

Transforming Nigeria's Agricultural Value Chain



*A case study of the Cocoa
and Dairy industries*

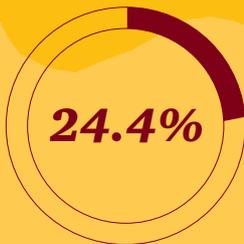
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Total land mass - 92.4 million hectares

Arable land – 82.0 million hectares

Contribution to GDP



Real growth rate



Export earnings



US\$ 1.4 billion

Food import bill



US\$ 5.3 billion

Top 5 Agriculture products - Production in thousand tonnes



Cassava	Yam	Maize	Sorghum	Millet
66,258	44,661	17,241	16,360	11,388

Top 5 Agriculture exports - Exports in US\$ million



Cocoa	Oil seeds and oleaginous fruits	Fruits and nuts	Milk, cream and milk products	Spices
698	216	156	68	48

Top 5 Agriculture imports - Imports in US\$ million



Fish	Wheat	Sugar, molasses and honey	Milk, cream and milk products	Fixed vegetables, fat and oil
1,461	1,070	373	295	250

All data are as at 2016, except production which is 2015

Sources: World Bank, NBS, FMARD, UNCTAD, CBN

Executive Summary



Agriculture was the mainstay of Nigeria's economy before the discovery of crude oil. From 1960 to 1969, the sector accounted for an average of 57.0%¹ of GDP, and generated 64.5%² of export earnings. From 1970 to late 2000s, the sector's contribution to GDP and export earnings steadily declined, because Nigeria's focus shifted to petroleum exploration. Over the past five years, the sector has contributed an average of 23.5%³ to GDP, and generated 5.1%⁴ of export earnings.

Due to the recent fall in crude oil prices, export earnings from crude oil has reduced significantly. This has triggered conversations around the critical role agriculture has to play in diversifying the economy.

Increase in yield per hectare, and land expansion, are two factors which determine growth in agriculture. In Nigeria however, land expansion has been the primary driver of growth. Yield per hectare has been low, because of poor and limited farming inputs, such as seedlings, pesticides and fertilisers. Moving further down the value chain, processing and marketing activities have been plagued by poor infrastructure, low investment, and unfavourable government policies.

This report argues that Nigeria's agriculture sector requires massive investments to increase production, and to create value addition across the most profitable segments of the value chain. In order to examine Nigeria's agricultural value chain, the report focuses on cocoa and dairy as case studies. Also, it suggests strategies for upgrading the production and processing segments of the value chain.

According to the FAO, Nigeria is the sixth largest producer of cocoa globally, with a production volume of 248,000

tonnes of cocoa beans*⁵. However, only 30% of the cocoa beans is processed, with the remaining exported. In 2014, processed cocoa generated US\$ 144 million. Based on an extensive review of the cocoa value chain, we identify significant scope to increase production by at least 70%, driven by an increased supply of improved seedlings, pesticides and fertilisers.

Cocoa processors are underutilised, as Local Buying Agents (LBAs) and cooperatives prefer to sell cocoa beans to merchants, who offer a higher premium than processors. Introducing an appropriate tariff on cocoa beans exports to disincentivise LBAs and cooperatives from selling to merchants could be a policy for upgrading processing in the cocoa value chain.

Dairy on the other hand is a major import for Nigeria. In 2016, it accounted for 6% of the total food import bill. With an estimated annual consumption of 1.7 million tonnes, Nigeria's milk production is low at 0.6 million tonnes. To close this production deficit, a significant amount of foreign exchange is spent on the importation of milk. In recent years, an average of US\$ 480 million⁶ has been spent on milk imports annually.

In dairy value chain, we have identified production as a key upgrade segment, and suggest breed improvement as a strategy to increase dairy production. Establishment of suitable grazing reserves, provision of extension services, setting up milk collection centres, improved access to pasture and water will also enhance dairy production. To promote import substitution in the dairy industry, a stronger integration between the pastoralists and processors should be encouraged.

Background

The Agriculture sector is a key economic sector. However, the value chain is highly underdeveloped.

Agriculture is Nigeria's single largest economic sector. In 2016, agriculture accounted for 24.4%⁷ of Gross Domestic Product (GDP). The sector is highly concentrated on crop production, which accounts for 90%⁸ of output. Fishery, forestry, and livestock, account for the remaining 10%. Though agriculture makes up a sizeable portion of economic activities in Nigeria, the sector's impact on government and export revenues is relatively small, accounting for only 4.8% of total foreign earnings in 2016.

In spite of this, the country's agricultural potential is high, because Nigeria has 82 million hectares of arable land, and so far, only 34 million hectares⁹ have been cultivated. With government's renewed focus on diversification through import substitution, as well as Nigeria's large and growing population, agriculture is increasingly becoming important as a source of consumer and industrial demand.

In the last five years, different administrations have focused on agriculture as a means to diversify the economy and several policies have been designed in this regard. In 2012, the Agricultural Transformation Agenda (ATA) was introduced to

improve farmers' income, increase food security, generate employment and transform the country to a leading player in the food market¹⁰. The ATA is reported to have increased agriculture output by 11% to 202.9 million tonnes between 2011 and 2014. Also, the scheme is reported to have boosted commercial banks' lending to agriculture from 0.1% in 2011 to 5% in 2014, and reduced the 2014 food import bill by NGN 466 billion¹¹. More recently, the current administration launched the Agriculture Promotion Policy (APP) aimed at resolving food production shortages and improving output quality. In addition, the Economic Recovery and Growth Plan (ERGP) prioritises food security and aims to achieve self-sufficiency in tomato paste, rice and wheat, by 2017, 2018, and 2019/2020 respectively. The ERGP projects that the value of agricultural production would increase by 31% to NGN 21 trillion in 2020.

Despite these policy interventions, the agriculture sector is still largely underdeveloped, primarily because the focus is on production, rather than on enhancing value addition across value chain segments. For instance, analysis from cocoa barometer suggests that in the production of a bar of chocolate, a marginal 6.6% of the value addition is

in the production, while the remaining is in the processing, marketing, and retail segments of the value chain - we expect this trend to be similar across most agricultural products. However, Nigeria's value chain is characterised by c.80% small holder farmers¹² and a few commercial processors plagued by inadequate inputs, obsolete technology, and poor financing.

In Brazil, the improvement in the country's agricultural value chain resulted in agribusiness generating 16 million new jobs in 2012¹³ and accounting for 46.3% of exports in 2016¹⁴. Also, Brazil has become a global producer of many agro processed commodities including orange juice, sugar and ethanol¹³. Brazil's agricultural value chain has developed because of the availability of improved seeds, improvement in soil fertility, increased adaptation to technology, and the support of domestic and international research institutions¹⁵.

Nigeria is a big producer of many agriculture commodities. To achieve self-sufficiency and deepen diversification, there is an increasing need to increase production and value addition across key agriculture food products.



Methodology

Our Approach

This report examines the agricultural value chain, using cocoa and dairy as case studies. The report also recommends ways to upgrade key segments of the value chain, based on practices adopted by leading agriculture producers and agro-processing economies.

To arrive at our conclusions, we conducted primary and secondary research, which included a mix of

desktop research, face-to-face interviews, and telephone conversations. The report generated qualitative and quantitative data which has been analysed and presented in this report. Respondents include farmers, processors, and industry experts, in cocoa and dairy industries. Most of the cocoa survey respondents were drawn from the South West, and those for dairy from Northern Nigeria.

Data Limitations

Some industry data were unavailable at the time of the report. These include but are not limited to data on production, yield, consumption, exports and imports. Data gaps were estimated using assumptions clearly stated in the report. Sources of information used in the report include insights from interviews conducted which have not been independently verified, and the information provided not exhaustive.

For currency conversions, the assumed exchange rate is the official exchange rate obtained from the corresponding Central Banks. In the analysis of the sector, we selected key crops from Nigeria's major products, top exports and included top imports based on government's import substitution plans.



Review of Nigeria's Agriculture Sector

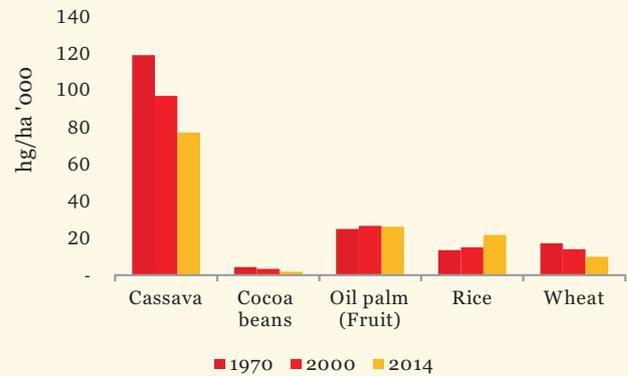
Utilisation of poor inputs has resulted in declining yields across key crops

According to Fugile and Rada (2013), growth in yield per hectare and land expansion are the sources of agriculture growth. Yield growth can be achieved by increasing inputs, and by improving input productivity through the use of technology.

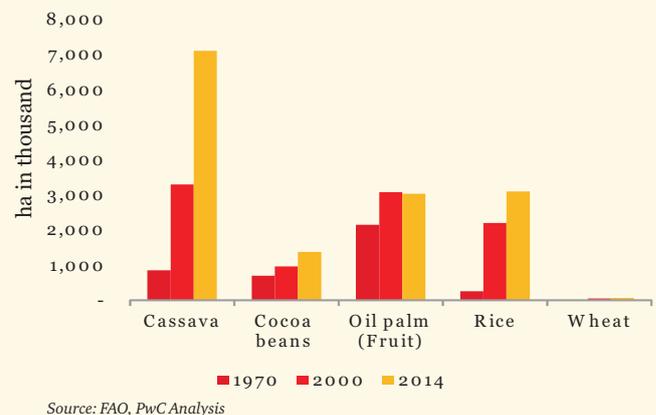
Over the last 4 decades, the yield of most key crops has declined, in particular, cassava, cocoa beans and wheat – a reflection of low utilisation of improved seedlings, agrochemicals and poor adoption of technology. The yield of rice on the other hand has increased steadily, resulting from government's increased support for rice production, by providing subsidised agrochemicals and credit facilities through various intervention funds.

In contrast to agriculture yield, agricultural land usage in Nigeria has increased across key crops, like cassava, cocoa beans, rice paddy and wheat. This has been primarily driven by an increase in the population engaged in farming, although production remains at subsistence level. In the long run, the use of technology and better inputs are expected to play an increasing role in raising agriculture productivity¹⁶, thereby reducing the growth of agricultural land usage.

Agriculture yield



Harvested area by crop category

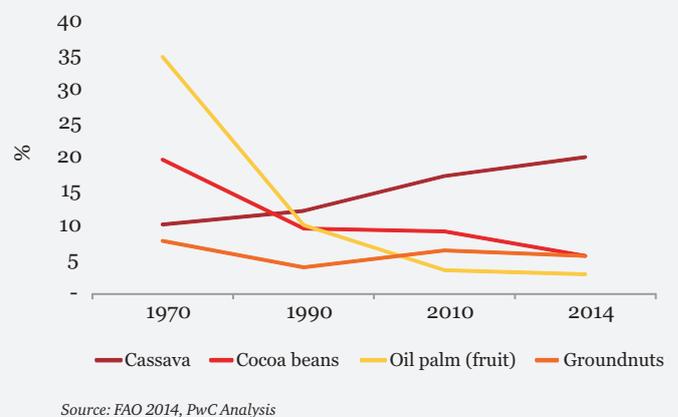


Share of global production of key crops remains low

For most key crops, Nigeria's share of global production has remained low over the past four decades. Specifically, the country's share of global production for oil palm, cocoa and groundnuts, has declined as a result of the slow adoption of efficient production processes. A combination of rural poverty, increasing rural-urban migration and land degradation have kept production at subsistence levels.

Compared to other countries that produce cassava, cocoa beans, oil palm and groundnut, Nigeria's yield remains low. In 2014, yields for cassava, cocoa beans, oil palm (fruit) and groundnuts were lower than the global average yield of all producing countries. This is possibly a reflection that unlike Nigeria, other countries utilise improved inputs and technology to increase their yield and production levels.

Nigeria's share of global production across select crops



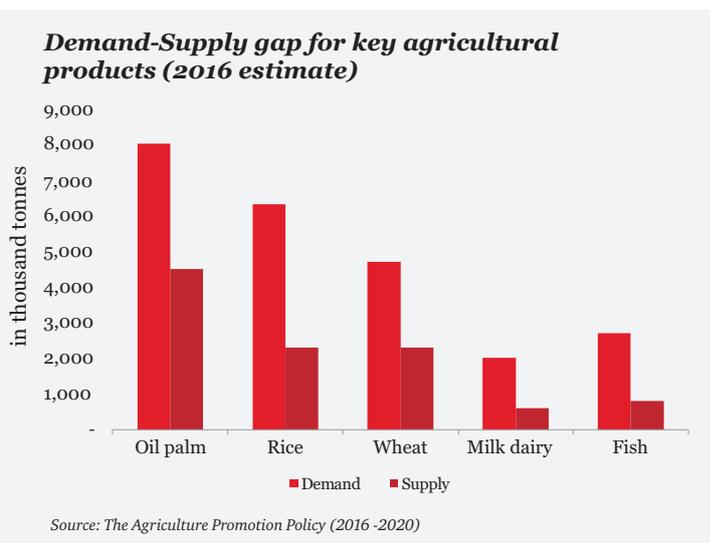
Increasing food consumption is being driven by population

In the last 5 years, Nigeria's share of global food consumption has averaged 3.4%⁵, the highest amongst all African countries. By 2050, Nigeria's population is projected to be 400 million, which would make it the third most populous country in the world. We expect food consumption to continue to grow by at least 4% per annum – its historical average. Thus, there is an urgent need to increase production to meet the country's food requirement and achieve self-sufficiency.

A recent study¹⁷ that examines rural and urban households' food consumption in Nigeria, indicates that the urban populace consume more processed foods than the rural population. With increasing rural-urban migration and rising discretionary incomes, the consumption of agro-processed products is expected to increase¹⁶.

Low agricultural production promotes import dependency

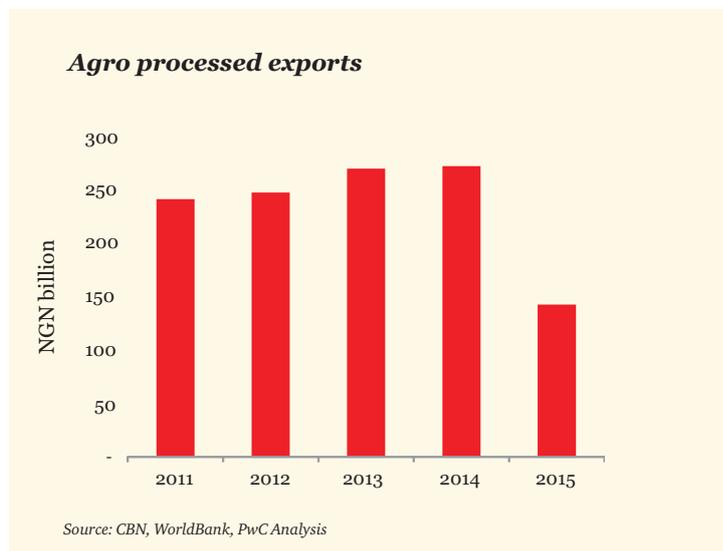
In Nigeria, across most key crops, the rate of consumption has outstripped production. The deficit has been met largely by importation, making the country a net importer, a trend evident since 1975. On the average, between 2011 and 2015, NGN 1.4 trillion¹⁸ has been spent on food imports with wheat, milk, rice, sugar and malt extract, constituting the bulk of Nigeria's food import bill. Consequently, Nigeria is vulnerable to changes in the global agro-commodity prices, with significant impact on inflation and foreign reserves.



Agro-processed exports have declined as a result declining production and quality

Between 2011 and 2015, agro-processed exports declined by 41% to NGN 143 billion. These exports, which accounted for an estimated 20% of Nigeria's non-oil exports in 2015, were mainly leather and processed skin, alcoholic and non-alcoholic beverages, tobacco and cocoa derivatives. According to the FAO, Nigeria is estimated to have lost US\$ 10 billion in annual exports of agriculture and agro-processed commodities including groundnut, palm oil, cocoa and cotton as a result of the decline in production of these commodities¹⁹.

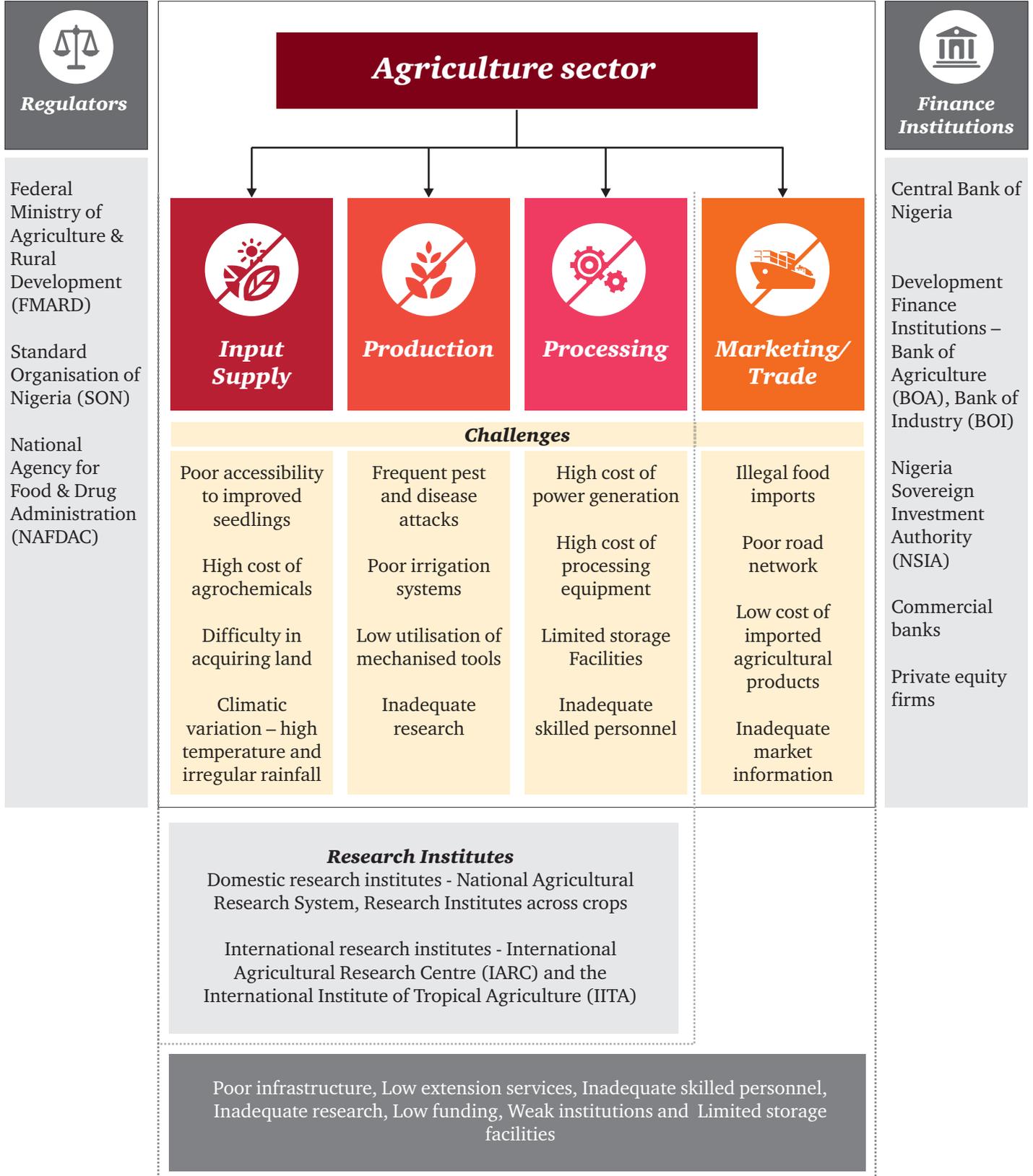
In addition, the Nigerian Export Promotion Council (NEPC) has attributed the decline in food exports to non-compliance with regulatory and documentation requirements for food imports to the European Union and the United Kingdom. Also, the World Bank estimates that Nigeria and other developing countries could have lost as much as US\$ 6.9 billion in 2015, as a result of food exports rejection²⁰.





The Agricultural Value Chain

Nigeria's Agricultural value chain



Federal Ministry of Agriculture & Rural Development (FMARD)

Standard Organisation of Nigeria (SON)

National Agency for Food & Drug Administration (NAFDAC)

Central Bank of Nigeria

Development Finance Institutions – Bank of Agriculture (BOA), Bank of Industry (BOI)

Nigeria Sovereign Investment Authority (NSIA)

Commercial banks

Private equity firms

Source: PwC Analysis

A review of the challenges and recent reforms along the agricultural value chain in Nigeria

Input Supply

Over the years, agricultural production in Nigeria has been impacted by the limited availability of inputs. Local farmers have lacked the required seedlings, fertilisers, and water for production activities. Also, the process for securing land is time-consuming and expensive, and this discourages agricultural activities.

The Agriculture Transformation Agenda (ATA) was focused on addressing the input challenge. This resulted in policies that facilitated the supply of subsidised seedlings and fertilisers to 18% of farmers in Nigeria (estimated at 12 – 14 million) between 2011 and 2014. In addition, some state governments have launched different initiatives to ease the process of land acquisition for agriculture purposes. Edo State subsidised land acquisition costs and eased the Certificate of Occupancy (C of O) acquisition process²¹. Similarly, Anambra State is promoting community relations to facilitate a conflict free land acquisition process, while enacting the Land Acquisition Act to smoothen land transfers²¹.

Production

Water and Irrigation Systems: Low investment in irrigation systems, water pollution, increasing deforestation, have impacted the quality and availability of water for agricultural production. Several irrigation projects have been initiated to improve the supply of water for agriculture purposes. For instance, the Zauro irrigation project entails the development of farmland and 50 million m³ water reservoir; and the middle Ogun irrigation project is expected to develop 12,000 ha of land under irrigation. At completion, the

Zauro irrigation is projected to have the capacity to facilitate the production of 42,000 tons of rice, 4,800 tons of maize, 2,200 tons of cowpea and 800 tons of wheat annually²². This project however, has been ongoing for several years and is yet to be completed.

Mechanisation: The slow adoption of mechanisation in Nigeria has significantly reduced the quality of agricultural products. The rate of mechanisation has been held back by limited accessibility to modern agriculture equipment and the limited availability of skilled workers.

Storage

Limited storage facilities have resulted in high post-harvest loss, low food quality and undersupply of agricultural products. In 2014, the Africa Exchange (AFEX) and the government, introduced the Electronic Warehouse Receipt System (e-WRS) to facilitate the storage of agricultural products. Farmers and distributors are able to store products in certified warehouses which provide quality storage facilities thereby reducing post-harvest loss. Also, warehouse receipts are eligible as collateral and can be utilised to access finance from banks. By 2016, the scheme had engaged 60,000 farmers across eight states, with plans to develop mobile warehouses to reach more farmers.

Processing

Processing of agricultural products is vital for the reduction of post-harvest losses. In Nigeria, this is estimated at between 35%-50% for fruits and vegetables, and 15%-25% for grains. Inadequate extension services for post-harvest handling, poor quality control, and limited use of modern processing practices and technology have limited

the processing of agricultural output. In 2011, government introduced the Staple Crops Processing Zone (SCPZ) Programme to develop commercial agriculture, increase value addition and reduce Nigeria's dependence on food imports. Estimates from the Federal Ministry of Agriculture and Rural Development (FMARD) suggest that the first 12 SCPZ sites would improve annual farming production by 12.7 million metric tonnes, increase agriculture processing production by 6.2 million metric tonnes and create up to 550,000 direct jobs²³.

Marketing and Trade

A study²⁴ conducted in Kwara State found that the high cost of transportation, bad roads, and long distances from the farms to the market negatively impact the marketing of agricultural produce. Similarly, in most other states, the challenges associated with farm-to-market are poor road networks, inadequate market information to identify domestic and external opportunities, and poor logistics infrastructure. From a trade perspective, limited understanding of key export markets (US, UK and EU) and low quality of agricultural products have hindered international trade.

In 2012, Nigeria Expanded Trade and Transport (NEXTT) project was funded by USAID to advance trade efficiency along the LAgos-KAno-JIbiya (LAKAJI) corridor. By 2015, the project facilitated a 25% reduction in time for importing goods and 5% decrease in time for exporting goods through Lagos to Jibiya border²⁵. In addition, a 35% decrease in cost-to-import, and 21% reduction in cost-to-export was recorded for goods passing through the corridor²⁵.

A review of the challenges and recent reforms along the agricultural value chain in Nigeria (cont'd)

Research

Domestic and international research institutes have contributed to improvements in agriculture products including rice, cassava, beans, sorghum and livestock. Between 2002 and 2010, the International Institute of Tropical Agriculture (IITA) and its partners introduced and promoted over 40 cassava varieties²⁶ which contributed significantly to the growth of the cassava industry. In addition, the National Animal Production Research Institute (NAPRI) utilised crossbreeding to upgrade some indigenous cattle to produce higher milk yield²⁷. However, the impact of some domestic research institutes have been constrained by inadequate funding, poor research infrastructure, unskilled workers and weak linkages to the agriculture sector.

Brazil's agriculture sector has been transformed in the last four decades. Leveraging research, the country was able to modify inputs, making them more adaptable to climatic and land conditions. In addition, an estimated 1% of GDP is spent on research, thus attracting the best minds and hands to drive the development of agriculture. As a result, agriculture production increased by over 300%²⁸.

The Nigerian government plans to improve the contribution of domestic research institutions by providing funds to the National Agricultural Research System (NARS) to attract talent and expertise, as well as promote domestic and foreign partnerships.

Financing

Developing the agriculture sector requires long term and affordable financing across the value chain segments. Over the years, the government has facilitated several financing interventions in the sector (as detailed in Appendix 3). However, the sustainability of the intervention schemes and accessibility by farmers have been major constraints to expanding credit growth available to the agriculture sector.

In 2015, the CBN's Anchor Borrowers Programme was launched to provide loans to farmers at single digit interest rate (maximum of 9%). The CBN, in collaboration with other financial institutions (commercial banks, microfinance banks and development finance institutions) had a target to spend NGN 40 billion by March 2017. In April 2017, the programme is reported to have disbursed NGN 33.3 billion to 146,557 farmers across 21 states²⁹.

Regulators

The regulators are expected to formulate and enforce regulations to maintain the quality of agriculture output across the agricultural value chain. The Federal Ministry of Agriculture and Rural Development (FMARD) is the umbrella body, focused on ensuring sustainable access, availability and affordability of quality food. Other regulators include: Standard Organisation of Nigeria (SON), National Agency for Food Drug Administration and Control (NAFDAC) and Federal Produce Inspection Service (FPIS). These regulatory bodies are mandated amongst other functions to ensure there are standards for the production and exports of food and agricultural products and ensure compliance with set standards.

The impact of regulatory activities in the agricultural value chain has been constrained by inadequate funding and limited manpower. This has limited their quality assurance and oversight functions. According to the Agriculture Promotion Policy (APP), the government plans to improve the capacity of these institutions to enforce standards, and promote quality of foods by proper use of agrochemicals and enhance quality control mechanisms across the value chain.



Cocoa Industry



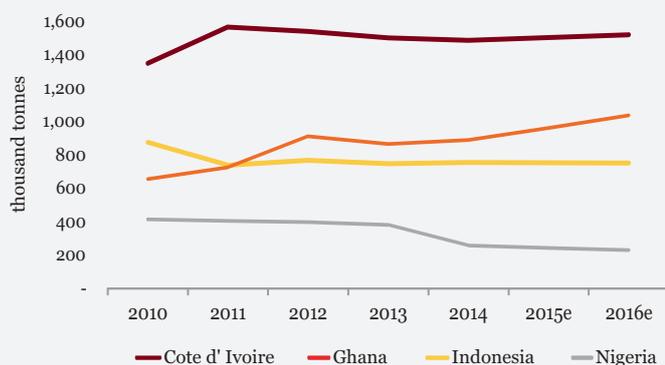
Cocoa, a key cash crop, accounted for 21% of Nigeria's agricultural exports⁸ and generated US\$ 711 million⁸ in 2015. Nigeria is the sixth largest global producer of cocoa, behind Cameroon, Brazil, Indonesia, Ghana, and Ivory Coast.

Between 2010 and 2014, Nigeria's cocoa output declined by 37.9% to 248,000 tonnes⁶, a reflection of decreasing cocoa yield. On the contrary, other cocoa producing countries in West Africa have recorded increases in output based on an

expansion in area growth and increasing inputs. In the last four decades³⁰, Ivory Coast has remained the top cocoa beans producer in the world, and in 2014, Ghana moved from the fourth largest cocoa beans producer to the second position.

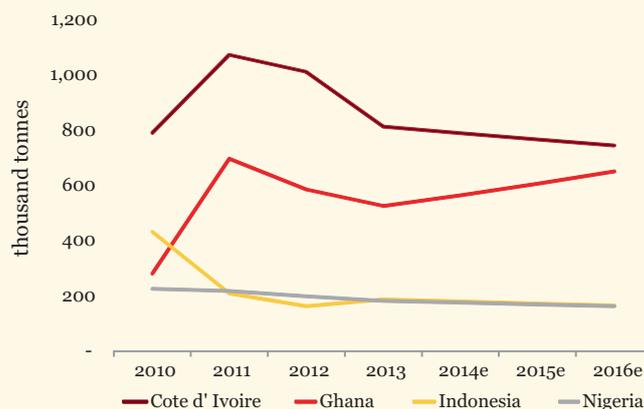
As a result of reduced cocoa output, between 2010 and 2013, Nigeria's cocoa exports declined by 19% to less than 200,000 tonnes. Consequently, Nigeria lags behind other cocoa exporting countries in West Africa.

Cocoa production of top producers



Source: FAO, PwC Analysis

Cocoa beans export of top producers



Source: FAO, PwC Analysis

Value Chain Activities

The main actors in the cocoa value chain are small and medium scale farmers, Local Buying Agents (LBAs), cooperatives, merchants, processors and few local users, which include

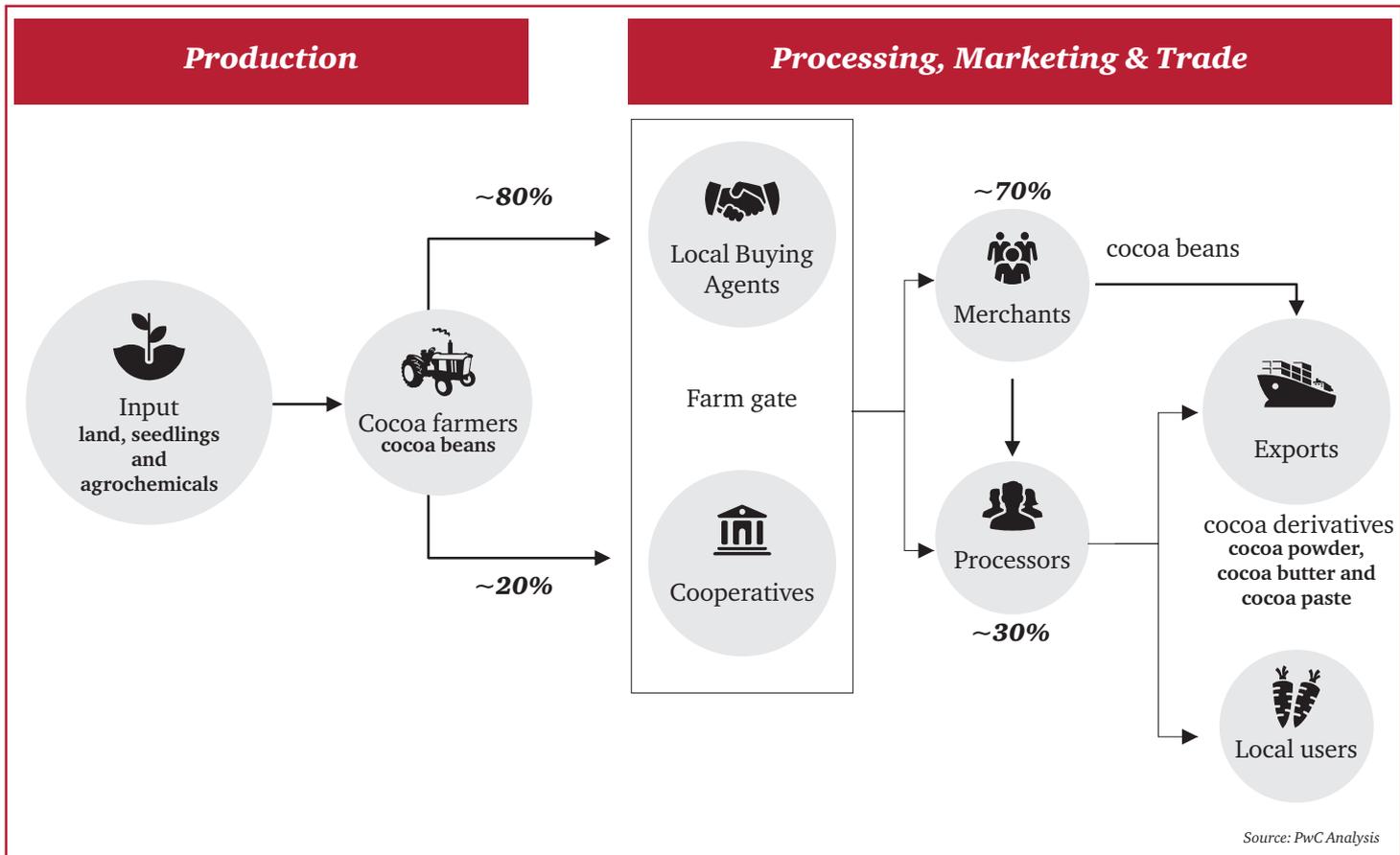
manufacturing firms that produce beverages. Processing of cocoa into cocoa derivatives is the highest value adding activity in the cocoa value chain, with the potential to generate

significant export revenues. However, based on our primary research, only about 30% of cocoa beans in Nigeria is processed, with the remaining exported by the merchants.

Country	Production of cocoa beans (in '000 tonnes)	Cocoa export -beans & derivatives (in '000 tonnes)	Cocoa exports in value (in million US\$)
Ivory Coast	1,434.0	1,022.7	2,933.0
Ghana	858.7	546.6	1,447.0
Indonesia	728.4	384.8	1,099.7
Nigeria	248.0	222.8	564.0

Source: FAO (2013 and 2014)

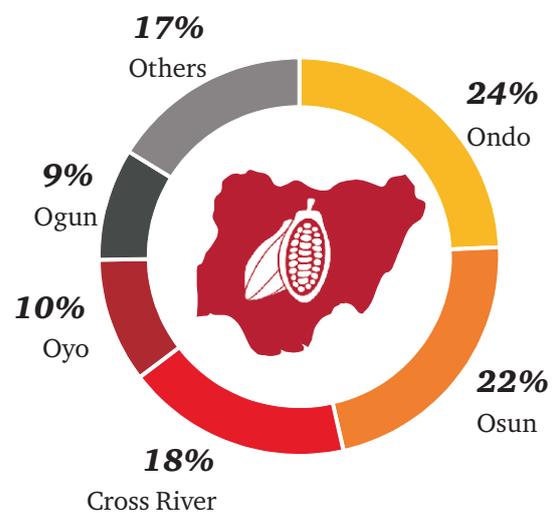
The Nigerian Cocoa Value Chain



Input Supply & Primary Production

Cocoa is grown by an estimated 30,000 farmers in fourteen states across Nigeria, which include Ondo, Ogun, Ekiti, Osun, Oyo, Edo and Cross River. Ondo is ranked as the largest cocoa producing state and accounted for 24%³¹ of total production in 2011*. The state is commonly called “land of cocoa farmers”. Most of the farmers are clustered in various local government areas, which include Owo, Idanre, Ile- Oluji/ Oke Igbo, Ondo West and Ondo East.

Cocoa production across states in Nigeria



Source: NBS 2010/2011

*Latest available data

Cocoa production in Nigeria is highly subsistent and harvest is done in small quantities. From our survey, we identify that a combination of inadequate farm inputs, in particular, improved seedlings and fertilisers, high disease and pest incidence, limited agricultural mechanisation, ageing cocoa trees and inadequate extension

services have been responsible for low cocoa yield. Production is further limited by the size of the cocoa plantations, which is an average of 2.5ha farm size.

Based on our primary research, LBAs are the major purchasers of cocoa beans. In Ondo state, LBAs account for

90% of sales, while the remaining is sold via the cooperatives to merchants and processors. Price is determined by an open market system. The processors and merchants negotiate with the suppliers (LBAs and cooperatives) based on the global market prices and logistics cost.

Processing

“There is price war for the limited cocoa beans. The LBAs and cooperatives prefer to sell to the merchants who quote higher prices”

Cocoa Processor

An estimated 30% of total cocoa beans is processed into cocoa derivatives- cocoa powder, butter, and paste. An estimated 90%³² of this cocoa derivatives is exported, with the remaining utilised by local beverage manufacturers.

Our survey findings suggest that the processing capacity of most processors range from 12,000 to 20,000 tonnes per annum, with a utilisation rate estimated between 9% and 25%. Most respondents surveyed highlight insufficient cocoa beans as one of the factors responsible for low capacity

utilisation. This is because LBAs and cooperatives prefer to sell to merchants who quote higher prices, which reduces the quantity of cocoa beans available to processors.

The Netherlands, a non-cocoa producer, has one of the largest cocoa processing industry globally. The processing and exportation of cocoa derivatives generated US\$ 4.2 billion³³ for the Dutch economy in 2016. In comparison, Nigeria generated only US\$ 144 million from the exportation of cocoa derivatives.

Marketing and Trade

Prior to the abolition of the cocoa marketing board, marketing was highly regulated with government controlling prices. In 1986, the cocoa market was liberalised resulting in an increasing number of industry players including LBAs, cooperatives and merchants, providing multiple marketing channels for the farmers. However, farmers prefer to sell to LBAs and cooperatives because it minimises transportation

cost and the risk of product rejection due to quality concerns.

The presence of stones, molds and high moisture in Nigeria's cocoa beans allow for a discounted price in the commodity market. This reduces the earnings of Nigerian traders/ marketers. There is a need to improve the country's cocoa production; failure to do so, and Nigeria would keep losing market share

to neighboring countries like Ivory Coast, Cameroun and Ghana.

The Netherlands is the third largest exporter of chocolate in Europe³⁴ and accounted for 58%³⁵ and 90%³⁴ of Nigeria and West Africa's cocoa exports respectively in 2014. Belgium, UK, Germany and USA are other major buyers of Nigeria's cocoa beans.

Strategies for Upgrade:

Production

Efficient distribution of improved inputs: A key driver to improved yield is quality inputs – seedlings and agrochemicals. The Cocoa Research Institute of Nigeria (CRIN) has developed several improved cocoa seedlings that are: early bearing, high yielding, resistant to pests and diseases and good quality. However, poor accessibility has limited the use of improved seedlings in Nigeria. Government needs to partner with

cocoa cooperatives, for an effective distribution of improved inputs. We expect that increased usage of pesticides and improved seedlings can increase production by at least 70%, consistent with what the industry experienced between 2004 and 2011.

Processing

Export tariff on cocoa beans: With 70% of cocoa beans being exported without processing, an introduction of

a cocoa beans export tariff in Nigeria could discourage the exportation of cocoa beans, thus shifting more cocoa beans to the processing segment. This could reduce the existing price war between merchants and processors whilst increasing the quantity of cocoa beans available for processing. This should attract more investment to the processing segment while optimising the revenue potential across the entire value chain.

Marketing and Trade

Certification of cocoa products: Cocoa farmers and processors can certify their products with recognised certifications like UTZ and Rain Forest Alliance certifications. This should improve the quality and yield of cocoa beans, which could increase productivity and guarantee farmers a fair price for their produce.

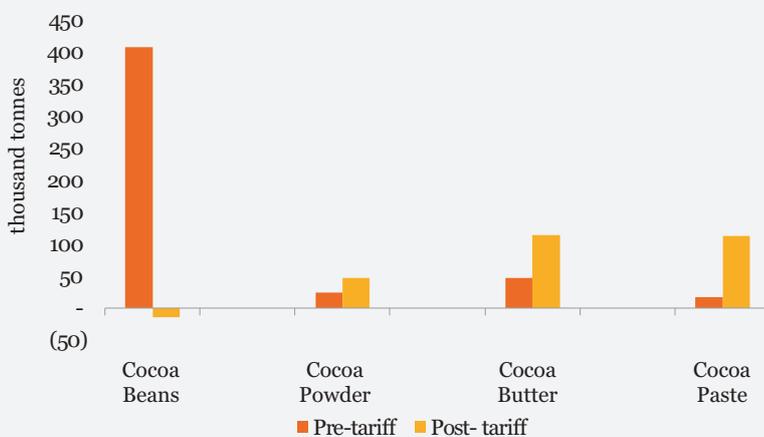


Case Study:



Promoting cocoa processing through cocoa beans export tariff Indonesia – The power of an Export Tariff

Net export of cocoa (pre and post export tariff)



Source: FAO

In April 2010, Indonesia introduced an export tax on cocoa beans ranging from 0-15%, targeted at encouraging the processing of cocoa and exportation of cocoa derivatives (powder, butter and paste). Prior to the introduction of the export tariffs, cocoa derivatives exports were below 100,000 tonnes.

The tax resulted in a shift from cocoa beans exportation to processing, which led to an increase in the capacity of processors and the reopening of previously closed processing plants. By 2015, cocoa derivatives exports increased to 274,018 tonnes. Similarly, Indonesia's focus on cocoa processing has increased the country's cocoa derivatives' export revenues from US\$ 326.0 million in 2009 to US\$ 1.2 billion in 2015³⁶.

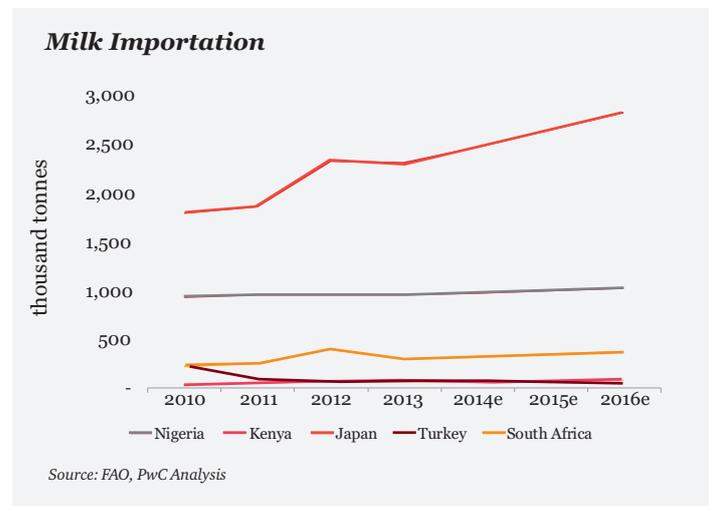
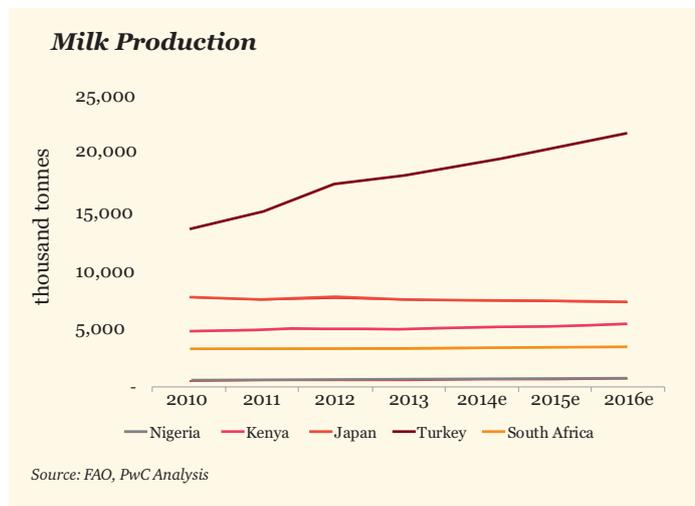


Dairy Industry

Compared to Africa and Asia's average of 0.9 million tonnes and 6.6 million tonnes respectively, Nigeria's 0.6 million tonnes of milk production is the lowest in the world. The country's low milk production is attributed to low yield at 2,458 hg/An relative to Africa and Asia's average of 7,409.7 hg/An and 31,835.4 hg/An⁶ respectively.

With an estimated annual milk consumption of 1.7 million tonnes, production only meets about 34% of demand, while importation makes up for the deficit. As a result of the production deficit of over 1 million tonnes, in recent years, Nigeria has spent an average of US\$480.3 million⁶ on the importation of milk annually.

Nigeria's per capita consumption is low at 10 litres/person, relative to 28 litres/person in Africa, and 40 litres/person globally³⁷. This suggests there is scope to increase milk consumption supported largely by a large and growing population.



Value Chain Analysis

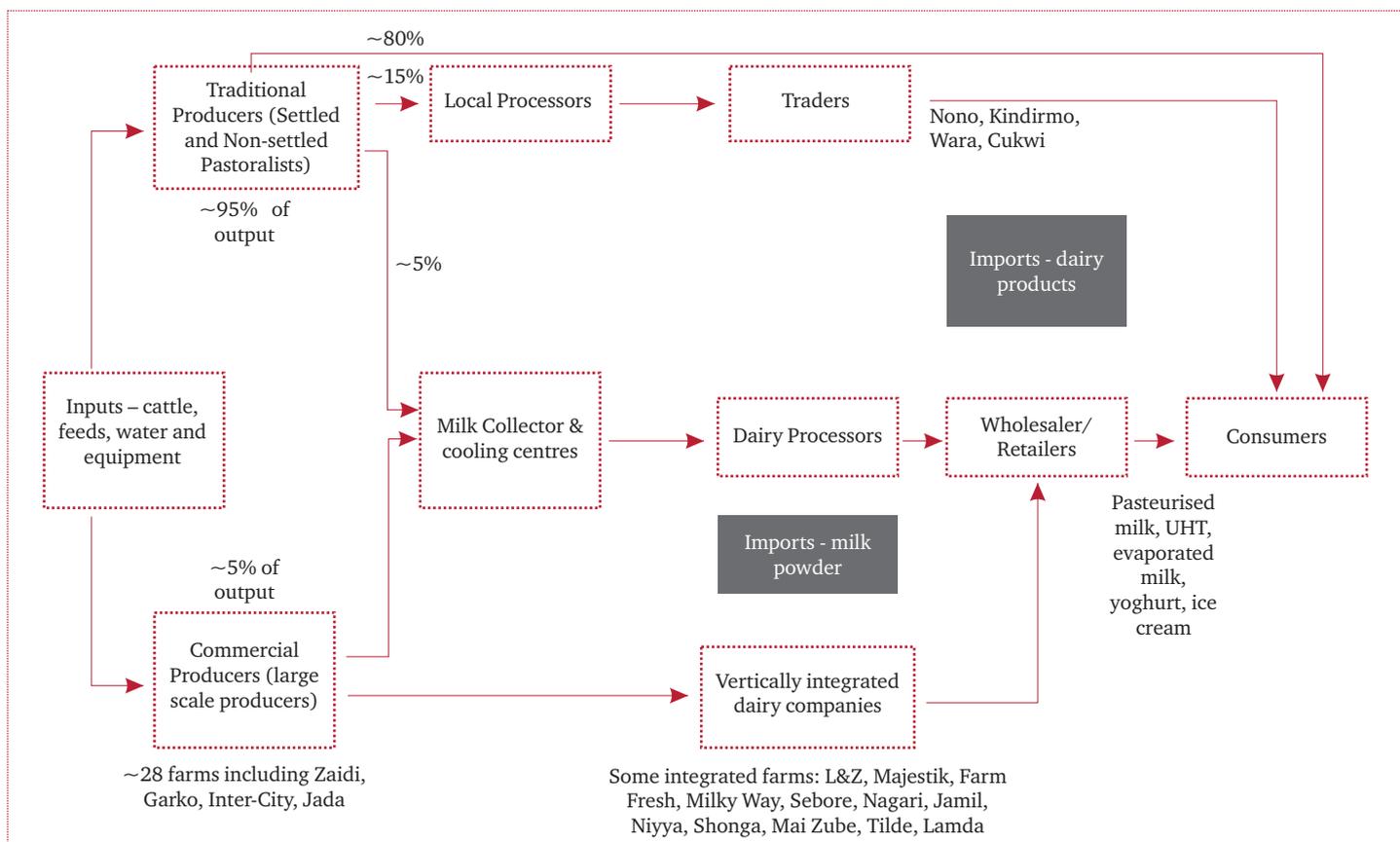
The main actors in the chain include pastoralists and commercial dairy producers, local and commercial processors, retailers and consumers. In Nigeria, pastoralists play a vital role in the value chain – accounting for an

estimated 95% of the total dairy output. However, only a small percentage of the pastoralist's milk is collected by the formal processors, and this limits the quantity of milk available for processing, resulting in large

importation of milk powder. Within the value chain, storage and preservation of the milk is important, given the perishable nature of milk.



The Nigerian Dairy Value Chain



Storage and preservation are critical activities across the value chain segments

Source: PwC Analysis, Dairy Sector in Nigeria (2015)

Imports bridge the deficit between local milk supply and milk demand

Input Supply & Production

Nigeria's cattle population is estimated at 20 million. Of these, 2.3 million are utilised for dairy production while the remainder is utilised for meat production. Majority of the cattle are found in the northern part of Nigeria, which include Kano, Kaduna, Nassarawa and Niger. Most of these cattle are mainly local breeds including Bunadji, Rahaji and Sokoto Gudali, and represent 99%³⁸ of total cattle population in the country. In addition to the local breeds, few cultured breeds including Friesians, Jerseys and Brown Swiss are imported from South Africa or the Netherlands for dairy production. However, cultured and cross breeds account for less than 1 %³⁸ of the country's cattle production.

According to a baseline report by Heko W. Köster and John de Wolf³⁹, three major production systems characterise dairy production in Nigeria. First, settled Fulani Pastoral system which is dominated by purely indigenous cattle breed. The settled farmers/herders utilise 20 to 100 herds of cattle for dairy production while cultivating crops at the same time. Grazing is done in recently harvested areas or fallow

ground, and milking is done once in a day.

Non-settled Fulani nomadic system is another dairy production system. The herders are not engaged in farming and move their cattle across state and national boundaries. Grazing is done on fallows, harvested fields and river plains. Similar to the settled Fulani Pastoral system, this system utilises local breeds. The continuous movement of the cattle results in weight loss and sickness. Poor animal nutrition and animal diseases including tse-tse fly infestation and foot-mouth disease are common challenges faced by settled and non-settled Pastoralists.

“80% of the challenges in the dairy industry are in the production segment. Production is key for the development of the value chain”

Dairy Specialist

Large scale dairy farming is another dairy production system in Nigeria, which comprises of more than 50 cattle, high mechanisation, processing facilities and zero grazing. The cattle are a mix of local, cultured and cross breeds and artificial insemination is commonly used for cross breeding. The high cost of inputs including feeders is a major challenge for large scale farmers.

Government has attempted to increase milk yield via the development of grazing reserves. However, this has not been successful with most pastoralists remaining nomadic as a result of limited grazing areas and cultural nuances.

The milk output of both settled and non-settled Fulani Pastoral system in Nigeria is low at 0.7 litres of milk per day relative to global pastoralists which produce an average of 6.6 litres of milk per day³⁷. Also, the country's large scale dairy producers produce low output of 8 litres of milk per day relative to global commercial dairy which produce 30 litres per day³⁷.

Milk Collection

Milk Collection Centres (MCCs) were established to collect milk from the pastoralists. The National Livestock Development Project (NLDP) and National Animal Production Research Institute (NAPRI) have several milk collection centres in Northern Nigeria. At the collection centres, milk is tested for quality using lactometer and

alcohol test, pasteurised in a batch pasteuriser and transported to the processing factory. In addition, the MCCs provide training covering hygiene, animal health, and feeding to dairy producers.

A large milk processor has established MCCs across the country to increase its

utilisation of domestic milk. The company engages over 1600 local dairy farmers and trains dairy producers towards increasing their milk yield and quality. In 2016, the company sourced only 3% of milk domestically, as a result of low yield and inadequate milk from the pastoralists.

Processing:

In Northern Nigeria, most local milk processing firms operate at a small scale with a capacity of about 50 litres per day.

“The dairy market requires high investment but returns are not fast paced. The dairy industry could take 20 -30 years to develop”

Commercial Dairy Processor

The local processors utilise semi-mechanical processors to produce traditional milk products which include nunu (sour milk), kindirmo (sour yoghurt), manshanu (local butter), cukwi (Fulani cheese) and wara (Yoruba cheese). The lack of advanced technology and inadequate dairy infrastructure has resulted in sub-standard milk products.

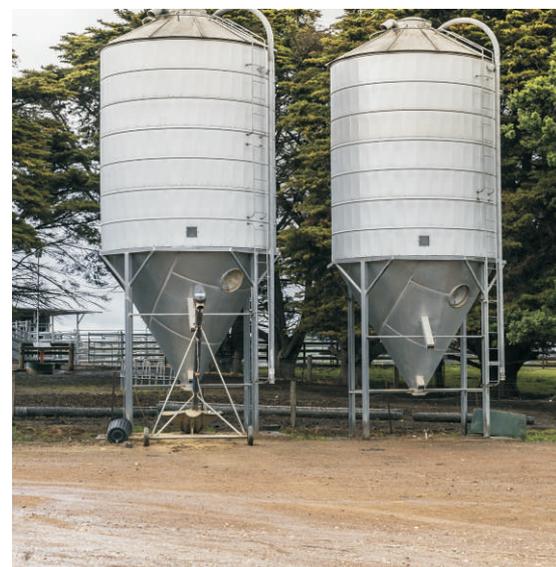
The few commercial processors utilise local and imported milk for production of milk derivatives – pasteurised milk, UHT, evaporated milk, yoghurt and ice cream.

Imported milk accounts for 75% of milk processing inputs³⁷. Most dairy processors import and reconstitute

imported milk powder into liquid milk and other dairy products like yoghurt, ice cream and confectioneries. The imported milk powder is sourced mainly from New Zealand, Australia, South America, the EU, India, Ukraine and Poland⁴⁰. Some multinationals including Cussons-PZ (UK) and Promasidor have partnered or acquired some Nigerian dairy firms for reconstituting and/or packaging imported milk powder.³⁸ The high utilisation of imported milk does not encourage backward integration within the value chain. Our primary research identified lack of cold chain infrastructure, exchange rate fluctuations and logistics as major challenges encountered by dairy processors in Nigeria.

Company Shares (by National Brand Owner) Other Dairy – Retail Value RSP - % 2016

Companies	Shares
FrieslandCampina WAMCO Nigeria Plc	74.5%
Nutricima Pz	7.0%
National Food Industries Co Ltd	5.1%
Sosaco Nigeria Ltd	4.8%
CHI Ltd	4.0%
PZ Industries Plc	3.5%
Others	1.0%



Other dairy includes condensed/evaporated milk, cream, coffee whiteners etc.

Source: EuroMonitor (2016)

Retail & Consumption

In Nigeria, local processors sell milk informally using traders and hawkers within their communities. The commercial processors utilise more robust distribution models including company owned systems, grocery retailers and super markets. With increasing modern malls across the country, many processors partner with

the supermarkets to supply dairy products periodically.

Dairy is mainly sold in three categories—powdered, evaporated and condensed milk; packaged in metal cans and sachets of different weights. Small sachets milk are more affordable ranging from NGN 25 – NGN 50, and are targeted at consumers who would

prefer to “trade-down”. Other packages are mid and large sizes which range from NGN 150 - NGN 6,500. Nigeria's milk consumption per capita is low at 10 litres per person. However, increasing retail malls, rising urbanisation, and a rise in per capita income is expected to support demand for dairy products.

Strategies for Upgrade:

Production

Breed improvement: With a low genetic yield, improvement in milk production can be facilitated via breed improvement (natural breeding or artificial insemination). Artificial insemination is recommended in the Nigerian dairy sector as most imported cattle are unable to thrive within this environment, hence limiting the adoption of natural breeding. Breed improvement is a long term process requiring commitment as cross-breeding could take as long as 10 years.

Scaling up of dairy extension services: Extension services including training on animal health and hygiene can be provided to the traditional producers to improve milk quality. Government provides extension services; however this needs to be scaled up by encouraging more private participation. Some dairy processors currently providing extension services are faced with many structural issues including transportation and logistics, and inadequate power supply.

Improved organisation of producer groups: Difficulty in accessing pastoralists has discouraged commercial processors from sourcing milk from the traditional producers. The formation of producer groups/ cooperatives will improve accessibility to the pastoralists as processors can work directly with the cooperatives towards increasing the processing of domestic milk. Also, extension services can be facilitated via the cooperatives to increase the quality of pastoralist's milk output.

Processing:

Encourage backward integration: Towards increasing milk supply, processors should be encouraged to produce milk or work closely with the pastoralists. Currently, one of the leading processors in the Nigeria engages pastoralists, provides training and has set up a milk collection centre

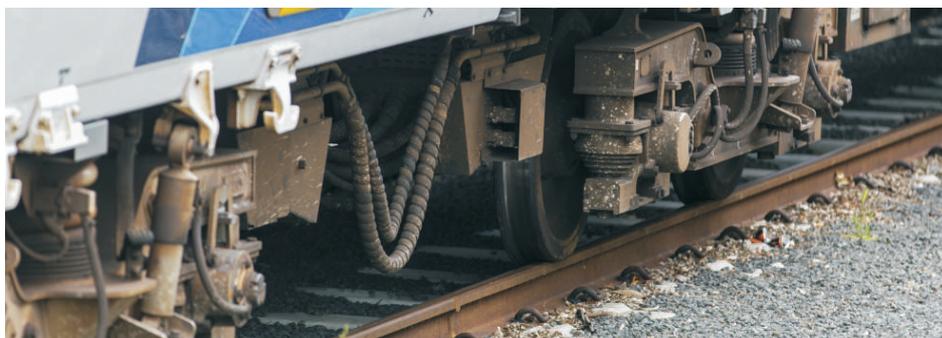
close to the pastoralists. The processor aims to increase its local content while supporting the traditional producers.

Improve processing tools: Many local processors have high milk supply due to proximity to pastoralists but lack essential processing tools. The

provision of improved tools including homogenisers, pasteurisers, blenders and fillers to local processors is expected to increase processing capacity and milk quality. The usage of improved tools by the local processors could reduce milk spoilage and increase commercial production.

Marketing and Trade:

Investment in cold chain technology: Agriculture infrastructure should be developed to accommodate the storage needs of the dairy industry. Specifically, the installment of cold chain technology in the planned rail construction linking Northern and Southern Nigeria will ease the transportation and distribution of dairy products across the country.

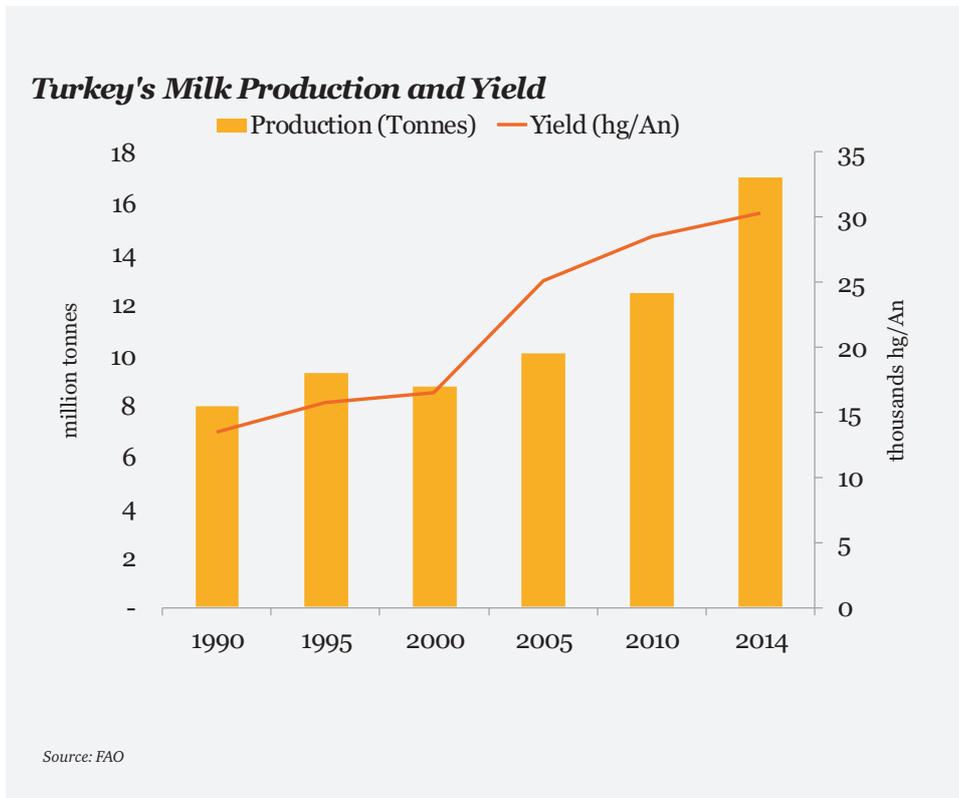


Case Study:



Increasing yields via cross breeding

Turkey



With production at over 16 million tonnes⁶ annually, Turkey is one of the top 10 producers of milk in the world. Unlike most top milk producing countries, Turkey's local cattle is deficient in milk yield (0.6– 1 tonnes) and weight of 300 kg⁴¹. High breeds like Anatolian Brown have a milk yield of 3 tonnes and weigh 500kg in the first 17-18 months⁴¹.

Realising the deficiencies in Turkish local cattle, the country utilised crossbreeding (natural and artificial) to improve the cattle's characteristics. The objective was to combine the early growth ability and higher milk yields

of imported breeds with the local breed's good characteristics – climate adaptation, resistance to disease and parasite, roughage evaluation, high survival rate and reproductive performance abilities.

In 2010, the Turkish Agricultural bank provided long term loans at zero interest rate for cattle breeding. Also, the government through Ministry of Agriculture and Rural Affairs (MARA) provided subsidies for the purchase of cattle and cross breeding equipment. Other independent associations such as the Cattle Breeders' Association of Turkey which facilitate the importation

of semen for artificial insemination worked closely with the dairy farmers and government authorities.

In the last decade, the country reduced domestic breed by 44% to 1.9 million in 2016 while increasing crossbreed and cultured breed cattle by 3% to 4.8 million and 137% to 6.6 million respectively. This significantly impacted the country's milk yield and production which is estimated to have increased by 67% and 92% to 43373hg/An and 20.9 million tonnes respectively within the same period.

Appendix 1: List of abbreviations

AFDB	African Development Bank
AFEX	Africa Exchange
AI	Artificial Insemination
APP	Agriculture Promotion Policy
ATA	Agricultural Transformation Agenda
CACS	Commercial Agricultural Credit Scheme
CAGR	Cumulative Annual Growth Rates
CBN	Central Bank of Nigeria
C of O	Certificate of Occupancy
CRGs	Credit Risk Guarantees
CRIN	Cocoa Research Institute of Nigeria
DFID	Department for International Development
DMO	Debt Management Office
ECOWAS	Economic Community of West African States
EEG	Export Expansion Grant
EMBRAPA	Enterprise for Agricultural Research
ERGP	Economic Recovery and Growth Plan
ETLS	ECOWAS Trade Liberalisation Scheme
E-WRS	Electronic Warehouse Receipt System
EU	European Union
FAO	Food and Agriculture Organisation
GDP	Gross Domestic Product
GEMS4	Growth and Employment in States – Wholesale and Retail Sector
GES	Growth Enhancement Scheme
GPS	Global Positioning System
IARC	International Agricultural Research System
IITA	International Institute of Tropical Agriculture
ITC	International Trade Centre
LAKAJI	LAGos-KAno-JIbiya
LBAs	Local Buying Agents
MARA	Ministry of Agriculture and Rural Affairs
MCCs	Milk Collection Centres
NAFPP	National Accelerated Food Production Programme
NARS	National Agricultural Research System
NAPRI	Nigeria Animal Production Research Institute
NBS	National Bureau of Statistics
NEXTT	Nigeria Expanded Trade and Transport
NGN	Nigerian Naira
NIRSAL	Nigerian Incentive Based Risk Sharing System for Agricultural Lending
NLDP	National Livestock Development Project
NRA	Nominal Rate of Assistance
NSS	National Seed Service
NSPFS	National Special Programme on Food Security
OFN	Operation Feed the Nation
PCS	Pest Crop Survey
SCPZ	Staple Crop Processing Zones
SSA	Sub-Saharan African
TOHFAN	Tractor Owners and Hiring Facilities Association of Nigeria
UHT	Ultra-High-Temperature
UNIDO	United Nations Industrial Development Organisation
UK	United Kingdom
US	United States
USAID	United States Agency for International Development
US\$	United States Dollar
ZT	Zero – Tillage

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Appendix 3: Select financial interventions

 Programmes	 Results
<p>The Nigerian Agricultural Insurance Corporation (NAIC) was established to provide insurance cover to farmers.</p>	<p>Between 2007 and 2010, NAIC insured an average of 35,000 food crops and 100,000 Ha. commercial crops, representing less than 1% of Nigeria's food and commercial crops.</p> <p>NAIC paid NGN 193 million and NGN 687 million as claims to farmers in 2012 and 2013 respectively.</p>
<p>The Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) was introduced to provide affordable financing to actors in the agricultural value chains.</p> <p>NIRSAL was funded by the CBN to the tune of US\$ 500 million at inception.</p>	<p>Between 2011 and 2015, 225 Credit Risk Guarantees (CRGs) were given to value chain actors valued at N 21.7 billion.</p> <p>Recently, the CBN initiated a public-private sector initiative with the Bankers' Committee and the Federal Ministry of Agriculture and Rural Development to provide NGN 75 billion as loan to farmers under the scheme.</p>
<p>The Commercial Agriculture Credit Scheme (CACCS) was launched to fast track development of the agriculture sector through the provision of single digit interest rate loans to farmers.</p> <p>The scheme was funded from NGN 200 billion three year bonds raised by the Debt Management Office (DMO) in its inception in 2009.</p> <p>The scheme will continue till 2025.</p>	<p>The CBN has disbursed a sum of NGN 336.4 billion for 420 projects for the scheme. The sum released during the period was mainly allocated to farming which received 50.9%, while processing, marketing, storage, and input supplies received 36.9%, 6.6%, 2.4% and 3.1% respectively.</p>
<p>Growth and Employment in States (GEMS) was established primarily to generate at least 100,000 direct jobs and increase the non-oil growth in specific high potential value chain sectors.</p> <p>The World Bank and the United Kingdom's Department for International Development (DFID) supported the project with US\$ 160 million and GBP 90 million respectively.</p>	<p>Established an online credit information platform to enable easy access to information on available loans across all financial institutions in Nigeria.</p>
<p>The World Bank approved a US\$ 200 million loan in March, 2017 to foster growth in small and medium scale farming. The credit line has a maturity period of 25- 30 years.</p>	<p>The fund will be utilised to empower small and medium scale farmers to tackle basic production and processing challenges.</p>

Source: CBN, GEMS, NAIC, NIRSAL, World Bank

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