghana there are about 12 companies in the milk processing sector, which cover a different product portfolio depending on their size and are mainly located in the capital Accra.

Table 19: Overview of milk-processing companies in Ghana

Company	Location
Nestle Ghana Ltd	Accra/ Tema
Fan Milk	Accra
Promisidor Ghana Ltd	Accra
Dolait ghana	Accra
Maria Yoghurt factory	Accra
Dano Milk Ghana	Accra
Nana milk	Accra
Emigoh Ghana Ltd.	Accra
Piccadilly	Accra
Emadon Company Ltd	Accra
Amrahia Dairy farm	Accra

All these dairy product manufacturers typically do not purchase local (raw) milk, but mainly use imported milk powder for further processing. They have their own refrigerated transport vehicles and modern hygiene management for the production and distribution of their dairy products. Processed dairy products, such as UHT milk, (drinking) yoghurt, etc. are then delivered directly to food retailers or supermarket chains or are further marketed to wholesalers, who in turn distribute the goods to smaller companies and grocery shops. The larger milk-processing companies, such as Nestle Ghana Ltd. offer a wide range of products from simple condensed milk to food supplements for small children, baby food and ice cream. Smaller companies, on the other hand, focus almost exclusively on the production of drinking yoghurt or other milk soft drinks, which can be produced without major technical effort.

4. Supply of equipment and technology

4.1 Animal feed

In Ghana, the supply of feed is defined for each respective production system. Holders of small ruminants usually manage mixed farms. Therefore, they have access to crop residues (peanut weed, black-eyed bean hay, pea residues, rice straw, sorghum heads, yams and cassava shells) and natural pastureland as feed. Agro-industrial by-products such as spent grains, maize and rice bran may also be available to some farmers, depending on their location.

As pig and poultry farmers usually maintain intensive production systems (without connected arable farming), they are mostly dependent on imported premixes, concentrates, compound feed, feed components or other feed materials. The supply of feed (components) is usually carried out directly via special compound feed companies or feed shops. The main raw materials for compound feed are locally produced or imported maize and wheat bran as well as imported soya (meal).

Table 20: Feed imports (in tonnes) 2013 - 2017

Products	2013	2014	2015	2016	2017
Fishmeal	6,255	8,476	1,082	229	848
Premixes	1,156	714	830	1,572	2,018
Concentrates	15,495	11,819	10,320	9,483	13,275
Soybeans	9,000	32,451	36,041	38,375	45,329
Copra wholegrain				33,473	
Maize					8,496

Source: Animal Production Directorate, MoFA 2018

Poultry farming is a special case in this respect. Around 70 percent of commercial poultry farms buy the individual raw components and mix them themselves on their farms, either by hand or using simple mixing and milling technology. Due to past bad experiences with purchased compound feed and the high sensitivity of the production systems, the confidence of many poultry farmers in local suppliers of compound feed is rather low. Limited knowledge in the field of feed formulation has repeatedly led to quality issues with locally produced feed. Most feed mills currently produce at a capacity of around 40 to 50 percent. Maize typically accounts for about 60 percent of the total feed formulation. Ghanaian poultry farming thus requires almost 30 percent of Ghana's total maize production. The increased feed costs in poultry farming in Ghana are primarily due to the steadily rising cost of maize, with maize as feed competing with its use as food.

Most cattle herders graze their animals outdoors and on crop residues from cultivated fields. As the majority of cattle breeding and cattle farming is in the hands of nomadic herders (Fulani) who do not build up fodder stocks for the dry season, they are heavily dependent on natural pastureland all year round. As a result, violent clashes between local farmers and nomadic cattle herders occur time and again as herders search for fresh grazing land. In the dry season, nomads from Burkina Faso also graze in northern Ghana. Grazing with a pasture grazing plan and management is not common. Similarly, the production of silage or hay for

fodder storage is not widespread. However, individual farmers harvest crop residues and store them for later use in the dry season.

It is estimated that Ghana produces around 10,600,000 tonnes of fodder per year, 70 percent of which comes from grassland farming. The biggest challenge in feeding ruminants is that large parts of the country's natural feed resources are often destroyed by bush fires. Bush fires are mainly caused by illegal and uncontrolled burning of bushes after harvesting to remove resistant vegetation or for hunting purposes. The damage to natural pastures caused by fires is very significant and contributes significantly to the deterioration of both natural and managed pastures.

4.2 Genetics and veterinary medicinal products

In Ghana, the state distributes bovine semen to local farms through the Animal Production Directorate (APD), a department of the MoFA. Dairy farms receive their semen through the state dairy farm Amrahia, which is also under the MoFA. Dairy farms can also request artificial insemination from the official authorities, which is then made available to the farms free of charge. Heifers (Jersey cattle) are partly distributed (free of charge) to local dairy farmers and breeding associations via NGOs such as Heifer International.

Day-old chicks are mostly distributed by private importers in Ghana. Depending on the availability of the different breeds and the availability of zoo-sanitary import certificates, the marketed poultry breed may vary. Most day-old chicks are imported from the Netherlands, Belgium, Germany or France.

Table 21: Imports of day-old chicks (in pieces) 2014 - 2018

Year	Broiler	Laying hens	Turkeys	Parents
2018	511,960	7,130,999	41,189	101,871
2017	724,580	5,476,815	14,945	86,099
2016	784,917	3,963,705	13,412	158,386
2015	246,948	2,573,326	19,497	111,692
2014	3,161,144	602,209	6,840	18,080

Source: VSD / MoFA 2018

Products such as veterinary medicines are typically distributed in Ghana through local vet shops or retail outlets. The MoFA also has its own vet shops where farmers can purchase medicines and preparations. Importers of day-old chicks often also sell veterinary medicines and feed additives in addition to live animals. All medicines, additives and preparations must be imported from abroad. European goods generally enjoy a very good reputation in Ghana, but are not affordable for many farmers due to their high prices. Many livestock farmers thus resort to Asian substitute products, well aware of the reduced efficacy, product quality and storage stability.

4.3 Technical equipment

As most cattle, goats and sheep are kept in extensive systems by Fulani herders, no technical equipment is used. On dairy farms (backyard management), however, simple, self-built and self-supplied stalls and drinking troughs are used. A few technical barn and milking systems can be found only on state and university dairy farms, but these no longer meet modern standards.

Housing equipment for poultry farming is partly produced locally or it is imported. In commercial poultry farming in Ghana, most farms use automated drinking systems. The feed is provided via modern feed trays,

which are filled manually. Automated air conditioning and ventilation technology is not available on most farms, but is used by medium, large and intensive farms (>10,000 animals).

Almost no technical housing technology is used in pig farming. The animals are usually kept in simple open barns on concrete floors with walls of brick and wire mesh fencing. Automated drinking systems are sometimes available, while feed is fed by hand.

5. Quality and safety of animal products

There are four main regulatory bodies in Ghana which are responsible for the control and monitoring of animal health, carcass quality, food safety and environmental compliance, namely the FDA (Food and Drug Authority), GSA (Ghana Standards Authority) and VSD (Veterinary Service Directorate) and EPA (Environmental Protection Agency). While the FDA, GSA and VSD directly monitor the processes and products of meat and milk production and processing, the EPA assesses the adequacy of production flow, plant location and waste management and provides certification to start production.

The FDA ensures the safety and health of food (including meat, milk and their processed products) and the safety and efficacy of veterinary drugs. The FDA's Animal Products Unit regulates the processing, storage and transportation of animal products (including eggs and honey). It also inspects and tests meat processing and refrigeration equipment; it trains processing plant personnel in the handling and storage of animal products. Moreover, it also provides consumers with information on food safety in relation to animal products. The FDA's Feed Safety Division continues to ensure strict adherence by the industry to good feed manufacturing practices to ensure the safety and quality of animal feed (imported and locally produced) and thus the safety of food of animal origin for humans.

The Ghanaian Standards Authority (GSA) is the guardian of the "Regulation on Weights and Measures". The Authority's tasks are to set and promote standards for the production of goods and services. It ensures the continuous improvement of standards in industry and trade and the promotion of productivity and efficiency in the workplace. It also ensures that public health is improved.

The VSD controls imports of live animals and meat products. It carries out meat inspection at the slaughterhouse and ensures that its rules are enforced and that offences and infringements are punished, however, this remains a challenge in the country. Although well established companies are properly controlled by this authority, enforcement of its rules and regulations in the informal sector is weak. All the above authorities issue individual certifications (EPA, GSA FDA certification), which are required before a company can start business. The FDA and the GSA periodically take random samples for analysis from retailers and companies to ensure that companies continue to comply with the rules and regulations.

5.1 Meat and carcass quality

Locally produced carcasses are not subject to classification. However, veterinary officials work with slaughterhouse operators to inspect live animals before slaughter. Officials from the local health authority inspect the carcasses and either release them for consumption as healthy or order them to be withdrawn from the processing chain. Carcass inspection is carried out in well organised, registered slaughterhouses for a fee. According to the Food Act, no carcass that has not been inspected by a veterinary official may be introduced into the food chain and marketed. In the informal sector, where individuals slaughter their own animals on the farm or in a small slaughterhouse, there is no meat inspection. Most slaughterhouses do not process chickens, so inspection is usually very limited or not carried out at all. Butchers are the main group of people who handle and process raw meat on site. Training for this group is regularly provided by the Ministry of

Health, but there is no compulsory training or certification. Some selected members of the Ghanaian butchers' associations are sent abroad for further training in meat processing and hygiene in order to help the members of the association in the future.

Large quantities of meat are produced in smaller slaughterhouses scattered across the country where meat inspection is weak. Most slaughterhouses use outdated equipment, which severely affects meat quality and hygiene and results in lower product quality and shelf life. For example, the James Town slaughterhouse was built 70 years ago and has not been properly renovated to date. Most slaughterhouses and places of slaughter lack infrastructure facilities (cold storage etc.), adequate equipment and financial support. There is also a lack of supervision and qualified staff to carry out ante-mortem and post-mortem examinations.

5.2 Quality of raw milk and dairy products

As with meat, the FDA is responsible for ensuring compliance with national hygiene regulations for raw milk and dairy products (see above). There is hardly any monitoring of local raw milk producers or processors, as most local raw milk production is informal.

Officially, the water content, freezing point, fat content, protein content and inhibitor content of raw milk should be determined before it goes into processing. However, this hardy happens in practice in Ghana in the informal sector. Furthermore, there are currently no officially defined thresholds for the above parameters. Due to these circumstances, raw milk, which is mostly produced locally and informally, poses a considerable potential health risk. For this reason, locally produced milk suffers from a bad reputation and is avoided by many Ghanaians.

As the formal processing of milk powder and import of dairy products is more important for the country's supply and more tangible for the authorities, FDA's controls tend to focus on this area. The FDA regularly samples the raw material for bacteria count, which according to the GSA must be <5.0log10cfu/g. In general, dairy products (as with meat) must be inspected and approved by the FDA before they enter the market. Furthermore, a certification by the local food authority and GSA is required.

5.3 Animal health and food safety

The Ghanaian veterinary service implements national programmes for the monitoring and control of infectious animal diseases in cattle, sheep, goats and poultry. Measures include vaccination and testing. However, the authority has an insufficient number of specialised staff, which makes it impossible to carry out broad-scale control and surveillance. Repeated outbreaks of foot-and-mouth disease, for example, have occurred due to a lack of husbandry, treatment and veterinary care.

In most regions there is a lack of qualified staff to look after livestock farmers throughout the country. CBPP (*Contagious bovine pleuropneumonia),* PPR (*Peste des Petits Ruminants*), Newcastle Disease, IBD (*Infectious Bursal Disease*) and tick infestations regularly affect livestock. In addition, all veterinary medicinal products must be imported. Due to the high import prices of European veterinary medicinal products, many livestock farmers resort to Asian substitutes.

In Ghana there is no specific legislation covering animal welfare and only weak animal protection legislation. Although the constitution (ACT 29, Section 303) prohibits the mistreatment of animals, there are no clear rules on animal welfare in husbandry, transport and slaughter. The stunning of animals before slaughter is not required for religious reasons, for example, and is therefore not encouraged, as the meat processing industry is dominated by Muslims. The establishment of corresponding legislation therefore holds great potential for social conflict.

Butchers and meat and milk processing plants are officially subject to approval by FDA EPA, GSA and VSD (see above). Due to the high proportion of informal processing and the focus of the authorities on

larger and formal companies, the majority of companies and processors are not registered or controlled. None of the official slaughterhouses, butchers and processors have a HACCP concept or ISO 22000. FDA, EPA, GSA and VSD, however, issue their own national operating and hygiene certificates.

6. Availability and consumption of natural resources

Ghana is located on the west coast of Africa with a total area of 238,540 km². The country has a north-south extension of about 670 km and a maximum east-west extension of about 560 km. It is bordered by Côte d'Ivoire to the west, Burkina Faso to the north and Togo to the east. The Gulf of Guinea and the Atlantic Ocean lie to the south. The topography is predominantly undulating. The highest elevation in Ghana, Mount Afadjato, rises 880 metres above sea level.

Ghana has a warm, humid climate. The average annual rainfall of the country is estimated at 1187 mm. Average annual temperatures range from 26.1°C near the coast to 28.9°C in the far north. 70 percent of the country's territory is located in the catchment area of the Volta river system. This consists of the rivers Oti and Daka, the rivers White and Black Volta and the rivers Pru, Sene and Afram. In the forest and coastal regions there is one major and one minor rainy season. In the savannah region one rainy season is common. Here the rainfall also fluctuates more. More than 60 percent of the land area can be used for agriculture. 37 percent of the land area is used exclusively for grazing. Most agricultural crops are grown in rainfed agriculture. Irrigated agriculture still takes place on a relatively small area but is increasing.

In Ghana, as in many sub-Saharan countries, the available grazing resources are the limiting factor for the further development of ruminant husbandry. Especially in the north of the country, lack of pasture and fodder management leads to frequent overuse. This can lead to conflicts between different user groups of the water points and wells during the dry season. Hay production from grasses or cultivated fodder legumes in mixed cultivation with cereals is not yet widespread. In contrast, bush fires in the northeast are a problem, which are often set due to the hunting of wild animals.

In particular cattle, goat and sheep farmers in the northern regions are unable to provide their animals with adequate feed during the dry season. High livestock densities meet borderline locations (mostly in northern pastures) there, whose feed and water capacities are regularly overused. The low recovery rate of cattle herds continues to indicate low performance, with disease incidence also playing a role. Local livestock is insufficient to supply the country’s demand, so cattle are imported from neighbouring countries for slaughter in Ghana.

Ghanaian farmers cultivate cash crops such as beans, yams and manioc, and above all maize. Maize is the basis of many dishes and is served almost daily with meals in the form of fufu, boiled corn flour. The consumption of maize as food is in direct competition with its use as animal feed, especially for local poultry farming. About 30 percent of Ghana's total maize production is used for feed purposes in the poultry industry. As the cultivation of maize is financially attractive for farmers due to its dual-use potential, most farmers do not practice a distinctive crop rotation and accept a deterioration of soil fertility. Modern innovative techniques are under-used and yields are low.

The availability of water is usually ensured by natural water sources (such as streams or rivers) or by simple wells, boreholes and dams. There are no national or regional water use plans that are subject to sustainable control. Only a few modern arable farms have irrigation systems. Traditional irrigation is carried out in flooded lowland areas. Here too, management should be improved. In general, the water use potential of irrigation systems, e.g. drip irrigation, is far from being exhausted, especially in the north and centre of the country.

The absence of a national management and grazing plan and a lack of a system for registering livestock farmers and their livestock, currently encourages over-exploitation of natural resources, especially in the drier northern regions of the country. In addition, the State lacks instruments for the management and organisation of its livestock and a related regulation of the use of natural grazing resources.

A systematic integration of agriculture and animal husbandry is not common in Ghana. However, it can be assumed that animal dung from animal stables is used for crop production and thus represents a useful resource for maintaining soil fertility and structure and reducing soil erosion. For example, poultry farms sell their manure to surrounding farmers who use it to fertilise their land.

7. Opportunities for investments along the value chains meat and milk

In Ghana, 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 improving the climate and environmental sustainability of existing production systems.

Technical priorities

The poultry value chain currently offers probably the greatest potential for growth and investment. Although the value chains of poultry meat and eggs should be considered in a differentiated way, they share the same challenges. In particular, the availability of reliable inputs such as feed, effective and inexpensive veterinary drugs and day-old chicks are promising starting points for investment.

As the provision of feed in particular is by far the biggest cost factor in poultry farming, this can have a huge leverage effect on the comparative marketability of locally produced eggs and poultry meat. Many poultry farmers in Ghana are widely sceptical about the product quality of the feed currently available from local compound feed producers. Investors from India and the Netherlands have already taken the first steps towards building modern compound feed mills with annual production capacities of 500,000 and 90,000 tonnes respectively. Given the dynamic nature of the Ghanaian poultry industry, this market segment still holds great market potential. The introduction of more modern farming techniques and hygiene measures in production would also strengthen these value chains. By increasing the comparative cost advantage of local poultry and egg production (by reducing feed costs), Ghana could increase its self-sufficiency in both product categories. At the same time, the Ghanaian government would have to regulate imports from abroad more strictly, at least for a transitional period.

In addition to feed, the supply of day-old chicks is also an interesting investment opportunity. In recent years, imports of day-old chicks have increased rapidly. Currently, most poultry farmers import their chicks from Europe. On the one hand, this is cost-intensive for producers, on the other hand they do not have a continuous supply of sufficient live animals, so that production or housing delays may occur.

The existing locally operating (Indian) hatcheries, which are currently breeding and supplying day-old chicks, are currently producing below capacity. Ghanaian poultry farmers do not demand these locally produced day-old chicks very much, as there is a perception that locally produced chicks are inferior to European breeds and more susceptible to disease. European breeds, however, are very popular because poultry farmers see them as more stable in terms of production and performance than locally produced chicks. Investing in a hatchery with a European parent bird population would therefore be a strong anchor for a sustainable and stable supply of day-old chicks. The establishment of a European managed hatchery would improve the networking of local value chains and significantly reduce the purchasing costs for producers and the dependence on exchange rate fluctuations.

The value chain red meat offers comparatively few starting points, as the prospects for growth in this sector are poor. The main reason for this is the limited availability of pastureland and basic fodder. While sheep and goat meat is largely self-sufficient, beef supply is strongly supported by imports of live animals from neighbouring countries.

In the dairy sector, the investment opportunities in the current market conditions need to be assessed in a differentiated way. At present, product innovations and the further development of product portfolios for dairy products are largely based on imported milk powder and lead to a value added that is currently limited to the processing sector. Moreover, the lack of suitable animal breeds with sufficient milk yields and the lack of basic feed and general feed supply throughout the year mean that raw milk production in Ghana is at a standstill. Developments at this point would be strategically important for the country in the long term but are not profitable in the short- to medium-term and would require considerable support through technical development cooperation. So far, only a small number of cattle farms, mainly in the urban areas around Accra, have specialised in milk production. A coordinated milk collection system, as currently started by an Indian investor, has not previously existed in Ghana.

Due to the low raw milk supply, the processing sector, such as milk collection and dairies, and structures to ensure logistics, quality and processing capacities of raw milk are seriously underdeveloped. In this respect, it could be helpful to impose conditions on Ghanaian milk processors, obliging them to base part of their milk processing on locally produced raw milk.

Investment opportunities

The following table gives an overview of potential investment opportunities in the value chains milk and meat in Ghana. This is done from the perspective of a private investor who wants to invest in the value chain milk or meat. Necessary preconditions or complementary public investments and programmes are additionally listed under the conditions. The ranking was made according to the attractiveness of the investment from the perspective of a private investor. This means that the table shows first those investment opportunities that are expected to generate a high return and whose implementation is largely within the sphere of the investor 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 and better control of the use of veterinary medicines and antibiotics. This will help to better protect the health of consumers using a One-Health approach. In addition, the provision of a functioning public infrastructure (road network, energy, water, sewage, communications, 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.

Investors (number): Investors include actors, suppliers of production equipment and service providers in the milk and meat value chains. Potential actors are thus also livestock farmers in Ghana who want to modernise or expand their production systems. Even if the majority of these are Ghanaian investors, foreign investors can also become active in Ghana, especially as the investment climate is friendly. Current examples include the establishment of a feed mill by a Dutch investor or the construction of a small dairy plant by an Indian investor. 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 partnership of a hatchery with a foreign partner, market-related conditions (such as the regulation of market access for imported products) as well as 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 sectoral structure, e.g. when it comes to the product range and competitiveness of local milk processing.

Return on investment: The profitability of the investment project is estimated on the basis of the expected return on long-term capital employed by private investors. It is categorised in five steps based on experience from comparable investment projects.

Risk: The assessment of risks 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 validated on a case-by-case basis for each spatial zone or investment project. In Ghana 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 Ghana. The aim is to reduce losses and the production of waste or to recycle waste through improved resource efficiency at all stages of the value chain. With regard to climate compatibility, the investments should both contribute to a reduction of greenhouse gases emissions (GHG emissions) per kg of milk and meat and not further increase the total emissions of climate-damaging substances in the respective region/country.

Table 22: Potential intervention options

	A. Private investment					
	Investment property	Investment costs (in EUR) / Investor (number)	Auxiliary conditions / third party contributions	Benefits	Return	Risk
					1 very low - 5 very high	
1.	VC Poultry + VC Milk - New construction of feed plant (30,000 to 50,000 t capacity)	8,000,000 - 12,000,000 Feed mill (2)	Financing, Securing the flow of raw materials	Added value, Jobs	5	3
2.	VC Poultry - Production of day-old chicks by modernising and expanding parent stock breeding and hatchery	500,000 - 1,000,000 poultry farmers (1-3)	Willingness of foreign breeding companies to cooperate	Added value, Jobs	4	2
3.	VC Red Meat - Modernisation of meat cutting and processing	15,000 - 60,000 meat processing plants, butcheries (500)	Grant for pilot operation, Financing	Improving meat hygiene and meat quality	4	2
4.	VC Poultry - Expansion / modernisation of the poultry slaughter and cold chain	800,000 – 2,000,000 Slaughterhouse (1-2)	Financing, Ensuring sufficient numbers of animals for slaughter through local production, Import regulation	Increase local added value, Improving product quality and safety	4	4
5.	VC Milk - Expansion of product diversity in dairy products	50,000 - 150,000 Milk processors (10)	Cheap import of milk powder	Increase in value added, Jobs, Security of supply of dairy products	4	4
6.	VC Milk - Establishment of rural dairy farms with about 20 cows with milking, milk cooling and husbandry technology	10,000 - 30,000 Dairy farmers (100)	Counselling and further education, Organisation of raw milk collection and market access, Grant and financing	Increase in value added and income, Improving productivity and animal welfare Improving the quality of work for livestock farmers	4	2

	A. Private investment					
	Investment property	Investment costs (in EUR) / Investor (number)	Auxiliary conditions / third party contributions	Benefits	Return	Risk
					1 very low - 5 very high	
7.	VC Poultry + VC Milk - Provision and rental of small and medium-sized mobile compound feed mills for in-house production	25,000 - 50,000 Private or local authorities	Availability of local raw materials	Improved feed quality -/hygiene, High productivity for laying hens, fattening poultry and dairy cows	3	3
8.	VC Red Meat - Modernisation of local slaughterhouses with technical equipment (animal-friendly slaughtering and conveyor belts, cold stores)	200,000 - 1,200,000 Slaughterhouse (1-3)	Funding	Improving animal welfare, Improving meat hygiene and meat quality	3	2
9.	VC Milk - Modernisation of milk collection through investment in transport and cooling equipment	10,000 - 50,000 Operators of milk collection centres (< 10)	Align and enforce legislation in the field of dairy hygiene, Grant and financing	Creating market access for small dairy farmers, Improving dairy hygiene	3	2
10.	VC Red Meat - Modernisation of marketing facilities (cold stores)	30,000 - 150,000 Market operators (municipal or private) (10)	Investment in the public interest, Grant and financing	Maintaining market transparency	2	2
11.	VC Poultry - Warehouse for animal-friendly and hygienic logistics of (imported) day-old chicks	300,000 - 500,000 Logistics specialists / Animal dealers (1-2)	Sponsorship must be clarified	Lower animal losses for importers/farmers, Jobs	2	3
12.	VC meat + VC milk - improved equipment for private veterinarians	5,000 - 10,000 Ministry of Agriculture (100)	Veterinarians are also used for public animal health surveillance, funding	Reduced animal losses, improved animal health	2	2

	B. Public investment					
	Investment property	**Investment costs (in EUR) / Investor (number)**	**Auxiliary conditions / third party contributions**	**Benefits**	**Return**	**Risk**
13.	VC Red Meat - Modernisation / repair of local communal slaughterhouses	50,000 – 70,000 Ministry of Agriculture/ local authorities (15–20)	Funding	Increased food safety Improving animal welfare	2	1
14.	VC Red Meat - Improving livestock health	> 1,000,000 Ministry of Agriculture All cattle farmers	Government programmes and funding, Farms' own precautions (biosecurity)	Reduction of animal losses, Increasing the overall productivity of the livestock	1	1
15.	VC Red Meat - Action Plan for livestock management (registration of livestock farmers, registration of livestock, management of stocking density and animal movements)	> 500,000 Ministry of Agriculture Cattle, sheep and goat farmers	Willingness of animal keepers to participate	Reduction of conflicts between livestock farmers and arable farmers	1	1
16.	VC Poultry + VC Red Meat - More targeted use and control of the use of veterinary medicines + antibiotics	Ministry of Agriculture	Cooperation with veterinary medicine manufacturers, Advice for pet owners	Reduction of antibiotic residues in meat, Reduction of the risk of antimicrobial resistance	1	1
17.	VC Poultry + VC Milk - New construction / extension of laboratories and provision of test kits for monitoring feed quality	100,000 – 250,000 Private or local authorities	Financing, Implementation of legal controls	Improved feed quality -/hygiene, Development of qualified jobs	1	1
18.	VC Red Meat - Combating African swine fever through improved biosecurity measures together with the Ghana Pig Farmers Association	> 100,000 Ministry of Agriculture All pig farmers	Government programmes and funding, Farms' own precautions (biosecurity)	Reduction of animal losses, Increasing the overall productivity of the livestock	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 Ghana:

- 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 feed rations
- Use of small biogas plants on 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 market platforms (B2B) for equipment and technological components
- Use of mobile, digital applications for herd management and inventory control
- Use of digital applications to record the quantity and quality of milk delivered
- Establishment of digital platforms for the marketing of livestock
- Use of photovoltaics on dairy farms for water pumping, milking machines and local milk cooling
- 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

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

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

GIPC - Ghana Investment Promotion Centre: Agency for Investment Promotion (https://www.gipcghana.com/)

GIZ - Society for International Cooperation: https://www.giz.de/de/weltweit/324.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)

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

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

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

MoFA - Ministry of Food and Agriculture: Ghanaian Ministry of Agriculture (http://mofa.gov.gh/site/)

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/)

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

Annex 2 – List of sources

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