GHANA EXIMBANK

AGRI-COMMODITY DIGEST

NEWSLETTER

GHANA EXIM BANK RESEARCH DEPARTMENT

VOLUME 2

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Rice

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RICE

INTRODUCTION

Rice is the most common cereal serving as stable food for about half the people in the world. Rice, also known as Oryza sativa is from a grass plant family called Poaceae. Although, rice is one of the most essential food crop grown and consumed worldwide, ninety (90) percent of the world's rice are produced and consumed in the Asia-Pacific Region (FAO, 2020). It contains nutrients such as complex carbohydrates, sodium-free, fat-free, and cholesterol-free, B-complex vitamins, rich in iron (Fe), zinc (Zn) and minerals, it has a high lysine content and a good protein digestibility.

GLOBAL OUTLOOK

The world's production of rice increased from 730.8 million tonnes in 2014 to 759 million tonnes in 2018 and declined to 756.7 million tonnes in 2020. In 2020, Asia was the highest rice-producing region in the world and produced 676.6 million tonnes of rice, representing 89.4% of the global output. Africa, Americas, Europe and Oceania regions produced 37.9 million tonnes, 38.1 million tonnes, 4.1 million tonnes and 0.06 million tonnes respectively.

According to FAO (2022), there was a consistent increase in rice production in Africa from 2013 to 2018. The decline in production in 2019 and 2020 can be attributed to the effect of Covid-19 pandemic. Although the annual yield per hectare in both 2019 and 2020 were higher than in 2017 and 2018, the total outputs in 2019 and 2020 were less than the outputs in 2017 and 2018 because the hectares cultivated in 2019 and 2020 were both less than the hectares cultivated in 2017 and 2018. This implies that one of the main drives of rice production in Africa is the number of hectares cultivated holding all other factors constant.

Table 1: Rice Production in the World, Africa and West Africa

YEAR	World Production (MT)	Africa Production (MT)	West Africa Production (MT)
2013	731,770,430	28,731,327	14,817,211
2014	731,417,050	30,455,512	16,748,205
2015	732,898,369	30,782,703	17,657,751
2016	737,089,267	35,887,742	21,687,265

2017	751,120,236	35,977,385	22,146,378
2018	761,025,481	36,739,594	23,109,153
2019	753,286,401	36,322,773	20,732,148
2020	769,227,953	36,201,642	20,519,565
2021	787,293,867	37,188,988	21,571,676

Source: FAOSTAT, 2023

The production of rice in Africa increased from 28.7 million tonnes in 2013 to 36.7 million tonnes in 2018. The total production in Africa declined by 1.13 percent to 36.3 million tonnes in 2019, dipping further to 36.2 million tonnes in 2020. The production increased by 2.73 percent from 36.2 million tonnes in 2020 to 37.19 tonnes in 2021. In 2020, Western Africa produced the highest (20.95 million tonnes), followed by Eastern Africa (9.9 million tonnes) and Northern Africa (4.97 million tonnes).

Country	Production (MT)
Nigeria	8,342,000
Egypt	4,841,327
Madagasca	4,391,386
Tanzania	2,688,000
Guinea	2,475,325
Mali	2,420,245
Sierra Leone	1,978,905
Cote d'Ivoire	1,659,000
Congo	1,580,620
Senegal	1,382,119

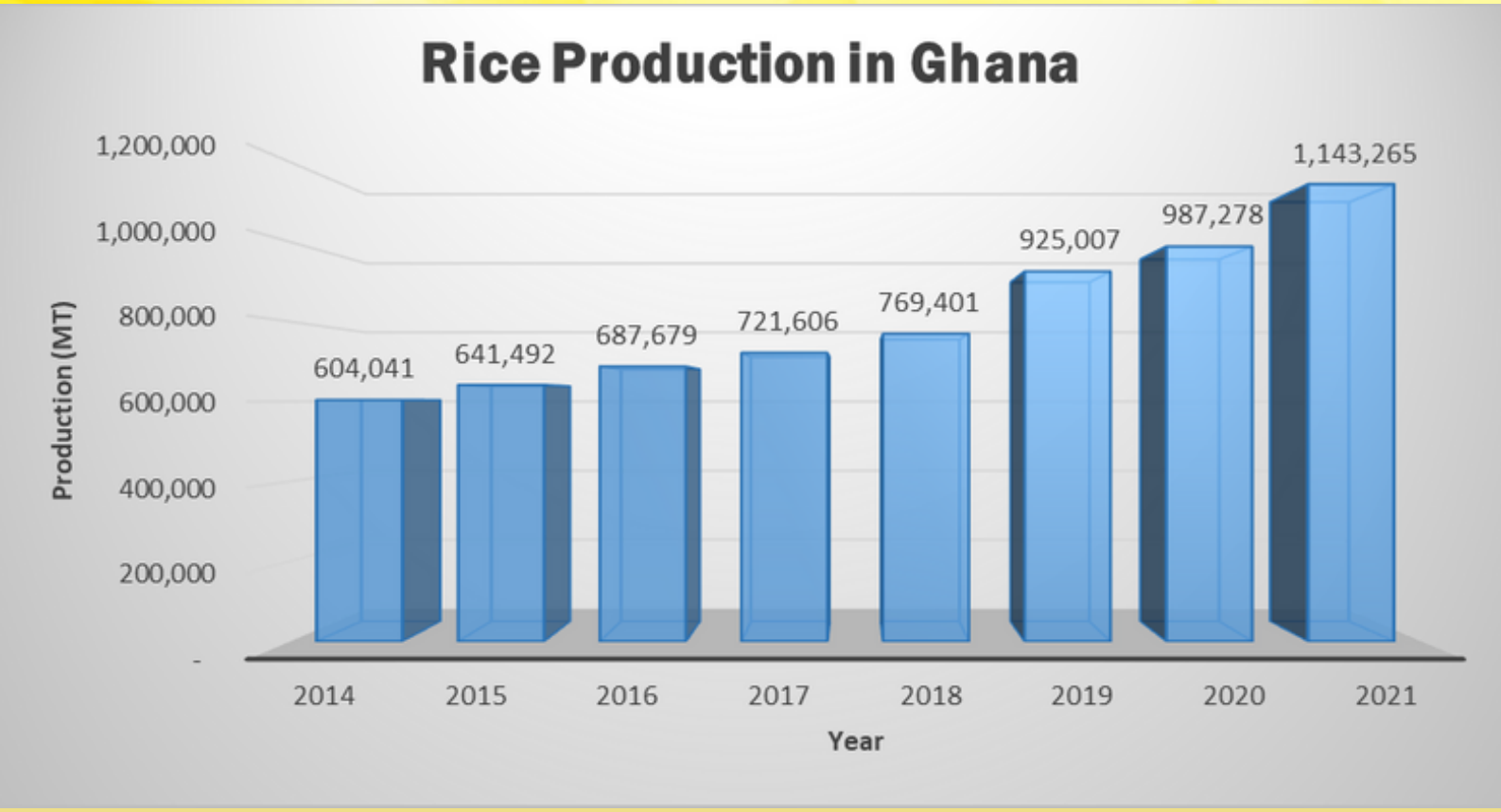
Nigeria was the highest rice-producing country in Western Africa and Africa in 2020 and 2021. The Country's production of rice increased by 2.1 percent from 8.17 million tonnes in 2020 to 8.34 million tonnes in 2021.

Although Egypt was the second largest rice-producing country in Africa in both 2020 and 2021, the Country's total production declined by 1.1 percent from 4.89 million tonnes in 2020 to 4.84 million tonnes in 2021. Madagascar increased their production of rice by 3.77 percent in 2021 to move from the fourth-largest producer of rice in Africa in 2020 to the third-largest rice-producing country in Africa in 2021. Tanzania was the fourth rice-producing country in Africa in 2021. Tanzania's rice production dipped from 4.53 million tonnes in 2020 to 2.69 million tonnes in 2021, representing a decrease of 40.6 percent.

GHANA'S OUTLOOK

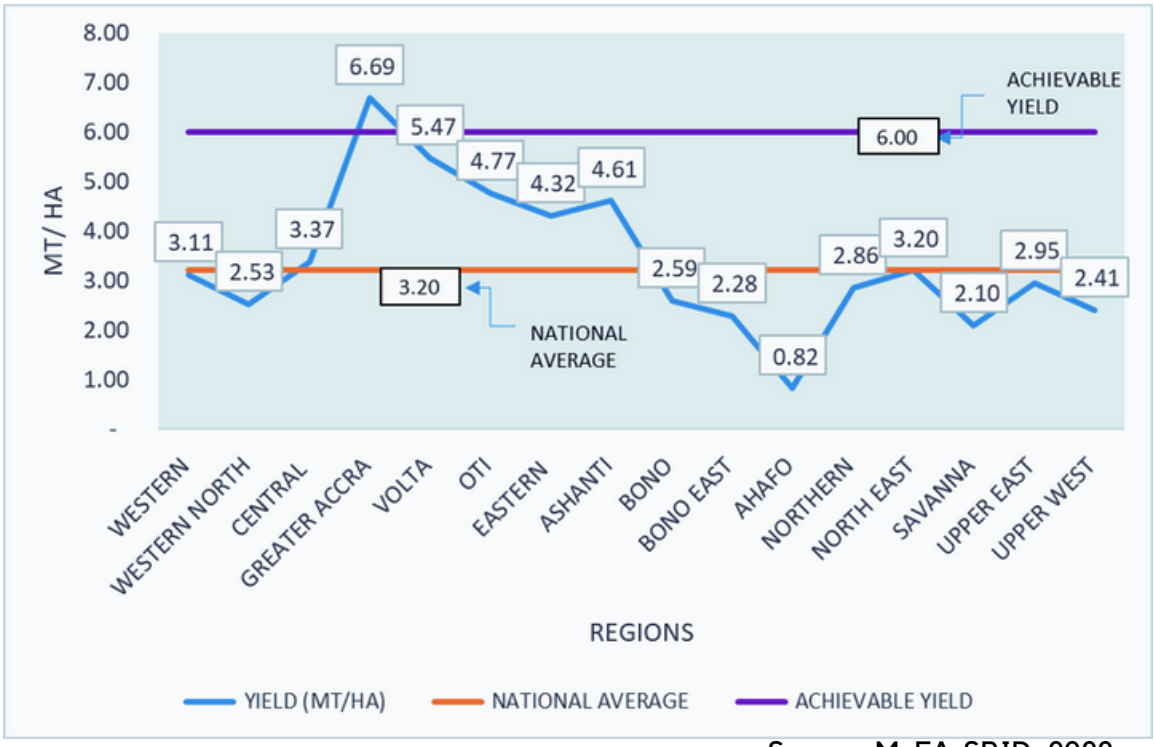
RICE PRODUCTION IN GHANA

Rice is cultivated in Ghana as a food and cash crop. Ghana was ranked the 11th rice-producing country in Africa in 2020 and 2021 and 41st in the world in 2020. The rice subsector has contributed significantly to the development of the Ghanaian economy especially in the area of employment creation and food supply. The annual production of rice has been on an upward trend since 2014. Between 2014 and 2021, rice production was in the range of 604,000 metric tonnes and 1,143,000 metric tonnes respectively. The increase in the production of rice in Ghana since 2014 can be attributed to an increase in yield and area under production. The area harvested increased from 224,000 hectares in 2014 to 357,000 hectares in 2021. The yield also increased from 2.69 MT/ha in 2014 to 3.20 MT/ha in 2021.



Source: MoFA-SRID, 2022

Rice is cultivated in all the regions in Ghana but the major regions that cultivate in large quantities are Northern, Volta, Upper East, Oti, and North East. The Northern region is the leading rice-producing region in Ghana and on average produces 20% of the total rice produced in Ghana annually. The Volta region is the second largest rice-producing region in Ghana followed by Oti and Upper East regions (MoFA, 2021). The top two (Volta and Northern) regions produce about 35 % of the total rice produced in Ghana



Source: MoFA-SRID, 2022

Figure 2: Average yield by Region in Ghana

As of 2021, the average yield of rice production by region ranges from 0.82 MT/ha to 6.69 MT/ha. Greater Accra region had the highest average yield of 6.69 MT/ha, followed by Volta region (5.47 MT/ha) and Oti region (4.77 MT/ha). Volta, Oti, Greater Accra, Ashanti, Eastern and Central have average yields above the national yield of 3.2 MT/ha.

There are three categories of producers in Ghana namely; small-scale subsistence farmers, small scale-commercial farmers and large scale commercial farmers. The small scale subsistence farmers normally depend solely on rain for production and also produce to feed their family and usually sell the surplus to members of their communities. Small scale commercial farmers usually use low level technology for harvesting and processing of the rice is done manually, or pay for harvesting, threshing, and milling (GIRSAL, 2022).

Majority of the rice farmers in Ghana are into small scale- commercial farming. The last category of rice farming has few farmers. Large scale -commercial farmers employ mechanisation and technology in planting, harvesting and processing of rice.

> *Rice is cultivated in all the regions in Ghana but the major regions that cultivate in large quantities are Northern, Volta, Upper East, Oti, and North East.*

RICE VARIETIES AND PLANTING SEASON IN GHANA

Rice is normally cultivated once per year under rain-fed conditions and twice per year under irrigation. Some rice varieties grown in Ghana include CRI-Amankwatia, Gbewaa Rice (Jasmine 85), Legon Rice 1 (Ex Baika), CSIR-AGRA Rice, CRI-Emopa, CRI- Mpuntuo, CRI-Oboafo, CRI-Emopa, CRI- Mpuntuo, CRI-Oboafo, CRI-Enapa. Planting season in forest, transitional and coastal zones in Ghana is March and harvesting season is June/July. For the Guinea Savannah Zone, planting is done in May/June and harvesting on October/November (GIRSAL, 2023).

Planting can be done using either the transplanting method or direct seeding methods. The seeding method can be either drilling or dibbling. Planting distance depends on the planting method the farmer is using. The planting distance for the transplanting method is 20cm x10cm. The planting distance for the drilling method is 30cm x1.5cm and the dibbling method is 30cm x 20cm (GIRSAL 2023). Experts in rice farming advise that sowing should be done after the rains have stabilized in order to avoid wilting.

IMPORTATION OF RICE IN GHANA

The demand of rice in Ghana exceeds total output of rice produce in Ghana yearly and therefore, Ghana imports rice every year to make up for the deficit in domestic rice supply. The rise in consumption of rice can be attributed to population growth, urbanization and change in consumer habits. The consumption profile in Ghana indicates that urban markets in Ghana represent 76% of total rice consumption. The Rice deficit continues to increase even though there is an increase in the production of rice. The rice deficit in Ghana increased from 354,762 tonnes in 2011 to 608,602 tonnes in 2015, declined to 577,977 tonnes in 2016 and increased again to 580,000 tonnes in 2017.

In 2020, rice was the third most imported product in Ghana (Observatory of Economic Complexity report, 2022). According to the Observatory of Economic Complexity (OEC) report, Ghana imported rice worth $391 million and was ranked the world's 20th largest importer of rice in 2020. The data available from theMinistry of Trade and Industry shows that Ghana imported rice worth about GH₵6.874 billion from 2017 to 2020 (Arko, 2021) and between 2007 and 2015 Ghana's expenditure on imported rice rose from US$151 million to US$1.2 billion. Ghana imports the majority of its rice from Vietnam, Thailand, India, China, United Arab Emirates, USA, Singapore and Cote d'Ivoire.

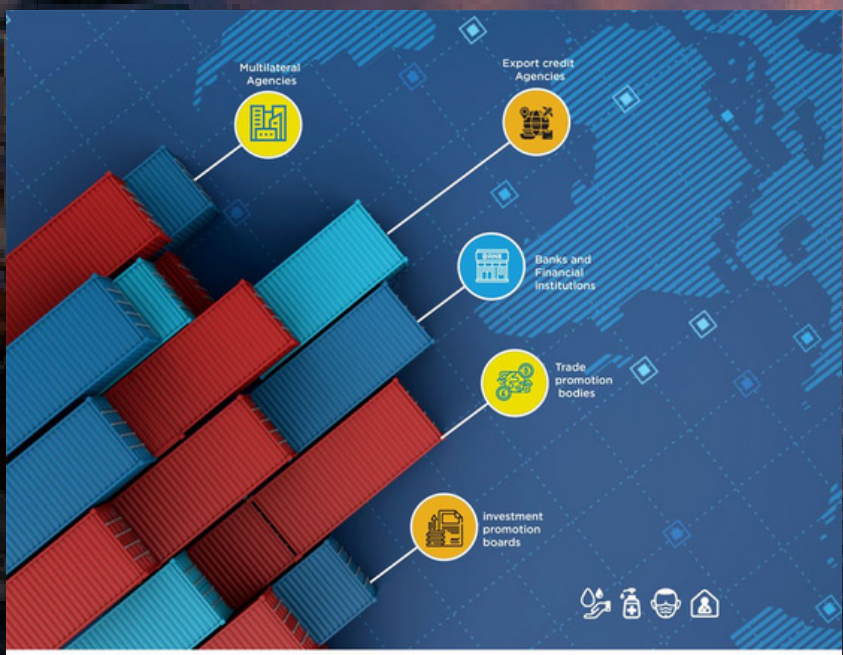
The quantities of milled rice imported in 2020 and 2021 were 706,240.13 tonnes and 667,340.90 tonnes respectively. The importation of milled rice increased from 819,839.40 tonnes in 2017 to 830,126.75 tonnes in 2018, 1,087,516.05 in 2019, declined to 706,240.13 tonnes in 2020, further declined to 667,340.90 in 2021 and finally increased to 829,672.37 tonnes in 2022. The monetary values of the milled rice imported in 2021 and 2022 were US$192.5 million and US$293.4 million respectively. Cumulatively, from 2017 to 2022 Ghana imported US$1.9 billion worth of milled rice.

Table 3: Importation of Milled Rice in Ghana

YEAR	Quantity (MT)	Value (USD)
2017	819,839.40	401,715,106.71
2018	830,126.75	449,011,630.16
2019	1,087,516.05	374,403,697.97
2020	706,240.13	198,523,490.21
2021	667,340.90	192,465,223.84
2022	829.672.37	283,372,012.68

Source: Ghana Statistical Service & Integrated Customs Management Systems (ICUMS).

The quantities of paddy rice (milled rice equivalent) imported according to FAO in 2021 was 734,785 tonnes and the monetary value was US$302.6 million. Paddy rice (milled rice equivalent) importation data in Ghana from 2014 to 2021 shows a great fluctuation. The importation of paddy rice increased from 856,057 tonnes in 2014 to 982,726 tonnes in 2015, declined to 698,396 tonnes in 2016 and surged to 1.08 million tonnes in 2020. The monetary values of the milled rice imported in 2020 and 2021 were US$559.5 million and US$302.6 million respectively. From 2014 to 2021, Ghana imported US$3.34 billion worth of paddy rice (FAO, 2022).



A hectare is equivalent to 2.5 acres. The total number of acres needed to produce 30 percent of the imported rice is 490,482 acres. Data available at the GIRSAL knowledge portal shows that the cost of production of rice per hectare in all the ecologies under a broadcasted field is GHS4,678.80. The total cost of cultivating the 196,193 hectares would be GHS 917,947,808.4 holding all factors constant.

Table 4: Importation of Rice Paddy (milled rice equivalent) in Ghana

30% Import Substitution	Projections/Quantity
Total paddy rice equivalent to total rice imported in 2021	2,092,725.2 tonnes
30% of total paddy rice equivalent to 30% of total rice imported in 2021	627,817.56 tonnes
National Average yield of rice in 2021	3.2 mt/Ha
Total Hectares needed to reduce importation by 30%	196,193
Total acreage needed to reduce importation by 30%	490,482
Cost of production per Hectares	GHS4,678.8
Total cost of production for the projected tonnes	GHS917,947,808.4

Table 4: Importation of Rice Paddy (milled rice equivalent) in Ghana

Year	Tonnes	US$ (millions)
2014	856057	475
2015	982726	489
2016	698396	287
2017	819746	401.9
2018	827607	451.9
2019	1087496	374.9
2020	1088063	559.5
2021	734785	302.6

Source: FAOSTAT 2023

ESTIMATED LAND SIZE NEEDED TO REDUCE IMPORTATION BY 30 PERCENT

The Food and Agriculture Sector Development Policy (FASDEP) II aimed at reducing the importation of rice by 30 percent through increasing production level to 370,000 tonnes annually to ensure food security and import substitution. Milled rice equivalent is equal to the amount of paddy rice produced multiplied by an extraction rate of 67 percent. After converting the total milled rice and milled equivalent into paddy form, we had 2,092,725.2 tonnes as the total import in 2021. Using FASDEP II targets and 2021 import data, 30 percent of 2,092,725.2 tonnes would be 627,817.56 tonnes. The national average yield of rice per hectare in 2021 according to SRID (2022) was 3.2 tonnes. To produce 30 percent of the rice locally, the Country has to cultivate additional 196,193 hectares of rice farms.

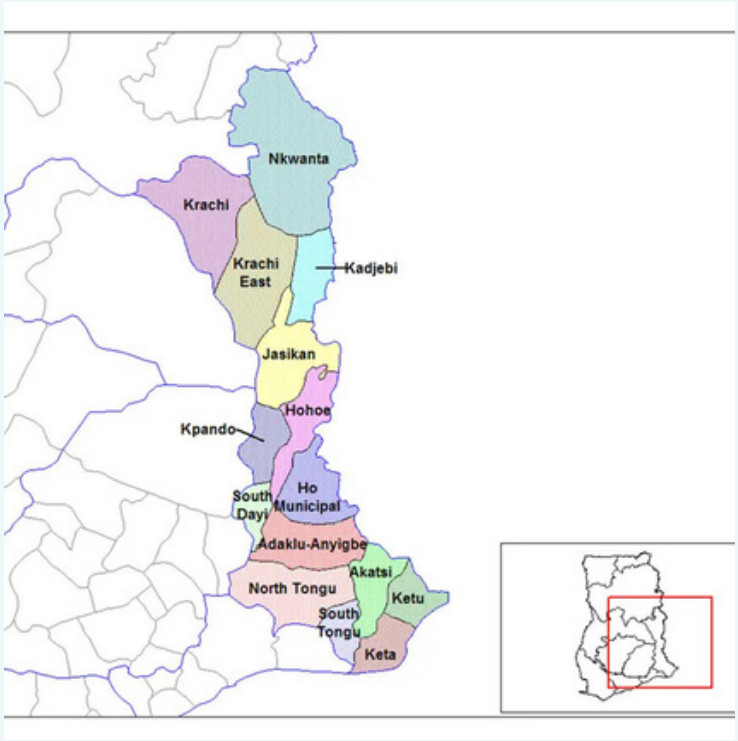
Factors hindering Rice production in Ketu South and Ketu North Districts in Volta region

According to the Ministry of Food and Agriculture (2021), the Volta region was the second-largest rice-producing region in Ghana and Ketu South and Ketu North districts in the Volta region produce rice in large quantities. Studies have revealed that rice farmers who use irrigational facilities are able to produce rice at a better cost-minimizing level compared to farmers who rely solely on rainfall. A lot of rice farmers in Ketu North Municipal cultivate rice at Weta irrigation project field which is owned by the government of Ghana. The irrigable land developed by the government for the cultivation of rice was 880 hectares.

However, close to one-third of the total 880 hectares of the irrigated area has been submerged underwater since 2006. According to the farmers, they lose millions of cedis yearly. This has also affected the number of acres that the farmers cultivate yearly. The size of land for rice cultivation has a positive effect on the number of tonnes that will be harvested. The larger the land the higher the yield holding all other factors constant. Adogla-Bessa (2018) reported that farmers who cultivate rice on Weta irrigated field lose approximately GHS 6 million every year because of the submerging of the land under water.

The farmers in Ketu North Municipal and Ketu South district do not have storage facilities to store their produce and also, dryers to dry the rice. The farmers depend on the sunshine to dry the rice and even with that method, they have to rent tarpaulins. Another challenge identified was inadequate funds. The majority of farmers in Volta region are into small-scale rice farming because they do not have enough funds to produce on a large scale. To produce on a large scale, a farmer needs funds to prepare the land and also buy inputs.

The high cost of inputs is also a challenge affecting rice production. The prices of agricultural inputs are high because of the high inflation rate and cedi depreciation. Increases in agricultural input prices have a negative relationship with the number of acres a farmer will cultivate. Rice farmers are not willing to increase the number of acres they cultivate because of the increase in the cost of production. Inadequate modern milling machine is one of the challenges hindering the development of the rice sub-sector.According to experts in rice production, the milling process is the most important step in rice production because it determines the nutritional, cooking and sensory qualities of rice. The objective of a rice milling system is to remove the husk and the bran layers and produce an edible, white rice kernel that is sufficiently milled and free of impurities.



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KEY INITIATIVES IN THE RICE PRODUCTION SUB-SECTOR UNDER GHANA CARES PROGRAM

The government of Ghana's 2022 budget had the following key initiatives under Ghana CARES:

1. Government will Support the development of 9,000ha in rain-fed lowlands in rice-growing regions for commercial farming. This is expected to produce an additional 31,500Mt of rice and also generate about 3,600 direct jobs with 40 percent being the youth
2. Government will support the rehabilitation and expansion of irrigation schemes in rice-growing areas to provide 1,000ha of land and produce an additional 11,000Mt of rice. This is expected to generate about 1,000 direct jobs with 40 percent being the youth;
3. Collaborate with the Ghana Enterprise Agency (GEA) and the National Entrepreneurship and Innovation Programme (NEIP), to provide starter packs for youth in the rice value chains.
4. Extend interest rate subsidies to commercial actors in rice, value chains to provide affordable financing.

> The Government of Ghana in 2022 through the Council for Scientific and Industrial Research (CSIR) supplied 4 tonnes of seed rice to farmers.

Also, the Ministry of Food and Agriculture procured and distributed 6,005 metric tonnes of improved rice seeds to farmers. The Ghana CARES programme facilitated the acquisition of a 10,000-acre land and is also, supporting an existing 10,000 acre farm in the Asutsuare-Tsopoli area to cultivate rice and vegetables. Currently, 1,000 acres have been cultivated and the Government is expecting the 1,000 acres to yield about 6,000 tonnes of rice.

The government of Ghana will mapped-out 13,000 ha of rain-fed lowland rice fields for development in 2023. Also, the Rice subsector is one of the priority sectors the board of Development Bank Ghana approved GHS500 million to support at preferential rates over the next five years.

Maize

Ghana Export-Import Bank has supported the poultry industry since its inception. The Bank has approved a loan of about GH¢ 168 Million to finance 14 companies that operate within the poultry value chain.

INTRODUCTION

MAIZE

Maize, also known as corn, is a widely cultivated cereal crop that is important to many countries around the world. Maize is a staple food for millions of people in many countries, particularly in Latin America, Africa, and Asia. It provides a significant proportion of the daily caloric intake for many people and is an important source of carbohydrates, protein, and essential micronutrients. Maize is a valuable cash crop that provides income to millions of farmers around the world and it's also an important source of employment in many rural areas, particularly during the planting and harvesting seasons.

GLOBAL OUTLOOK

The global production of maize, also known as corn, varies year to year depending on factors such as weather conditions, planting decisions, and demand. World production of maize has been increasing over the years, from 1.05 billion tonnes in 2015 to 1.21 billion tonnes in 2021. In 2016, the production decreased slightly to 1.12 billion tonnes, which was lower than the production in 2015. This was followed by a slight increase in 2017 to 1.14 billion tonnes. The world's production level declined to 1.12 billion tonnes in 2018 and surged to 1.16 billion tonnes in 2020. Americas and Asia regions are the largest maize producers in the world. Asia and the Americas together contribute to more than 80% of the world's total maize production, while Africa and Oceania account for a smaller share of the world's total maize production.

The Americas region has consistently been the largest maize producer in the world, with a production of 521.9 million tonnes in 2015, which increased to 592.4 million tonnes in 2021. Americas region produced 49.5% and 48.9% of the world's total maize production in 2015 and 2021 respectively. Asia region is the second-largest maize producer in the world, with a production of 353.6 million tonnes in 2015, which increased to 378.9 million tonnes in 2021. In 2015, Asia produced 33.6% of the total world maize production, and in 2021, it produced 31.3% of the world's total maize production. Europe's maize production has been relatively stable, ranging from 103.9 million tonnes in 2015 to 141.8 million tonnes in 2021.

Maize production in Africa has generally been increasing over the past decade, despite challenges such as drought, pests, and diseases. According to the Food and Agriculture Organization (FAO), the total maize production in Africa was approximately 73.7 million metric tons in 2015, and it has since increased to 96.6 million metric tonnes in 2021.

One of the factors that have influenced maize production in Africa over the past decade is government support.

Many African governments have implemented policies and programs to support maize production, such as subsidies for inputs like seeds and fertilizers, and the construction of irrigation infrastructure. For instance, in 2015 the Central Bank of Nigeria initiated the Anchor Borrowers Programme (ABP) which was an agricultural intervention programme to support smallholder farmers in Nigeria. The programme aimed to increase agricultural production and reduce Nigeria's dependence on food imports including maize. The programme provided farmers with credit facilities, inputs, and technical support.

The Kenyan government also has implemented various policies and initiatives to support maize production, such as subsidies for inputs like seeds and fertilizers, and the establishment of the National Cereals and Produce Board to support farmers' access to markets. Similarly, the government of Zambia implemented policies such as Farmer Input Support Programme (FISP), National Food and Nutrition Commission, Agricultural Credit Guarantee Scheme Fund and Irrigation Development to help farmers grow maize all year round, regardless of rainfall patterns and also, increase smallholder farmers' access to agricultural inputs, such as seed and fertilizer.

Additionally, Ghana since 2017 has been implementing a programme dubbed 'Planting for Food and Jobs where small holder farmers access inputs such as improved seeds and fertilizers at subsidized rates for production of food crops particularly maize.

Table 1: Maize Production in the World from 2015 to 2021

Year	World	Africa	America	Asia	Europe	Oceania
2015	1,053,891,010	73731518	521882986	353595567	103938636	742303
2016	1123728793	73490057	576446806	355480579	117678277	633074
2017	1139704590	90325306	578373634	359481901	110887777	635972
2018	1124172165	82863154	549166576	363145164	128393031	604240
2019	1137617353	83768692	562797235	357722955	132781469	547003
2020	1162997555	93972614	580331839	365111405	123098595	483101
2021	1210235135	96637314	592356330	378856372	141847697	537422

Source: FAOSTAT, 2023

Based on the latest data available from the FAO statistical corporate database, the United States was the largest maize-producing country in the world in 2021 followed by China and Brazil. The United States alone produced around one-third, 383.9 million tonnes, of the world's maize in 2021. China and Brazil produced 272 million tonnes and 88 million tonnes. Argentina and Ukraine were the fourth and fifth largest maize-producing countries in the world respectively in 2021. South Africa was the only African country among the top ten maize-producing countries in the world in 2021.

South Africa was the ninth largest maize-producing country with a total production of 16.8 million tonnes. According to data from the Food and Agriculture Organization of the United Nations (FAO), South Africa was the leading maize-producing country in Africa in 2021 followed by Nigeria (12.7 million tonnes) and Ethiopia (10.7 million tonnes). Egypt (7.5 million tonnes), Tanzania (7 million tonnes), Malawi (4.6 million tonnes) and Zambia (3.6 million) were the fourth, fifth, sixth and seventh largest maize-producing countries in Africa respectively.

Table 3: Top Ten Maize Importing Countries in the World in 2021

Country	Tonnes (millions)
United States	383.c
China	272.5
Brazil	88.4
Argentina	60.5
Ukraine	42.1
India	31.6
Mexico	27.5
Indonesia	20
South Africa	16.8
France	15.3

Source: FAOSTAT, 2022

According to the data available at the Food and Agriculture Organization of the United Nations (FAO) database, China was the largest importer of maize in the world in 2021, importing a staggering 28.3 million metric tonnes of maize. This could be attributed to the country's growing demand for animal feed as its population and livestock industries continue to grow. Mexico was the second largest maize importer followed by Japan and the Republic of Korea. Mexico is a major producer of maize, but it is also a significant importer due to its dependence on maize imports for its food and livestock industries. Mexico imported 17.3 million tonnes of maize in 2021.

Japan, the Republic of Korea and Vietnam imported 15.2 million tonnes, 11.6 million tonnes and 10.6 million tonnes respectively. Egypt was the eighth-largest maize-importing country in the world and the first-largest importing country in Africa in 2021. Egypt imported approximately 7 million tonnes of maize in 2021. Algeria was the second largest maize importer in Africa followed by Morocco and Tunisia.

Table 4: Top Ten Exporting Countries in the World in 2021

Country	Tonnes
United States of America	70041368
Argentina	36911996
Ukraine	24539480
Brazil	20429566
Romania	6904388
France	4302971
India	3615752
South Africa	3327209
Hungary	13270455
Russian Federation	2936350

Source: FAOSTAT, 2023

Ghana's Outlook

Maize is an important crop in Ghana, and its demand is driven by demand for animal feed, Industrial uses and food consumption. Maize is an important ingredient in animal feed, particularly for poultry and livestock. As the demand for meat and dairy products grows in Ghana, so does the demand for maize as an animal feed ingredient. Also, Maize is a staple food in Ghana, and it is consumed in various forms such as boiled maize, maize porridge, kenkey, and banku. As the population grows, the demand for maize as a food crop also increases.

Maize production seasons in Ghana

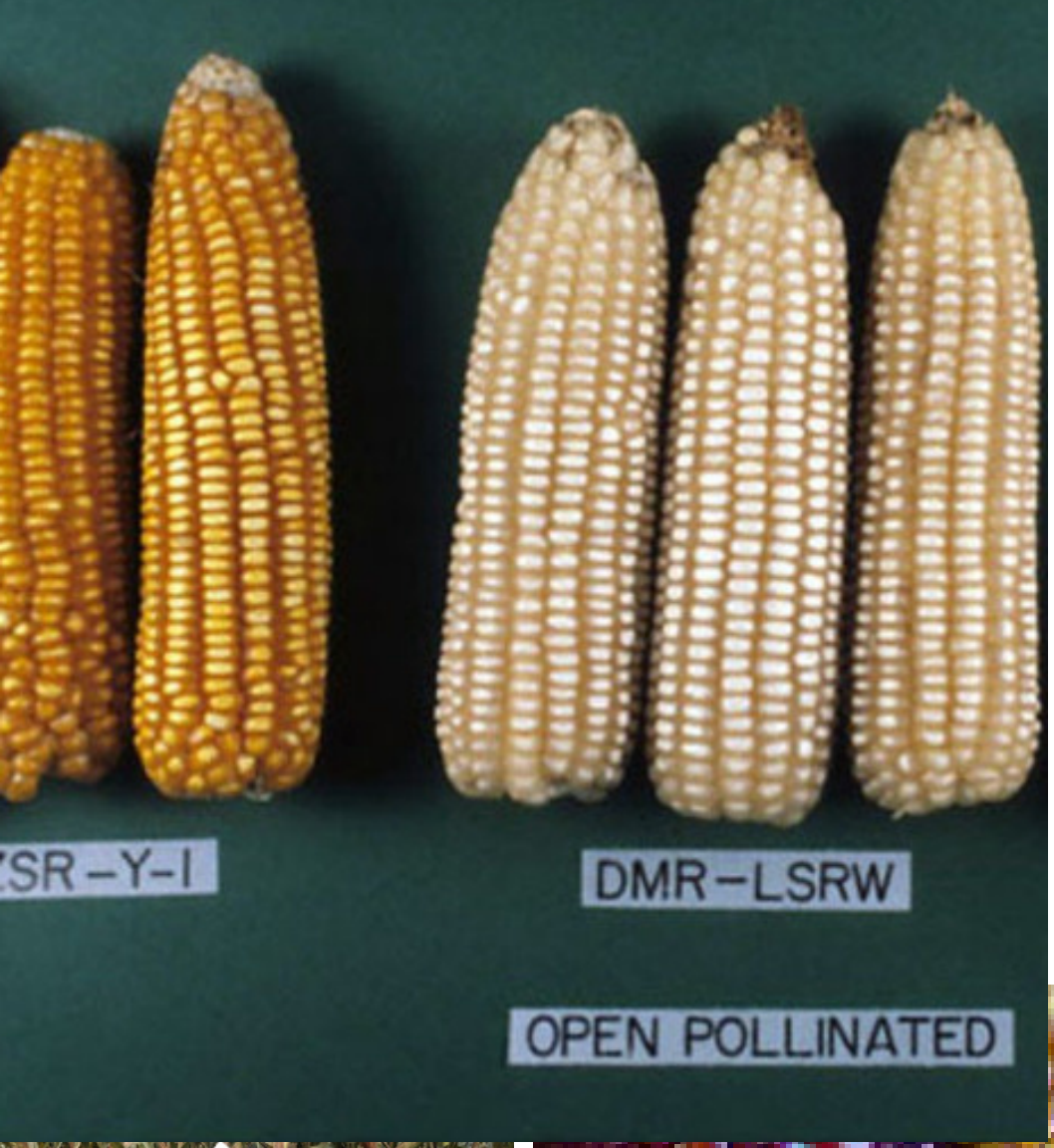
Maize is an important crop in Ghana accounting for over 50% of the country's cereal production. The crop can be grown in all the agro-ecological zones of Ghana. Maize is typically planted during two main seasons in different parts of the country. The major maize growing season occurs between March and April in the southern parts of Ghana and between May and June in the northern regions. This is the main season for planting maize, and it is usually followed by a long rainy season that lasts from April to September in the south and from May to October in the north. The minor maize planting season also occurs between July and August in the southern parts of Ghana.

This season is also known as the "Nimdie" season and is usually shorter than the major planting season. It is also characterized by lower rainfall amounts and higher temperatures. Farmers in Ghana often adjust their planting schedules based on local weather patterns and conditions. In some cases, they may also plant maize outside of these two main seasons to take advantage of favourable weather or market conditions.

Varieties of maize in Ghana

Several varieties of maize are grown in Ghana. These varieties can be broadly classified into two categories: hybrid and open-pollinated varieties. Hybrid varieties are created by crossing two or more parent varieties to produce offspring with desirable traits such as high yield, disease resistance, and drought tolerance. Hybrid maize varieties are often high-yielding and have good resistance to pests and diseases, making them popular among farmers. Some popular hybrid maize varieties grown in Ghana include Sika Aburoo, Kunju Wari, Pan 12 and Pan 53, Pioneer, lake 606, SC 719 (Gyemedi), Odomfo, Tintim, Aseda, Nwanwa and Etubi Pibi.

Open-pollinated varieties, on the other hand, are varieties that are pollinated naturally by wind or insects. These varieties can be maintained over time through natural selection, and they are often adapted to local growing conditions. Some popular open-pollinated maizes are Bihilifa, Ewul-Boyu, Obatanpa, Okamasa, Sanzal Sima, Aburohemaa, Abontem, Omankwa, Honampa and Wang Dataa. The availability of different maize varieties in Ghana provides farmers with a range of options to choose from based on their individual needs and growing conditions.



"PAN 53 is a medium maturity white maize hybrid with semi-flint kernels. Since its launch, the hybrid has been well received by the farming community in maize growing areas in both small holder and commercial farming area"

Major Maize Planting Areas in Ghana

Maize is grown in various regions of the country. The major maize-growing regions in Ghana include:

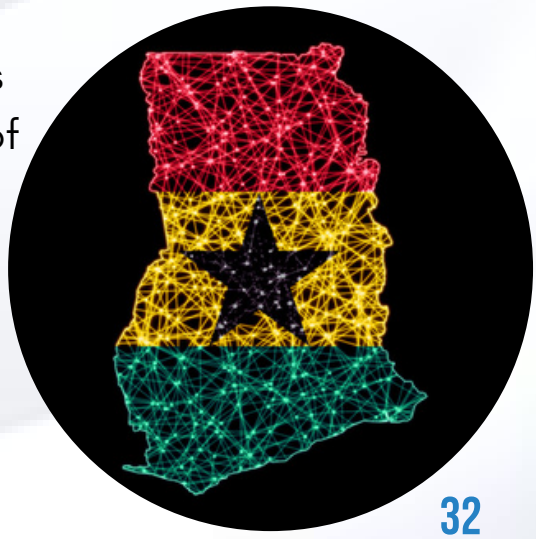
1. Ashanti Region: This region is one of the largest producers of maize in Ghana. Some of the major maize-producing districts in Ashanti include Ejura-Sekyedumase, Mampong Municipal, and Asante Akim North.

2. Bono Region: This region is also a major producer of maize in Ghana. Some of the major maize-producing districts in Bono include Sunyani West, Jaman North and Wenchi.

3. Bono East Region: significant quantities of maize is produced in the Bono East Region. Major production districts are Nkoranza North, Nkoranza South and Kintampo North.

4. Northern Region: The Northern Region is a significant maize-producing region, with districts such as Savelugu-Nanton, Karaga, and Tolon-Kumbungu being major maize producers.

5. Volta Region: The Volta Region is known for its large maize fields, particularly in the districts of Ho, Akatsi, and Hohoe



6 Eastern Region: The Eastern Region is another important maize-producing region in Ghana. Some of the major maize-producing districts in the Eastern Region include New Juaben North, Fanteakwa, and Upper Manya Krobo.

7 Central Region: The Central Region is also a significant maize-producing region, with districts such as Assin North, Twifo-Atti Mokwa, and Mfantseman being major maize producers.

MAIZE PRODUCTION IN GHANA

Table 5 shows that maize production in Ghana has an upward trend. The FAOSTAT data indicates that the total maize production in Ghana increased from 1,691,644 tonnes in 2015 to 3,500,000 tonnes in 2021. This is a significant increase of over 100% in maize production in just six years. The Table revealed that while the area harvested increased from 880,250 Ha in 2015 to 1,300,000 Ha in 2021, the total maize production increased from 1,691,644 tonnes in 2015 to 3,500,000 tonnes in 2021.

This indicates that the increase in maize production is not solely due to an increase in the area harvested but is also a result of an increase in yield per hectare. This is evidenced by the increase in yield per hectare from 19,218 hg/ha in 2015 to 26,923 hg/ha in 2021. In other words, farmers in Ghana are not only planting more maize, but they are also achieving higher yields per hectare due to improved farming practices, better use of technology and inputs, and favourable weather conditions.

The maize production trend is promising for the country's agricultural sector, as it shows that farmers are becoming more productive and efficient in their farming practices. However, it is also important to note that there is still room for improvement, especially in the areas of post-harvest management, storage, and distribution, to ensure that the increased production translates into improved food security and economic growth.

Table 5: Maize Production in Ghana from 2015 - 2021

Year	Tonnes	Area harvest (Ha)	Yield-hg/ha
2015	1691644	880250	19218
2016	1721910	883031	19500
2017	2011179	1000000	20112
2018	2306384	1184000	19480
2019	2900000	1200000	24167
2020	3032000	1100000	27564
2021	3500000	1300000	26923

Source: FAOSTAT, 2023

Table 6: Maize Importation in Ghana from 2013 to 2021

Year	Tonnes	Value in $1000
2013	3172.00	3163.00
2013	2641.00	3070.00
2013	98753.63	20543.00
2013	72059.49	16120.00
2013	40661.50	9794.00
2013	81707.64	22797.00
2013	8819.36	7974.00
2013	5781.00	7909.00
2013	86986.47	30603.00

Source: FAOSTAT, 2023

Table 6 presents data on maize importation in Ghana from 2013 to 2021. The table provides information on the quantity of maize imported in tonnes and the corresponding value in thousands of dollars. During the period from 2013 to 2015, there was a significant increase in both the quantity and value of maize imports. The quantity imported grew substantially from 3,172 tonnes in 2013 to 98,754 tonnes in 2015. Similarly, the value rose from $3.163 million to $20.543 million during the same period.

Following the peak in 2015, there were fluctuations in both the quantity and value of maize imports. For example, from 2016 to 2017, both the quantity and value experienced a decline. The quantity of maize imported decreased from 98,754 tonnes in 2015 to 72,059 tonnes in 2016 and further dropped to 40,661 tonnes in 2017. The import values also decreased from $20.5 million in 2015 to $9.8 million in 2017. In 2018, there was an increase in the quantity of maize imported, reaching 81,707 tonnes, and this further surged to 86,986 tonnes in 2021, following a decline in 2019 and 2020.

Challenges Hindering Maize Production in Ghana

Maize production in Ghana faces several challenges that have a significant impact on the yield and the profit of farmers. Pests and diseases have a significant impact on maize production in Ghana, as they reduce crop yields, increase production costs, and lead to food insecurity for farmers and their families. Some of the common pests and diseases that affect maize production in Ghana include fall armyworm, Maize weevil, Stemborer, Maize streak virus and Rusts. Fall armyworm causes significant damage to maize crops by eating the leaves and stems of the plants. The fall armyworm can quickly spread across large areas, leading to a reduction in crop yields. Similarly, Stem borer attacks the stems of maize plants, causing wilting and reduced crop yields.

Maize streak virus and Rusts are diseases that affect maize. Maize streak virus is a viral disease that affects maize plants, causing yellow streaks on the leaves and a reduction in crop yields whiles rusts are fungal diseases that affect maize plants, leading to reduced plant vigour and lower yields. The impact of these pests and diseases on maize production can be devastating, as they can lead to crop losses and reduced income for farmers.

Limited access to credit also significantly affects maize production in Ghana, as it limits farmers' ability to invest in inputs, technology, and other resources needed to produce high-quality maize crops. Maize production requires significant investments in inputs such as seeds, fertilizers, pesticides, and irrigation equipment. However, many small-scale farmers in Ghana do not have access to the necessary credit to finance these investments. Without access to credit, most farmers are forced to rely on traditional methods of farming, such as using low-quality seeds and applying inadequate amounts of fertilizers, which can lead to lower crop yields and poor-quality maize. Limited access to credit also prevents farmers from adopting new technologies and innovations that can improve maize production and reduce production costs. Limited access to credit hinders the ability of farmers to purchase inputs such as fertilizers and pesticides at the optimal time, resulting in delayed planting and reduced crop yields.

Post-harvest loss is one of the factors that have a significant effect on maize production in Ghana, as it reduces the amount of maize available for consumption and trade, leading to food insecurity and economic losses for farmers. Post-harvest losses can occur at various stages of the maize value chain, including harvesting, threshing, drying, and storage. Harvesting and threshing losses occur when maize grains are lost during the harvesting and threshing processes. These losses can be caused by poor harvesting techniques, such as cutting maize cobs too low or too high or using blunt harvesting tools. Threshing losses can also be caused by using inadequate threshing methods, such as manual threshing, which can lead to a significant amount of grain loss.

Drying losses occur when maize grains are not properly dried before storage, which can result in mould growth, insect infestation, and reduced grain quality. Storage losses occur when maize grains are not properly stored, leading to insect infestation, rodent damage, and mould growth.

According to Bruce (2016), Ghana loses about 318,514 tonnes of maize annually to post-harvest losses and this makes up 18% of the total stock of maize produced in Ghana. Bruce (2016) reported that most of the maize was lost because the farmers failed to dry them thoroughly before storage which caused insects to attack the maize.

Limited use of improved seeds is one of the factors that affect maize production in Ghana. Even though maize yield (yield per ha) of small holder farmers has improved over time, yield levels continue to remain a challenge. This is because the utilization of certified seeds among small holder farmers is still low contributing to low crop productivity.

According to Bruce (2016), reported that most of the maize was lost because the farmers failed to dry them thoroughly before storage which caused insects to attack the maize.

The high cost of agricultural inputs is another factor affecting the production of maize in Ghana. Inputs such as seeds, fertilizers, and pesticides are essential for growing maize and achieving high yields. However, the cost of these inputs has a significant burden on farmers, particularly small-scale farmers who do not have the financial resources to purchase them. When the cost of inputs is high, farmers are unable to purchase the required quantities, leading to lower yields and reduced profitability. This, in turn, has a negative impact on food security, as lower yields can result in reduced availability and increased prices of maize The high cost of inputs can be attributed to external factors such as inflation and currency fluctuations, COVID 19 and Russia-Ukraine War. According to an AFDB report in 2022, Fertilizer prices increased by 300% during the Ukraine crisis in 2022, and the continent faced a fertilizer shortage of 2 million metric tonnes.

MINISTRY OF
FOOD & AGRICULTURE
REPUBLIC OF GHANA

Government of Ghana interventions to increase Maize production in Ghana

The National Fertilizer Subsidy Program (NFSP) is a government-led initiative in Ghana aimed at increasing access to and use of fertilizers by smallholder farmers to improve crop yields and productivity. The NFSP has been in operation in Ghana since 2008 and has evolved over the years to include a range of fertilizer types, including organic and inorganic fertilizers. The program provides subsidies to farmers to enable them to purchase fertilizers at a reduced cost. This is aimed at making fertilizers more affordable and accessible to smallholder farmers who might not otherwise be able to afford them.

The program is managed by the Ministry of Food and Agriculture (MOFA) and is implemented in collaboration with various partners including the private sector, non-governmental organizations (NGOs), and development partners. After year of implementation, the NFSP was review to include other complementary support measures that would enable farmers to use fertilizer efficiently and profitably.

This led the introduction of the Planting for Food and Jobs Campaign. The "Planting for Food and Jobs" (PFJ) initiative launched by the government of Ghana in 2017 has had a significant positive effect on maize production in the country.

Under the PFJ program, the government provides farmers with subsidized inputs such as improved seeds, fertilizers, and pesticides, as well as extension services and marketing support. This has enabled many farmers, particularly small-scale farmers, to access these inputs and increase their maize production.

According to the Ministry of Food and Agriculture, the PFJ initiative has contributed to a significant increase in maize production in Ghana, with the country achieving a bumper maize harvest in 2018. The program has also contributed to increased employment opportunities in the agricultural sector, particularly for youth.

The National Buffer Stock Company (NAFCO) is one of the Government of Ghana's interventions aimed at incentivizing farmers to increase maize production in Ghana. The National Buffer Stock Company in Ghana was established to ensure food security and stabilize food prices by purchasing and storing excess food crops when there is bumper harvest and releasing them during times of scarcity..

This has a direct impact on the production of maize in the country. One of the ways in which the National Buffer Stock Company (NAFCO) encourages farmers to increases maize production is by providing a guaranteed market. Farmers are assured of a ready market for their produce, which encourages them to increase production, knowing that they will not suffer losses due to a lack of buyers or price fluctuations. In addition, the Buffer Stock Company purchases maize from farmers at competitive prices, which encourages farmers to produce more maize as they are assured of a reasonable return on their investment. This helps to stabilize food prices and ensures that the population has access to affordable maize, which is a staple food in Ghana.

Government of Ghana interventions to increase Maize production in Ghana

1. To increase food production and incomes of farmers, the Ministry of Food and Agriculture procured and distributed 10,508mt of improved maize seeds under the PFJ
2. A total of 14 maize germplasms and two foundation seeds for drought-tolerant maize varieties were developed for climate-smart agriculture and supplied to seed growers to produce certified seeds for farmers under the Planting for Food and Jobs (PFJ) initiative.

Government Proposed Interventions in 2023

1. Government intends to develop 110,000 acres of land for rice, maize, soya bean, and poultry. Funding will be sought from the GHc500 million DBG fund and GoG sources.
2. The Government will collaborate with the National Service Secretariat to commence a programme to cultivate 50,000 acres of maize in the Sekyere Kumawu District.
3. The Ministry of Food and Agriculture through the Savannah Agriculture Value Chain Development Project will support farmers with agro-inputs such as fertilizers, improved maize seeds and herbicides to cultivate 25,000 acres of maize in the 5 Northern Regions

Exploring the Critical Role of Maize in Poultry Feed Production

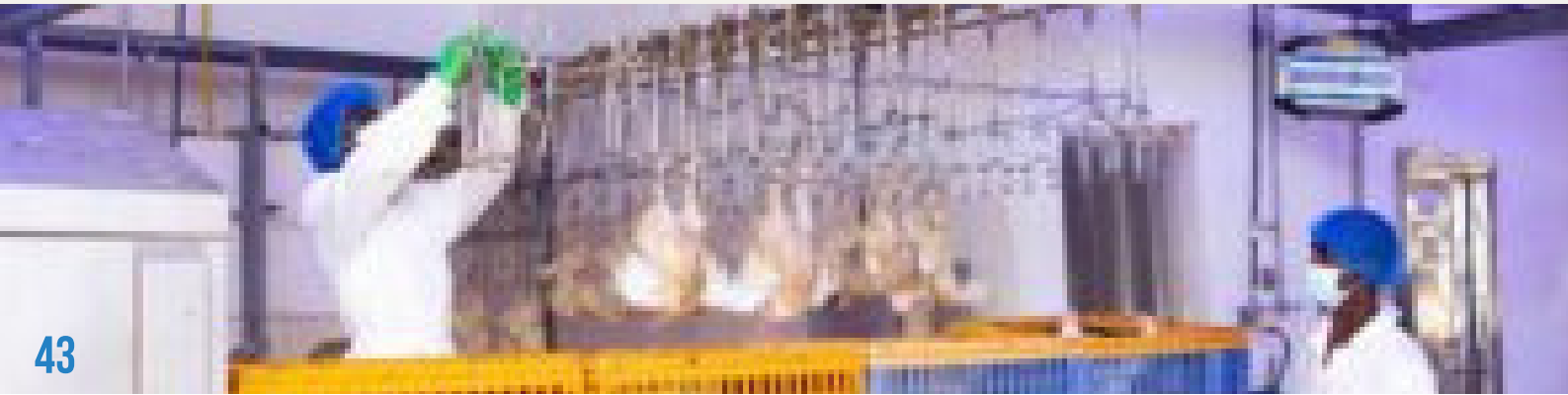
Maize is one of the key ingredients used in the production of poultry feed. It is an important source of energy, protein, and essential nutrients for poultry birds. Maize is rich in carbohydrates, which provide energy to poultry birds for their daily activities, such as walking, running, and foraging. Maize is also a good source of protein, with a relatively high content of essential amino acids such as lysine and tryptophan, which are important for the growth and development of poultry birds. Additionally, maize contains important vitamins and minerals such as vitamin A, vitamin E, phosphorus, and magnesium, which are essential for maintaining the health and well-being of poultry birds.

In poultry feed production, maize is typically used in combination with other feed ingredients such as soybean meal, wheat, and other grains. The specific composition of the feed will depend on the type of poultry bird being raised, as well as its stage of development (such as broiler, layer, or breeder). According to experts in poultry farming, each bag of poultry feed constitutes on average 60 percent of maize. Ghana on average imports 400,000 metric tonnes of poultry meat annually. To reduce the importation of chicken meat by 25 percent, Ghana needs 200,000,000kg (200,000 tonnes) of maize from 80,000Ha (200,000 acres) of maize farms to produce poultry feed to feed 66,666,667 broilers. This estimation is based on the 2021 National Average Yield of Maize and average feed per broiler. The 2021 National Average Yield of Maize was 2.5 MT/Ha and the average feed per broiler was 5.0kg.

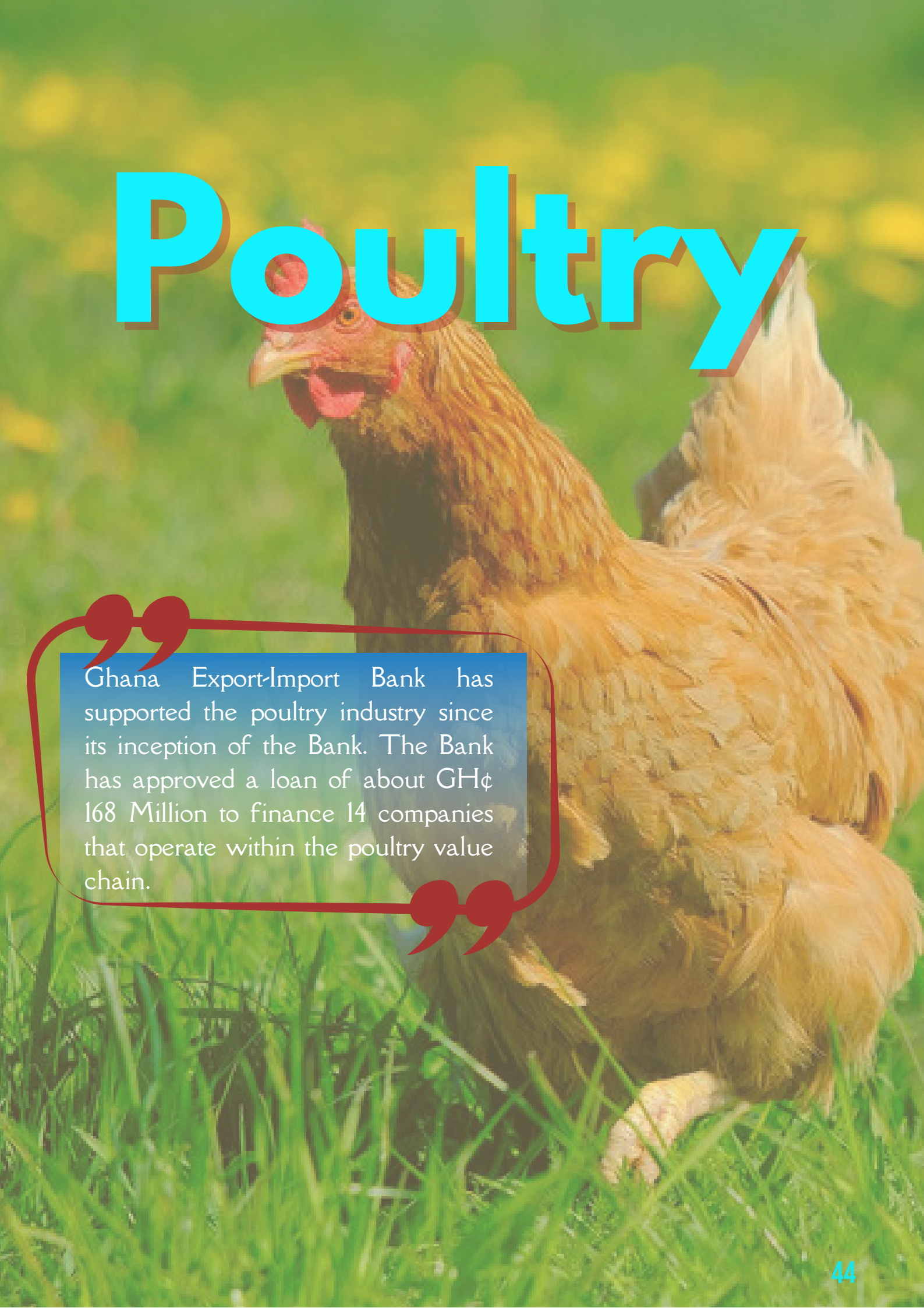
Ghana Export-Import Bank has supported the poultry industry since its inception. The Bank has approved a loan of about GH₵ 168 Million to finance 14 companies that operate within the poultry value chain. A total of GH₵111.2 Million has been disbursed to the poultry beneficiaries.

The poultry beneficiaries are found in 5 out of the 16 regions in Ghana. Find below the GEXIM-sponsored poultry beneficiaries' distribution across regions in Ghana;

Region	Number of beneficiaries
Ashanti	4
Eastern	4
Greater Accra	3
Central	2
Volta	1
Total	14



Poultry



Ghana Export-Import Bank has supported the poultry industry since its inception of the Bank. The Bank has approved a loan of about GH¢ 168 Million to finance 14 companies that operate within the poultry value chain.

Poultry

INTRODUCTION

The poultry industry in Ghana contributes significantly to Ghana's Gross Domestic Product (GDP) and also helps in alleviating poverty through the creation of employment. Poultry is defined as the raising of birds such as chickens, quails, geese, ducks, and turkeys on farms for food. Poultry eggs and meat are known sources of protein and other. Chicken meat contains vitamins B6, D and B12, selenium, zinc, magnesium and phosphorus which keep the human immune system strong and also help build strong bones. This paper focuses on chicken production, importation, challenges poultry farmers face and possible strategies to curb the challenges.

GLOBAL OUTLOOK OF CHICKEN MEAT PRODUCTION

The value of the total fresh chicken and frozen chicken exported worldwide in 2021 were US$7.6 billion and US$18.2 billion respectively. Global production of chicken meat fresh or chilled has had an upward trend since 2010. Global production increased by 4.08 percent from 87.27 million tonnes in 2010 to 90.98 million tonnes in 2021 and further increased to 100.77 million tonnes in 2014. The 2021 global production of chicken meat fresh or chilled increased by 0.93 percent, 1.13 million tonnes, from 120.46 million tonnes in 2020 to 121.59 million tonnes.

America since 2010 has been the leading producer of chicken meat fresh or chilled followed by Asia and Europe. America produced 41.14 percent, 40.55 percent and 41.2 percent of global production of chicken meat fresh or chilled in 2019, 2020 and 2021 respectively. Although there is an increase in Africa's production of chicken meat, the total production since 2010 has always been less than six (6) percent. The highest percentage since 2010 was 5.9 percent and it was recorded in 2021. Africa produced 7250,987 tonnes of chicken meat in 2021. North Africa is the leading producer of chicken meat (fresh or chilled) in Africa since 2010 followed by South Africa and West Africa.

Table 1: Maize Production in the World from 2015 to 2021

Year	Africa	America	Asia	Europe	Oceania	World
2010	4506783	38915464	28968584	13777196	1102305	87270330
2011	4624065	40371193	30346739	14448804	1192291	90983092
2012	4728960	40543761	32388379	15405134	1250220	94316455
2013	5080967	41692014	33684056	15863709	1261997	97582743
2014	5292499	42961253	34614468	16583171	1323428	100774819
2015	5435706	44687001	36026925	17239399	1340548	104729579
2016	5432751	45253897	37479471	17841239	1428072	107435430
2017	5887874	46307311	39536641	18356869	1494429	111583124
2018	6197952	47027553	40877240	19040713	1469365	114612823
2019	6423890	48357195	41739375	19489676	1523084	117533220
2020	6953743	48846229	43449832	19711918	1499550	120461272
2021	7250987	50175664	43126833	19479424	1555450	121588358

Source: FAO, 2023

In 2021, the Netherlands was the leading exporter of chicken meat (fresh or chilled) in the world followed by Poland and the United States. The top ten chicken meat(fresh or chilled) exporting countries in the world in 2021 were the Netherlands, Poland, the United States, Belgium, Germany, France, China, Italy, Austria and Belarus. These top ten countries exported 82.5 percent of the global exports of chicken meat (fresh or chilled). The Netherlands exported chicken meat (fresh or chilled) worth US$1.59 billion and Poland exported chicken meat worth US$1.59 billion in 2021. Netherlands and Poland exported 42.1 percent of the global total exports of fresh or chilled chicken meat in 2021.

With regards to frozen chicken, Brazil was the leading exporter in 2021 followed by the United States and the Netherlands which was the leading exporter of fresh or chilled chicken meat in 2021. The top ten frozen chicken exporting countries in the world in 2021 were Brazil, the United States, the Netherlands, Thailand, Poland, Turkey, Ukraine, Russia, Argentina and France. These top ten exporting countries exported 85.4 percent of the global exports of frozen chicken in 2021. Brazil and the United States accounted for more than half, 56.3 percent, of the global exports of frozen chicken in 2021. Brazil exported frozen chicken worth US$6.8 billion representing 37.6 percent of the global export of frozen chicken in 2021.

GHANA'S OUTLOOK

CHICKEN MEAT PRODUCTION AND IMPORTATION IN GHANA

According to the Animal Production Directorate of the Ministry of Food and Agriculture, the national demand for poultry in Ghana in 2021 was 400,000 tonnes. The post estimates of Ghana's chicken meat consumption in 2022 was 460,000 tonnes, a 15 percent increase above the 2021 consumption projection of 400,000 tonnes. Holding all other factors constant the average national demand for chicken meat is above 400,000 tonnes yearly. However, the average national production of chicken meat between 2011 and 2021 was 57,200 tonnes. The total production of chicken meat in Ghana in 2012 was 46,308 tonnes, a 12.9 percent increase above the 2011 production of 41,008 tonnes.

The production increased by 49 percent from 46,308 tonnes in 2012 to 69,009 tonnes in 2019. The production increased further to 74,124 tonnes in 2021. According to GIRSAL, spent layers constitute a higher proportion (more than 90 percent) of domestically produced chicken meat and broiler production only meets about two (2) percent of the National demand.

Table 2: Chicken Meat (fresh or chilled) Production in Ghana from 2010 to 2021

Year	Tonnes
2011	41008.00
2012	46308.00
2013	50985.00
2014	54809.00
2015	57276.00
2016	57276.00
2017	58350.44
2018	64037.26
2019	69009.52
2020	73289.70
2021	74124.27

Source: FAO, 2023

The demand for chicken meat in Ghana exceeds the total production of chicken meat yearly and therefore, Ghana imports chicken meat every year to make up for the deficit in domestic chicken meat supply. The consumption per capita of chicken meat in Ghana in 2021 was estimated to be above 13kg. The rise in consumption of chicken meat can be attributed to population growth. The importation of chicken meat since 2010 fluctuates from year to year. The importation of chicken meat surged from 109,179 tonnes in 2010 to 168,235 tonnes in 2013 representing an increase of 54.1 percent. The monetary value of the chicken meat imported increased from US$104.75 million in 2010 to US$197.39 million in 2013, an increase of US$ 92.64 million. The increase can be attributed to an increase in imported quantities.

The increase can be attributed to an increase in imported quantities.

The importation of chicken meat declined by 19.5 percent to 135,356 tonnes in 2014 and further dipped to 93,107.76 tonnes in 2016. Table 3 shows that the importation of chicken meat increased by 58.46 percent from 93,107.76 in 2016 to 147,537.69 in 2018, further increased to 201,812.81 tonnes in 2018 and declined to 150,038.91 tonnes in 2019. The quantity of chicken meat imported in 2021 increased by 25.9 percent from 283,828.76 tonnes in 2020 to 357,456.10 tonnes. The value of the chicken meat imported in 2021 was US$457 million. The top three countries Ghana imports chicken meat from are United States, Brazil and European Union.

Table 3: Importation of Chicken Meat (Fresh or chilled) in Ghana

Year	Tonnes	Value US$(Million)
2010	109179.00	104.75
2011	155056.00	175.40
2012	154366.00	186.00
2013	168235.00	197.39
2014	135356.29	167.30
2015	115334.61	115.73
2016	93107.76	103.90
2017	147537.69	119.98
2018	201812.81	127.79
2019	150038.91	752.50
2020	283828.76	284.91
2021	357456.10	457.06

Source: FAO, 2023

GHANA EXPORT- IMPORT BANK SUPPORT TO POULTRY INDUSTRY

Ghana Export-Import Bank has supported the poultry industry since its inception of the Bank. The Bank has approved a loan of about GH₵ 168 Million to finance 14 companies that operate within the poultry value chain. A total of GH₵111.2 Million has been disbursed to the poultry beneficiaries. The poultry beneficiaries are found in 5 out of the 16 regions in Ghana. Ashanti region has 4 beneficiaries, Eastern region has 4 beneficiaries, Greater Accra region has 3, Central region and Volta region have 2 and 1 respectively. The Bank's motive for supporting the poultry industry is to increase the production of poultry products to reduce the importation of such products in Ghana. The Bank finances companies that help to reduce the importation of products that can be produced locally. Table 4 shows the companies in the poultry industry that have benefited from the Ghana Export-Import Bank.

Table 4: Importation of Rice Paddy (milled rice equivalent) in Ghana

No.	Name	Amount Approved	Region
1.	Asamoa & Yamoa Farms	10,000,000.00	Ashanti
2.	Boris "B" Farms & Veterinary Supplies	65,200,000.00	Ashanti

3.	Darko Farms	22,100,000.00	Ashanti
4.	Farm Fresh Foods Limited	30,593,568.00	Greater Accra
5.	Delawin Farms Ltd	2,016,529.68	Greater Accra
6.	Appah Farms	16,248,000.00	Eastern
7.	Adelewa Integrated Farms	57,000.00	Upper East
8.	Johnny Food & Meat Co. Ltd	9,400,893.94	Greater Accra
9.	Akro Farms Ltd	5,000,000.00	Eastern
10.	Ghana Cuba Agric Ltd	1,000,000.00	Greater Accra
11.	Oslog Company Limited	1,000,000.00	Central
12.	Poultry City Limited	1,244,000.00	Eastern
13.	Aglow Farms	10,000,000.00	Central
14.	Windwus Company Ltd	1,000,000.00	Ashanti
	TOTAL	168,116,154.62	

DELAWINFARMS

GHANA EXIMBANK

GEXIM Supported Companies in Poultry Industry

POULTRY INDUSTRY CHALLENGES

The following are some of the challenges hindering the growth of the poultry industry.

All the farmers and poultry industry experts reported that the quality of Day-Old Chicks from local sources is poor. This poor quality has contributed to the rising importation of Day-Old chicks. According to some of the experts in the poultry industry, about 80 percent of the poultry farmers in Ghana import Day-Old chicks because the mortality rate is low. Local Day-old chicks' prices are cheaper than imported ones but have a high mortality rate as compared to imported day-old chicks. Under a hygienic environment, imported day-old chicks' mortality rate will not exceed 2 percent but local day-old chicks' mortality rate may be about 10 percent.

The acceptable mortality rate per production cycle according to GIRSAL is between 5 to 7 percent. Poor quality day-old chicks may lead to poor functioning flocks (Netherlands Enterprise Agency, 2020). The poor quality of the day-old chicks produced locally can be attributed to poor functioning hatchery equipment and day-old chicks not being vaccinated with the mareks vaccine.

Although the prices for the imported day-old chicks are high, the farmers prefer to buy them because the potential egg-laying rate of the imported birds is higher than the local birds. The imported birds' potential egg-laying rate is between 90 percent and 93 percent according to some of the experts in the industry and the local bird's potential egg-laying rate is between 50 percent and 70 percent. The life span of the imported birds is between 90 to 100 weeks and the life span of the local birds is between 70 to 75 weeks. According to some of the farmers interviewed, the quality of the parent stocks in Ghana is poor and this poor quality has an effect on the quality of the day-old chicks. The hatcheries that import eggs can have quality day-old chicks like the imported ones.

Another challenge hindering the poultry industry's growth is avian influenza. Avian influenza is a disease caused by infection with avian (bird) influenza (flu) Type A viruses. This disease is very contagious among birds, killing domesticated bird species, such as chickens, ducks and turkeys. Historically, the major spread of the HPAI H5N1 virus began in Eastern and South-eastern Asia from 2003 through to 2004. In 2005-2006, Highly Pathogenic Avian Influenza (HPAI) expanded westward through Asia into Europe, the Middle East, and Africa.

> the quality of the parent stocks in Ghana is poor and this poor quality has an effect on the quality of the day-old chicks. The hatcheries that import eggs can have quality day-old chicks like the imported ones.

The avian influenza outbreak was first reported in Ghana in 2007 in the Greater Accra region and the flu reoccurred and affected 148,448 birds in six regions namely Greater Accra, Central, Eastern, Western, Volta and Ashanti in 2015 and 2016.

It is believed that the outbreak in in Ghana originated in Nigeria. Also, on 8th July 2021 Accra Veterinary Laboratory confirmed an outbreak of Avian Influenza type A subtype H5 which affected birds in farms at Lagon, Darkuman, Nungua, Lashibi, Community 25.

The data available shows that the Highly Pathogenic Avian Influenza outbreak in 2021 affected 10 regions out of 16 in Ghana and the total number of birds affected was 703,966. Out of the 703,966 birds, 554,638 were culled by the Ministry of Food and Agriculture. The Ministry of Food and Agriculture reported that 102,760 birds affected were owned by small-scale commercial farms.

The outbreak in 2021 affected four of the Ghana Export-Import Bank-supported poultry farms named; Asamoah and Yamoah farms, Darko Farms, Aglow Farms and Delawin Farms. Darko farms lost a total of 19,067 birds. Darko farms lost 1,200 birds before Ministry of Food and Agriculture (MoFA) staff inspected the farms and after the inspection, the ministry destroyed 17,867 and 5,493 crates of eggs

Aglow farms lost a total of 70,000 birds. The farm lost 4,000 birds before the MoFA inspection and after the inspection, they destroyed 66,000 birds and 140 crates of eggs. Delawin farms also, lost 3,000 birds before the inspection and after the inspection, 29,985 birds and 2,840 crates of eggs were destroyed. Asamoa and Yamoah farms lost 20,000 birds as shown in Table 5.

Table 5: GEXIM supported Companies that were affected by the Bird Flu in 2021

Item	Name of customer/farms	No. of birds lost before mofa inspection	No. of birds destroyed during mofa inspection	No. of eggs destroyed (Crates)	No. of feed destroyed (kg)
1	Asamoah &Yamoah farms	20,000	Not applicable	Not applicable	Not applicable
2	Darko farms	1200	17,867	5,493	550
3	Delawin farms	3,000	29,985	2,840	5,000
4	Aglow farms	4,000	66,000	140	Not reported

The major challenge hindering the growth of the poultry industry is the high cost of feed. According to Dateh (2013), feed covers about 60 percent of the poultry farmers' cost of production. Boryor (2023) reported that feed accounts for 70 percent of farms' daily production costs. Anang et. al (2013) conducted a study in Ghana and found that because of the high cost of feed, many farmers purchase feed from cheaper and unscrupulous sources which in turn leads to poor development of the birds or death in extreme situations. Tables 6 and 7 show the broiler and layer weekly feed consumption per bird in kg and grams respectively. Holding all other factors constant, a broiler who is less than 5 weeks old consumes less than a kilogram in a day and a broiler who is 5 weeks old or above 5 weeks consumes more than a kilogram in a day.

Cumulatively, a broiler who is nine weeks old has consumed 9.785 kg of feed. A farmer who has 50,000 broilers that are nine weeks old has cumulatively purchased 9,785 50kg bags of broiler feed.

A broiler who is less than ten (10) days old consumes a feed called pre-starter and the one who is ten days old to four weeks consumes broiler starter mash. A broiler that is five weeks old or above five weeks consumes a broiler finisher.

Table 6: Broiler Feed Consumption

Age(Week)	Feed per bird(Kg)	Cumulative feed consumed(kg)
1	0.167	0.167
2	0.375	0.542
3	0.65	1.192
4	0.945	2.137
5	1.215	3.352
6	1.434	4.786
7	1.593	6.379
8	1.691	8.07
9	1.715	9.785

Source: Akinbobola (n.d)

Layers and broilers do not consume the same type of feed.The type of layer feed given to a layer by a farmer depends on the age of the layer. A layer that is less than eight (8) weeks old consumes layer starter mash and a layer between 8 weeks to 15 weeks consumes grower mash. A layer that is above 15 weeks old consumes layer mash. A farmer who has 50,000 layers that are nine weeks old has cumulatively purchased 2,131.5 of 50kg bags of layer feed.

Table 7: Layer feed Consumption

Age(Week)	Feed per bird(g)	Cumulative feed consumed(kg)
1	14.5	0.1015
2	19	0.2345
3	24	0.4025
4	28	0.5985
5	35	0.8435
6	39	1.1165
7	42	1.4105
8	47	1.7395
9	56	2.1315

Source: Akinbobola (n.d)

According to Greater Accra Poultry Farmers Association (GAPFA), the prices of 50kg bags of broiler finishers and broiler starters in December 2020 were GHS115 and GHS123 respectively. The broiler finisher price increased by 20 percent to GHS138 in December 2021 and further surged by 131.9 percent to GHS320 in December 2022. Similarly, the broiler starter price surged from GHS123 in 2020 to GHS143 in December 2021, representing an increase of 16.3 percent. The price of a 50kg bag of broiler starter as of December 2022 was GHS342 representing an increase of 139.3 percent. The cost of feed for chicken is high due to the high cost of raw materials used to prepare the feed. The major ingredients used to prepare both broilers and layers feed are soya, maize, palm kernel cake, fish meal, and wheat brown. More soya is used to prepare broiler feed as compared to layer feed because broilers need more protein at an early stage of their growth. The crude protein level for a broiler starter feed ranges between 21 to 22 percent CP. On average the percentages of maize and soya use to prepare a 50kg bag of feed are 60 percent and 20 percent respectively.

According to Greater Accra Poultry Farmers Association, the cost of maize per 50kg in 2020 was GHS55. The price declined 11 percent to GHS49 in 2021 and increased 108.2 percent to GHS102 in 2022. Soya, wheat bran and other ingredients prices are also high. The Association prepares feed for its members. The association in a peak period buys and processes 2000 bags of maize in a week. On average the Association needs 1,500 bags of maize in a week. Currently, the Association is producing below its installed capacity because of the high cost of maize and the unavailability of maize in the market.

Financial constraint is another challenge hindering the growth of the poultry industry. Some of the farmers do not have access to a formal source of credit because they do not have collateral and others who have collateral are not able to access loans because of high-interest rates. The average lending rate in December 2022 was 35.58 percent compared to 20.04 percent in the same period in 2021. According to Adei and Asante (2012), the few farmers who can have access to a formal source of credit at times find it extremely difficult repaying especially when the loans are not delivered to the farmers on time to embark on intended activities. The delay in the loan disbursement affects the growth of the poultry industry especially if the farmer applied for the loan to buy feed and drugs for the birds.

The importation of poultry meat is affecting the poultry industry. The chicken meat imported is cheaper than the chicken meat processed in Ghana. The increase in the importation of chicken meat has increased demand for imported chicken meat and reduced demand for locally produced chicken meat. According to some of the farmers, it is only during festive seasons that demand for locally produced poultry increases. Ghana imports about 98 percent of the chicken meat consumed yearly and the local poultry industry produces the remaining 2 percent (Ngnenbe, 2022). The cost of imported chicken is about 35 to 40 percent cheaper than locally produced chicken. Hence, imported chicken tends to be less expensive compared to locally produced chicken (Banson et.al (2015).

SITUATIONAL ANALYSIS AND SOCIAL IMPACT

of Ghana's Poultry Sector

The "Situational Analysis and Social Impact of Ghana's Poultry Sector" focused on the cost drivers, specifically day-old chicks and feed constituents. The report also addressed the need for 25% import substitution, which is considered a realistic goal.

Given the projected import of 400,000 metric tonnes of poultry meat per year

25% Import Substitution – 100,000MT	Projections
The volume of chicken meat required to meet 25%import Substitution in Kg	100,000,000
Average broiler dresses weight in kg	1.5
Projected number of broilers require to be processed	66,666,667
Projected Broiler Production Requirements	Quantity
Annual live broiler requirements	66,666,667
Projected Day-old chicks(DOC) requirements	66,666,667
Feed consumption per broiler/cycle	5.0kg
Projected annual feed requirements (kg)	333,333,333
Other Inputs (Drugs and Vaccines)	**Quantity (Kg)**
Maize – 60% of feed is maize	200,000,000
Soya – 35% of feed is soya	116,666,667
2021 National Average Yield of Maize	2.5 MT/Ha
2021 National Average Yield of Soya	1.7MT/Ha
Proposed Land Area to Achieve Projected Feed Requirement	Land Area (Ha)
Proposed Ha of maize to be cultivated	80,000Ha
Proposed Ha of soya to be cultivated	68,627Ha

The "Situational Analysis and Social Impact of Ghana's Poultry Sector" focused on the cost drivers, specifically day-old chicks and feed constituents. The report also addressed the need for 25% import substitution, which is considered a realistic goal. Projections were made to determine the required volume of chicken meat, which is 100,000 metric tonnes, to meet the 25% import substitution. It was estimated that 66,666,667 broilers need to be processed to achieve this target.

Additionally, the report analysed the necessary broiler production requirements, such as annual live broiler requirements and projected day-old chick requirements. It was also estimated that 333,333,333 kg of feed would be required annually. Other inputs such as maize and soya were also analysed, with proposed land areas of 80,000 hectares and 68,627 hectares respectively to achieve the projected feed requirement. These findings provide insights into the requirements and resources needed to achieve import substitution in the Ghanaian poultry sector.

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