Federal Republic of Nigeria

Federal Republic of Nigeria
Data Collection Survey on Agriculture Sector in Nigeria (QCBS)

Final Report
Annex

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Japan International Cooperation Agency
(JICA)

NTC International Co., Ltd.
Nippon Koei Co., Ltd.

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Annex 1

Current status of VC by commodity items

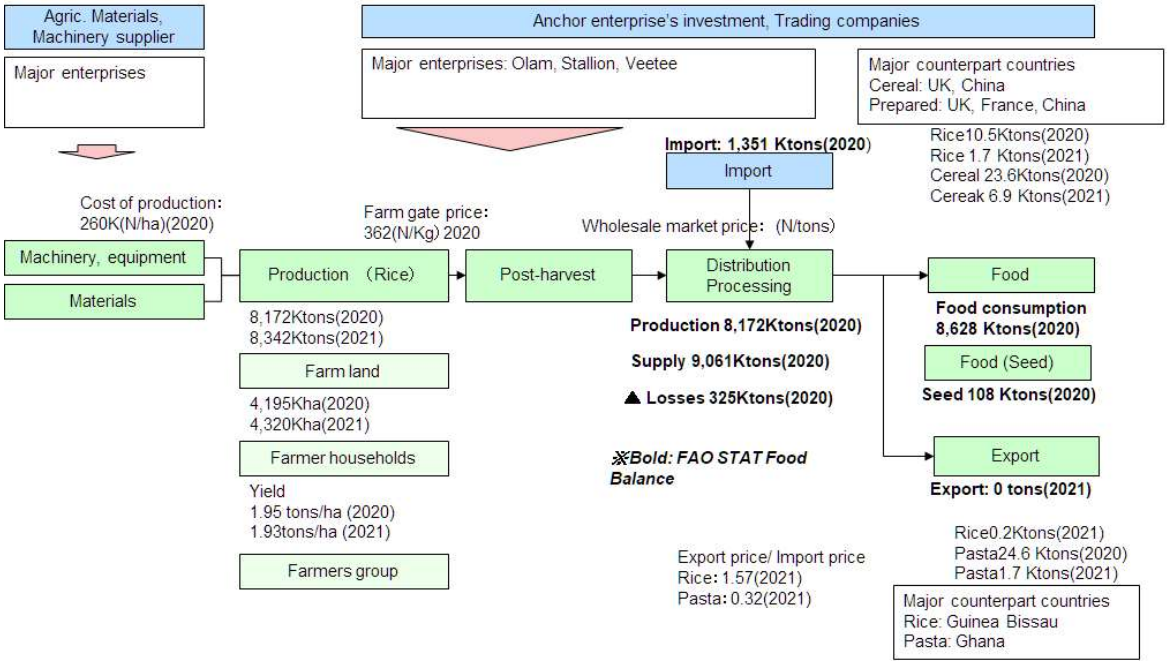
Annex 1: Current Status of VC by Commodity Items

1. Cereals

(1) Rice[1]

- Overview

Nigeria is Africa's largest rice consumer and producer. The cultivated area of rice is approximately 4,195,000 ha, of which 77% is rain-fed rice, 47% of which is lowland and 30% highland. Domestic production is 8,172,000 tons (2020) and 8,342,000 tons (2021). In addition, when related products are added, the supply amount including imports and domestic production is 9,061,000 tons (2020), consumption as food is 8,628,000 tons (2020), seeds are 108,000 tons, and the rest is disposal and export.[2]



Source: Prepared by the study team based on FMARD APS, FAO STAT, Comtrade, etc.

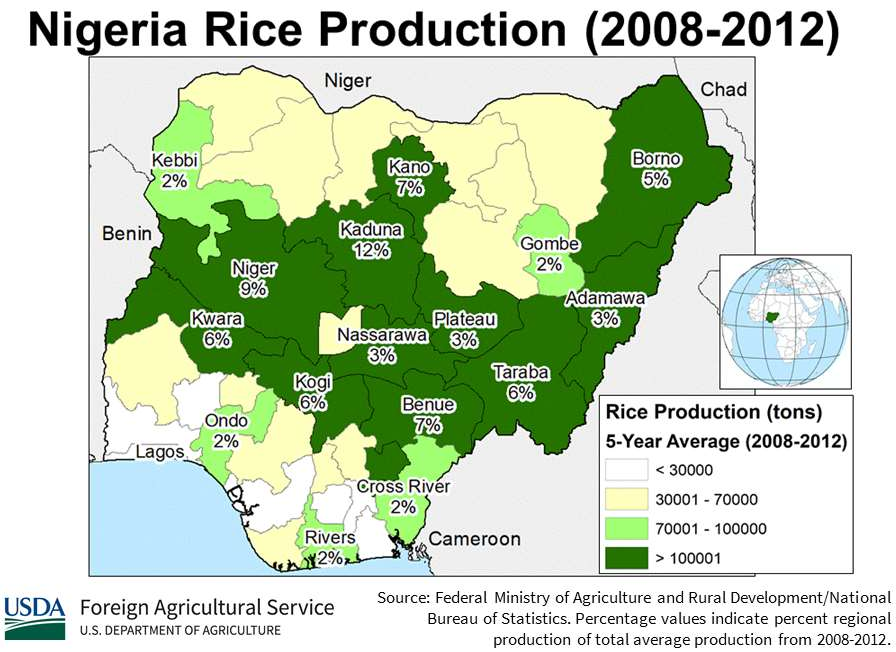
Figure 1 Overview (Rice and products)

- Production

Rice is a staple food in Nigeria and is grown in all agro-ecological zones of the country. Although the data are slightly older, the rice production areas shown in Figure 2 and Figure 3 show the rice planting calendar, and Table 1 shows the production area, production volume and yield by state.

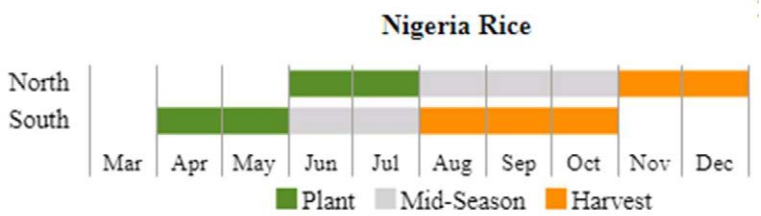
[1] https://research4agrinnovation.org/publication/innovation-rice-nigeria/ (Accessed:18 Apr., 2023), and KPMG "Rice Industry Review 2019"
[2] FMARD, 2020 Wet Season Agricultural Performance in Nigeria

Most rice farmers in Nigeria (90% of the total) are smallholders. Agricultural inputs (seeds and pesticides) are of low quality and high cost, and the weak fertilizer distribution system makes them miss the right time to apply fertilizer. Lack of mechanization, lack of irrigation facilities, lack of agricultural technology and knowledge, and high waste rate, rice productivity is the lowest among neighbouring countries, with an average yield of 1.93 tons/ha (2021)[3]. Land tenure systems and policies restricting land use limit access to land and reduce the area under cultivation. Furthermore, due to the lack of access to appropriate financial services, there is a high demand for small-scale finance and small-scale insurance for disasters. The Nigerian government has encouraged private companies to grow rice, and investment is increasing.



Source： USDA[4]

Figure 2 Rice production areas in Nigeria



Source： USDA[5]

Figure 3 Rice planting calendar in Nigeria

[3] FMARD, 2020 Wet Season Agricultural Performance in Nigeria
[4] https://ipad.fas.usda.gov/countrysummary/Default.aspx?id=NI&crop=Rice (Accessed:31 Jul., 2023)
[5] https://ipad.fas.usda.gov/countrysummary/Default.aspx?id=NI&crop=Rice (Accessed:31 Jul., 2023)

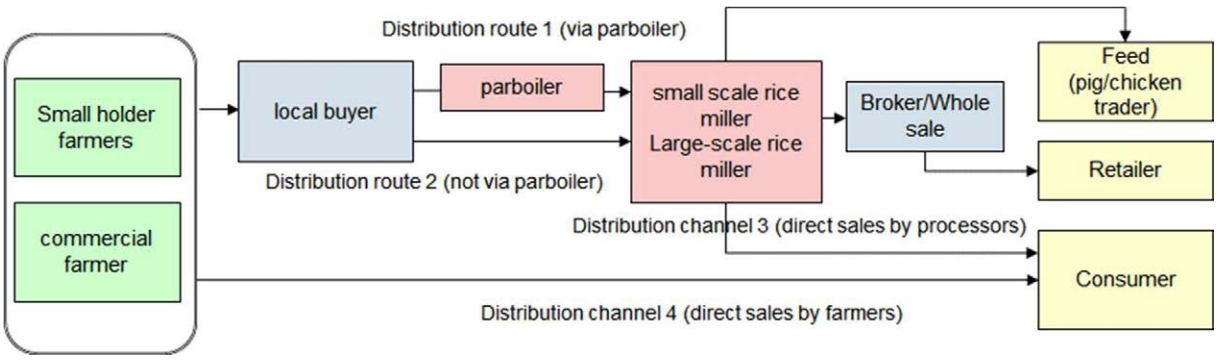
Table 1 Rice Production Area, Production Volume, and Yield by Production State

State	Land Area ('000) Ha			Production ('000) MT			Yield (Ton/Ha)	
	2020	2021	% Change	2020	2021	% Change	2020	2021
Abia	48.3	49.69	2.88	56.77	58.29	2.68	1.18	1.17
Adamawa	164.02	172.23	5.01	274.65	275.79	0.42	1.67	1.60
Akwa Ibom	10.78	11.37	5.47	23.32	24.02	3.00	2.16	2.11
Anambra	40.31	42.03	4.27	94.68	99.31	4.89	2.35	2.36
Bauchi	146.05	153.42	5.05	232.44	250.08	7.59	1.59	1.63
Bayelsa	49.69	48.47	-2.46	95.95	94.72	-1.28	1.93	1.95
Benue	271.7	272.29	0.22	506.68	517.65	2.17	1.86	1.90
Borno	116.81	120.19	2.89	186.36	189.51	1.69	1.60	1.58
C/Rivers	70.44	72.8	3.35	158.23	163.53	3.35	2.25	2.25
Delta	27.61	29.69	7.53	50.15	50.52	0.74	1.82	1.70
Ebonyi	61.22	65.59	7.14	138.33	145.73	5.35	2.26	2.22
Edo	64.34	61.84	-3.89	142	137.89	-2.89	2.21	2.23
Ekiti	78.88	81.95	3.89	132.55	140.47	5.98	1.68	1.71
Enugu	50.11	51.61	2.99	92.91	94.25	1.44	1.85	1.83
FCT	200.7	206.5	2.89	404.36	415	2.63	2.01	2.01
Gombe	147.43	157.01	6.50	209.84	215.08	2.50	1.42	1.37
Imo	42.89	44.07	2.75	84.3	85.49	1.41	1.97	1.94
Jigawa	117.95	122.18	3.59	203.3	215.31	5.91	1.72	1.76
Kaduna	159.57	163.92	2.73	347.01	360.37	3.85	2.17	2.20
Kano	125.34	131.74	5.11	412.14	438.72	6.45	3.29	3.33
Katsina	133.42	137.28	2.89	230.6	220.26	-4.48	1.73	1.60
Kebbi	218.12	224.42	2.89	343.24	348.69	1.59	1.57	1.55
Kogi	268.93	291.98	8.57	522.38	534.65	2.35	1.94	1.83
Kwara	202.3	208.37	3.00	419.36	431.94	3.00	2.07	2.07
Lagos	47.88	49.42	3.22	85.16	85.85	0.81	1.78	1.74
Nasarawa	181.11	189.91	4.86	403.95	417.39	3.33	2.23	2.20
Niger	258.06	255.91	-0.83	623.13	629.8	1.07	2.41	2.46
Ogun	54.36	58.45	7.52	88.82	93.58	5.36	1.63	1.60
Ondo	47.54	47.67	0.27	117.95	120.18	1.89	2.48	2.52
Osun	56.77	60.75	7.01	110.78	115.83	4.56	1.95	1.91
Oyo	61.04	63.37	3.82	103.65	108.6	4.78	1.70	1.71
Plateau	132.39	135.48	2.33	246.23	250.45	1.71	1.86	1.85
Rivers	42.14	42.11	-0.07	76.54	80.68	5.41	1.82	1.92
Sokoto	83.43	84.02	0.71	162.05	163.09	0.64	1.94	1.94
Taraba	191.85	201.45	5.00	386.54	388.16	0.42	2.01	1.93
Yobe	98.04	98.06	0.02	158.87	160.47	1.01	1.62	1.64
Zamfara	123.53	112.89	-8.61	246.55	220.62	-10.52	2.00	1.95
National	**4195.05**	**4320.13**	**2.98**	**8171.77**	**8341.9754**	**2.08**	**1.95**	**1.93**

Source：APS

- Distribution

There are four main distribution routes for rice, as shown in the figure below. Route 1 is the distribution from farmers to rice millers through buyers and parboilers, route 2 is the route from buyers to mills without passing through parboilers, route 3 is rice millers to sell directly to consumers, and route 4 is the route from farmers to sell directly to consumers.



Source: Prepared by the Study Team based on IC Net, "African Agricultural and Fishery Products/Food-Related (Including Machinery) Local Needs Report Nigeria", etc.

Figure 4 Rice; Distribution and Value Chain

- Processing

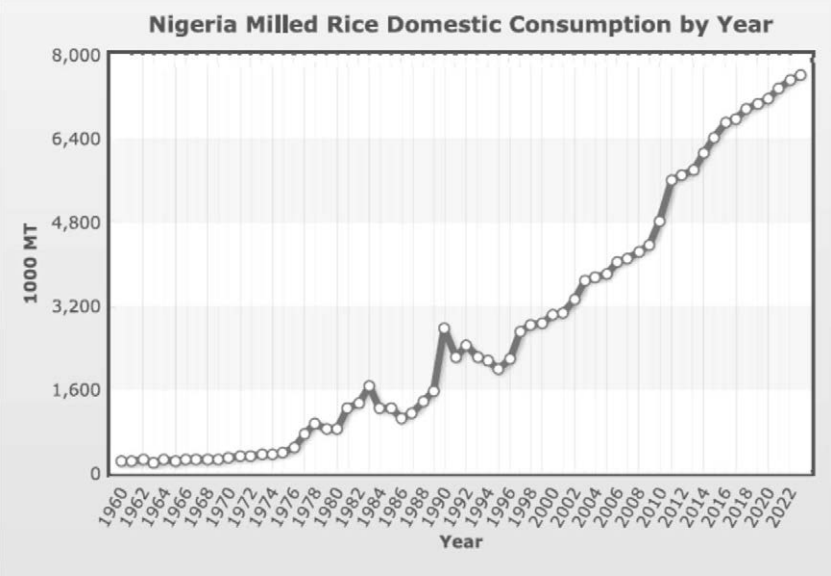
In Nigeria, rice is first semi-boiled (parboiled), threshed and squeezed. It is generally consumed in a form that is not polished[6]. Since the rice polishing technology is low, the rice-polishing yield is high, the complete rice rate is low, and the lustre of rice is not sufficient. In addition, the selection technique is low, stone contamination and rice breaking occur, and uneven coloured grains occur. For these reasons, there is no superiority in quality compared to imported rice. In addition, the mechanization of rice milling is delayed, resulting in high costs. In addition, there is no rice grading system, and quality standards are not constant. In order to compete with the price of imported rice, efficiency and cost reduction are required, and there is growing interest in investment in mechanization and efficiency.

[6] JETRO "Foreign Business Promising Industries in the Agriculture, Fisheries and Food Processing Fields of Major African Countries (African Food Guidebook)" Nigeria Edition, 2003

Figure 5 Traditional parboiling operation [7]

- Market[8]

Rice is one of the staple foods in Nigeria and is consumed by all regions and income classes. The domestic population, which has exceeded 200 million, is expected to continue growing at a rapid pace in the future, and the demand for rice is expected to increase as the population increases. There is a wide variety of domestic brands, and new brands are appearing every year, and the market is growing significantly.



Source: Prepared by the study team based on IndexMundi [9]

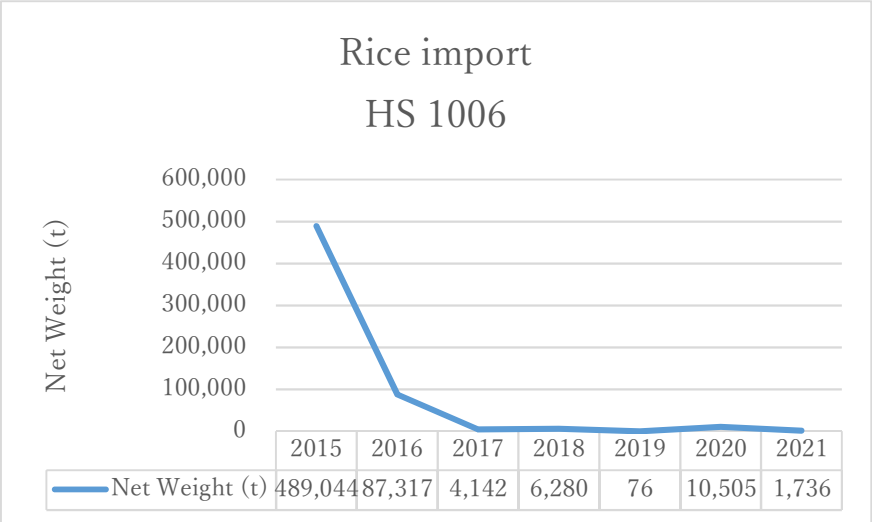
Figure 6 Domestic consumption of milled rice in Nigeria

[7] USAID Global Food Security Response, Nigeria Rice Study, 2009
[8] IC Net, "African Agricultural and Fishery Products/Food-Related (Including Machinery) Local Needs Report Nigeria" 2020.12
[9] https://www.indexmundi.com/agriculture/?country=ng&commodity=milled-rice&graph=domestic-consumption (Accessed:25 Jul., 2023)

- Trade

Rice imports are 1,351 thousand tons (2020) according to Food Balance, and according to ComTrade, rice imports are 10,500 tons for milled rice and paddy (2020) and 23,600 tons for cereals (2020). The main import sources are the UK, China and France. On the other hand, according to ComTrade, the export items are 200 tons of milled rice and paddy (2021) and 24.6 thousand tons of pasta products (2020). The main export destinations are Guinea-Bissau and Ghana.

The federal government of Nigeria is promoting import substitution, and in June 2015, the Central Bank of Nigeria banned foreign currency procurement for import settlement for 41 items including rice in order to promote domestic production and regulate imports. As a result of this measure, according to ComTrade, as shown in Figure 7, rice imports have sharply decreased from 489,000 tons in 2015 to 1,730 tons in 2021. However, there is a high demand for rice in Nigeria, and there is a view that rice from Thailand and other countries is being unofficially imported from Benin via land to fill the gap between domestic production and consumption.[10]



Source: Prepared by the study team based on ComTrade

Figure 7 Import volume of rice (milled rice and unhulled rice)

- Opportunities and challenges

Although it was not possible to build brand power due to the shortage of packaging capabilities and materials, in recent years each company has been promoting branding to meet market needs. Although the quality and brand power are lower than imported rice, local rice brands are increasing. The domestic population is expected to continue to grow at a rapid pace, and the demand for rice is expected to continue to increase.

[10] https://www.jetro.go.jp/biznews/2019/04/1aba04c6ef1c2ef9.html (Accessed:31 Jul., 2023)

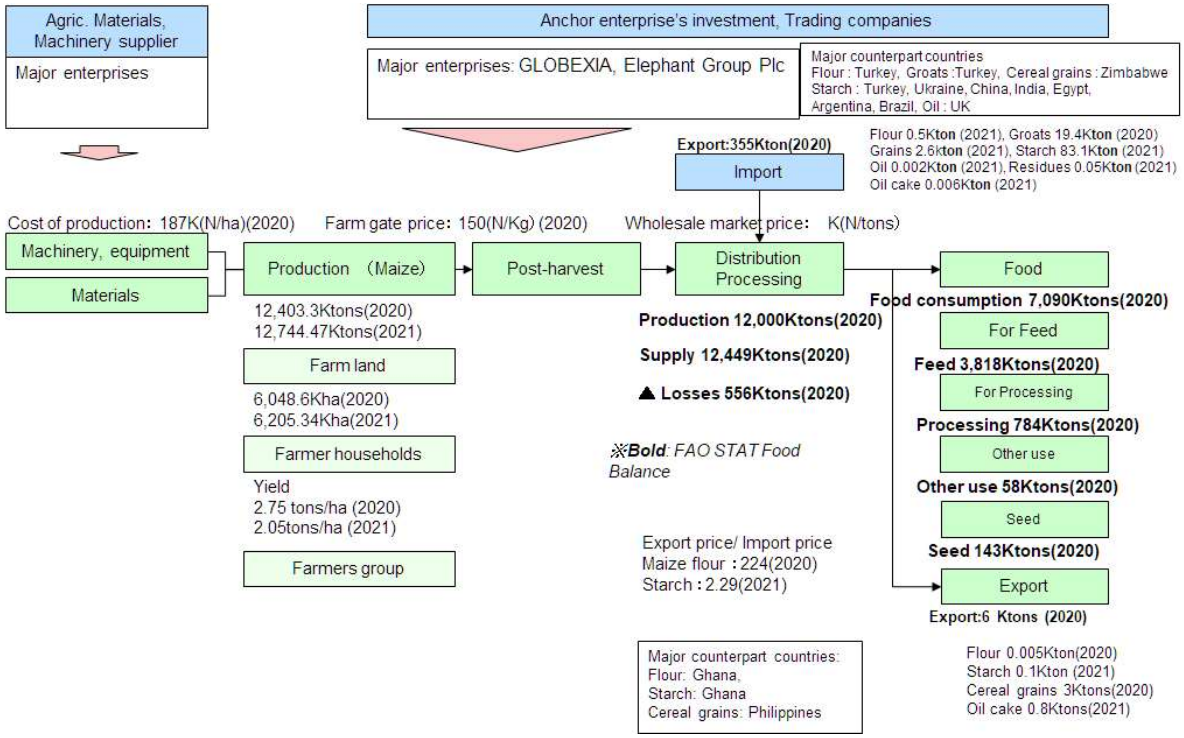
In addition, Nigeria is aiming to achieve 100% self-sufficiency in rice, and in recent years, large-scale rice mills have been built one after another (estimated rice milling facility capacity is 6 million tons). Since the lack of rice milling capacity is supplemented by imported rice, it is expected that the current self-sufficiency rate of 70% will be improved by improving the rice milling capacity.[11]

(2) Maize

- Overview

Nigeria is the second largest maize producing country in Africa after South Africa, with arable land of approximately 6,048,000 ha (2021) and 6,205,000 ha (2021). Domestic production is 12,403,000 tons (2020) and 12,744,000 tons (2021).

In addition, when related products are added, the supply amount including imports and domestic production is 12,449,000 tons (2020), consumption as food is 7,090,000 tons (2020), feed is 3,818,000 tons (2020), processed commodity is 784,000 tons (2020), 58,000 tons (2020) for other uses, 143,000 tons (2020) for seeds, and the rest is for disposal and export.[12]



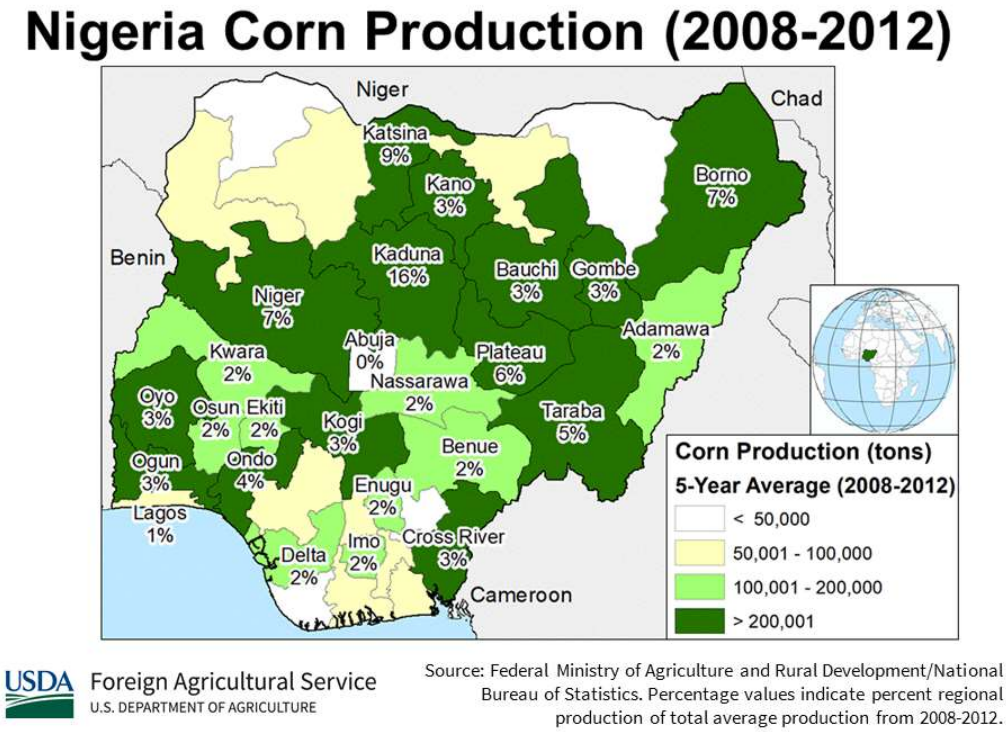
Source: Prepared by the study team based on FMARD APS, FAO STAT, Comtrade, etc.

Figure 8 Overview (Maize and products)

[11] https://www.jetro.go.jp/biznews/2023/06/9105be7e4877cf66.html (Accessed:31 Jul., 2023)
[12] FMARD, 2020 Wet Season Agricultural Performance in Nigeria

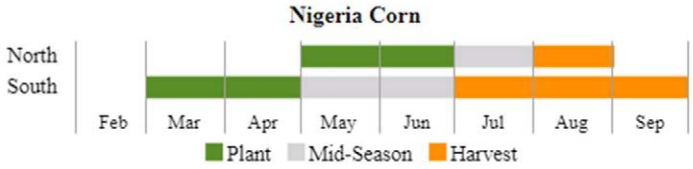
- Production

Nigeria is the second-largest maize producer in Africa after South Africa, producing more than 12,744 thousand tons of maize in 2021[13]. The production areas are north and southwest[14]. Although the data is a little old, maize production areas are shown in Figure 9 (in the figure, it says corn, but it means maize). Figure 10 shows the maize planting calendar, and Table 2 shows the production area, production volume and yield by state. For smallholder farmers, the production capacity is limited due to the lack of good quality seeds, the use of inappropriate fertilizers, the lack of extension activities for cultivation techniques, and the lack of small-scale irrigation.



Source： USDA[15]

Figure 9 Maize production areas in Nigeria



Source： USDA[16]

Figure 10 Maize planting calendar in Nigeria

[13] FAOSTAT
[14] UKaid, Investment Opportunities in Nigeria's Maize Value Chain, 2020
[15] https://ipad.fas.usda.gov/countrysummary/Default.aspx?id=NI&crop=Rice (Accessed:31 Jul., 2023)
[16] https://ipad.fas.usda.gov/countrysummary/Default.aspx?id=NI&crop=Rice (Accessed:31 Jul., 2023)

Table 2 Maize Production Area, Production Volume, and Yield by Production State

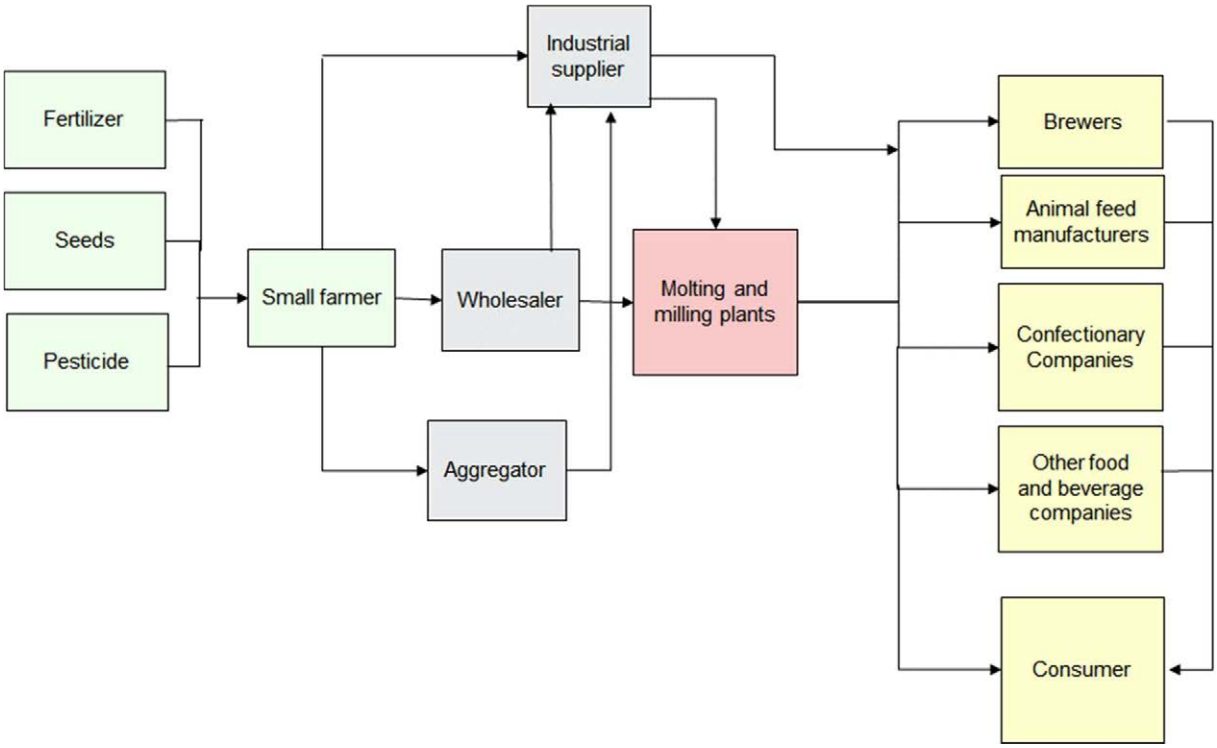
State	Land Area ('000) Ha			Production ('000) MT			Yield (Ton/Ha)	
	2020	2021	% Change	2020	2021	% Change	2020	2021
Abia	71.82	78.25	8.95	105.01	96.62	-7.99	1.46	1.24
Adamawa	189.92	203.17	6.98	412.96	442.39	7.13	2.17	2.18
Akwa Ibom	79.71	83.69	5.00	87.59	92.04	5.08	1.09	1.10
Anambra	53.18	55.08	3.58	104.29	109.50	5.00	1.96	1.99
Bauchi	295.24	307.07	4.01	542.09	581.01	7.18	1.84	1.89
Bayelsa	52.05	57.22	9.94	82.58	87.21	5.61	1.59	1.52
Benue	161.11	163.59	1.54	379.17	386.33	1.89	2.35	2.36
Borno	368.17	387.24	5.18	618.04	626.65	1.39	1.68	1.62
C/Rivers	59.38	60.74	2.29	103.71	112.77	8.73	1.75	1.86
Delta	76.54	81.49	6.48	154.52	163.29	5.68	2.02	2.00
Ebonyi	90.12	91.49	1.52	164	167.28	2.00	1.82	1.83
Edo	110.54	108.06	-2.25	167.88	159.70	-4.87	1.52	1.48
Ekiti	155.81	163.01	4.62	280.46	299.46	6.78	1.80	1.84
Enugu	96.36	97.25	0.93	175.75	182.79	4.01	1.82	1.88
FCT	197.27	198.89	0.82	448.52	454.42	1.32	2.27	2.29
Gombe	357.2	375.61	5.16	638.21	648.79	1.66	1.79	1.73
Imo	53.2	55.69	4.68	128.71	134.97	4.87	2.42	2.42
Jigawa	177.92	182.03	2.31	318.28	332.44	4.45	1.79	1.83
Kaduna	358.6	380.04	5.98	916.62	977.03	6.59	2.56	2.57
Kano	129.79	132.97	2.45	350.44	357.06	1.89	2.70	2.69
Katsina	189.74	187.21	-1.33	379.41	362.36	-4.49	2.00	1.94
Kebbi	174.09	170.79	-1.89	345.67	335.68	-2.89	1.99	1.97
Kogi	166.27	174.58	5.00	397.73	430.87	8.33	2.39	2.47
Kwara	166.59	171.59	3.00	325.74	335.49	3.00	1.96	1.96
Lagos	161.93	163.49	0.97	259.95	261.51	0.60	1.61	1.59
Nasarawa	106.04	115.79	9.19	308.08	311.95	1.26	2.91	2.69
Niger	281.13	258.93	-7.90	698.4	700.61	0.32	2.48	2.71
Ogun	141.65	139.09	-1.81	289.9	286.24	-1.26	2.05	2.06
Ondo	154.22	159.76	3.59	385.96	396.34	2.69	2.50	2.48
Osun	172.04	175.89	2.24	349.5	381.93	9.28	2.03	2.17
Oyo	162.86	170.86	4.91	305.36	315.82	3.43	1.88	1.85
Plateau	261.31	265.04	1.43	647.74	656.48	1.35	2.48	2.48
Rivers	61.56	64.21	4.30	132.59	135.86	2.46	2.15	2.12
Sokoto	101.88	102.58	0.69	272.7	260.99	-4.29	2.68	2.54
Taraba	277.16	296.50	6.98	565.5	605.80	7.13	2.04	2.04
Yobe	146.3	150.60	2.94	294.5	302.70	2.78	2.01	2.01
Zamfara	189.9	175.79	-7.43	265.74	252.07	-5.14	1.39	1.43
National	6048.6	6205.34	2.59	12403.3	12744.47	2.75	2.05	2.05

Source：APS

- Distribution

The distribution route of maize is shown in the figure below.

Suppliers store maize when it is available, sell it to food processors, and feed mill operators during non-harvest periods when prices are high.



Source: UKAID Investment Opportunities in Nigeria's Maize Value Chain, 2020

Figure 11 Maize; Distribution and Value Chain

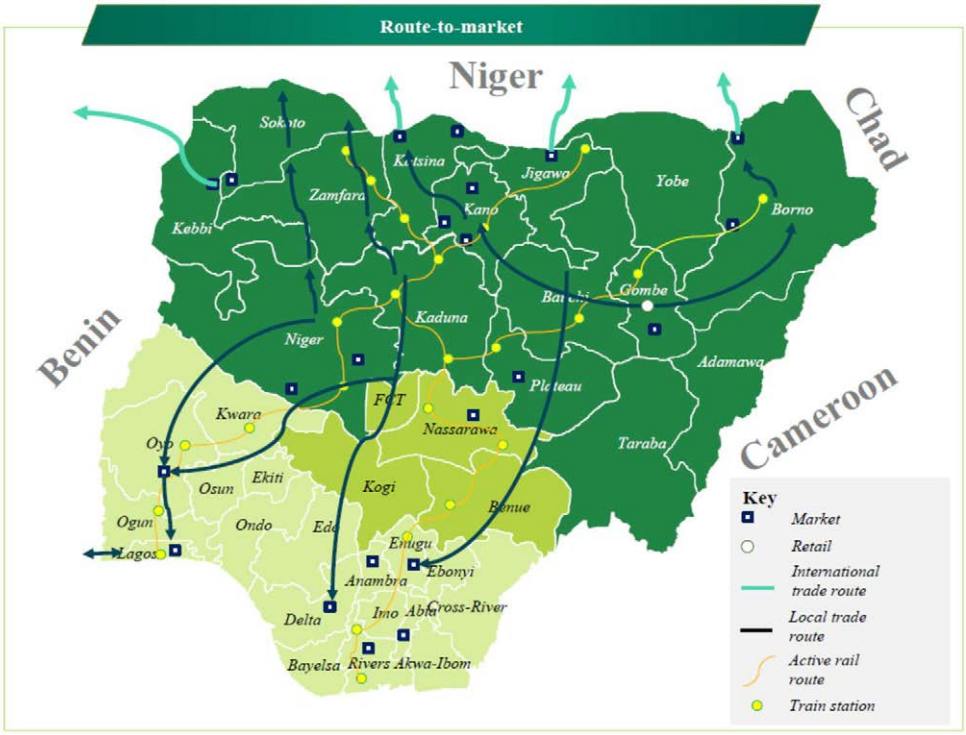
- Processing

About 70% of the total maize production is used for food, about 30% for feed, and the rest for other purposes. Maize constitutes about 55% of poultry feed and is widely used as the main calorie source for poultry. A variety of poultry feeds can be produced from gluten meal, gluten feed, seed pomace, germ meal, liquid feed syrup, etc.

It can be processed in a variety of ways, including beer and alcoholic beverages made from fermented maize, biofuel ethanol, pharmaceuticals, and confectionery using maize flour.

- Market

Most of Nigeria's maize is traded in the country's main markets and is mainly transported by road. Exports are mainly via the Kano-Katsina-Maradi corridor. Kano's Dawanau market is Africa's largest wholesale grain market, and grains from neighbouring countries are also traded here. The figure below shows the transportation routes of maize to the market.



Source: UKAID Investment Opportunities in Nigeria's Maize Value Chain, 2020

Figure 12 Transport routes for maize in Nigeria

- Trade

According to Food Balance, maize imports are 355,000 tons (2020), and according to ComTrade, the main importers of processed products are Turkey and Zimbabwe. On the other hand, exports are 6,000 tons (2020) according to Food Balance, and processed products are 3,000 tons (2020) according to ComTrade, and the main export destination is the Philippines.

- Opportunities and challenges

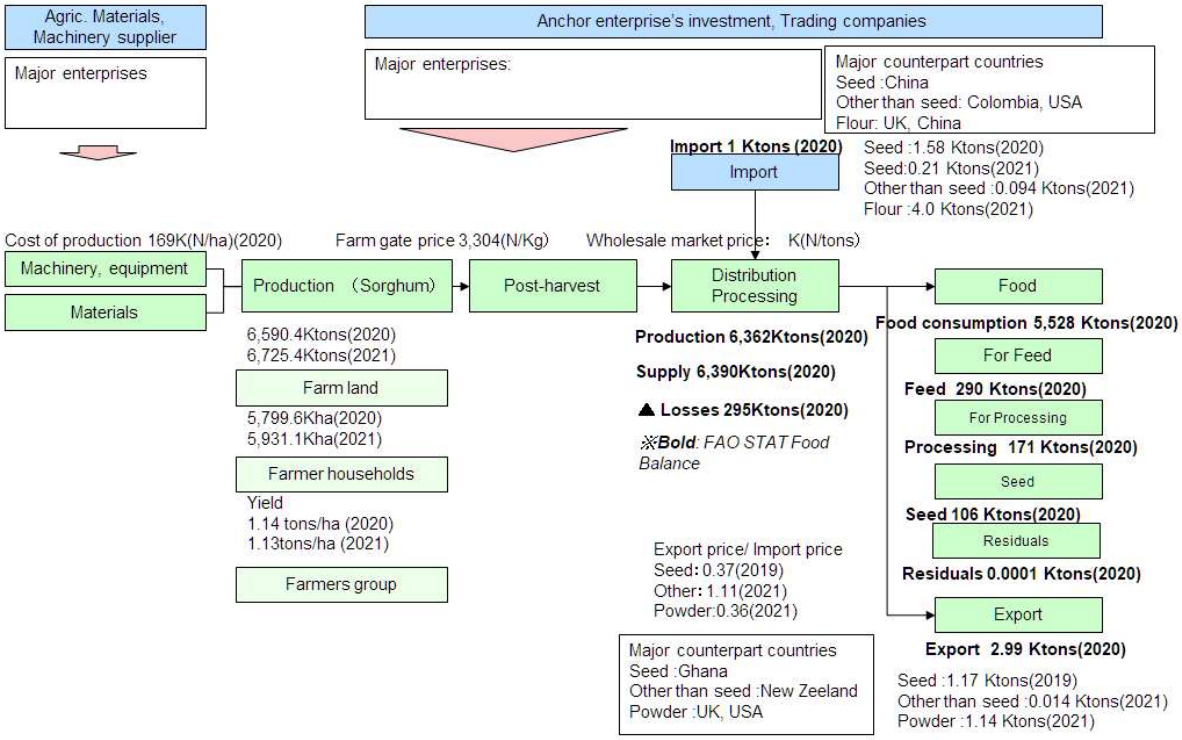
Nigeria has the potential to address Africa's maize supply shortage. In sub-Saharan Africa, 50% of the population consumes maize, resulting in a shortage of maize supply. It is therefore hoped that Nigeria will be able to address the problem of low yields, expand cultivation to available arable land and significantly increase production, thereby exporting to countries in sub-Saharan Africa.

In addition, domestic poultry production is expected to increase by 8 billion eggs and 100 million kilograms of poultry meat annually, and as the demand for feed increases, investment in maize production can be expected.

(3) Sorghum

- Overview

Sorghum is the third largest crop by production in Nigeria. Nigeria is the largest sorghum producer in West Africa, accounting for approximately 71% of the region's total sorghum production. However, with the increasing demand for maize and soybeans, farmers have increased their maize and soybean acreage in the northern regions, while sorghum acreage and yields have decreased significantly. Sorghum production is 6,590,000 tons (2020) and 6,725,000 tons (2021). In addition, when related products are added, the supply amount including imports and domestic production is 6,390,000 tons (2020), consumption as food is 5,528,000 tons (2020), and the rest is feed, processing, seeds, residues, export and disposal. [17]



Source: Prepared by the study team based on FMARD APS, FAO STAT, ComTrade, etc.

Figure 13 Overview (Sorghum and products)

- Production[18]

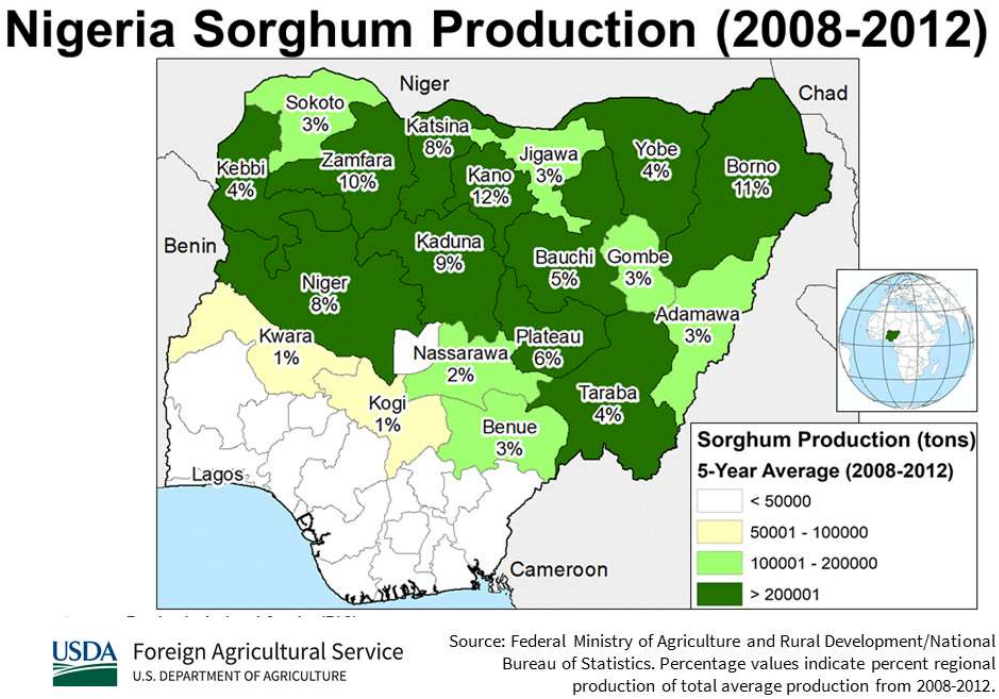
Sorghum production areas are the north-central, north-west and north-northeast regions. Cultivation of sorghum is well adapted to hot, arid and semi-arid regions, and is a particularly important crop in arid regions because it is tolerant of drought and heat.

[17] FAOSTAT
[18] USAID, Nigeria Sorghum Value Chain Analysis,2012

Sorghum grows in harsh conditions where other crops cannot survive, and can be grown without NPK[19] fertilizers or other inputs, although yields can be enhanced with the application of NPK fertilizers.

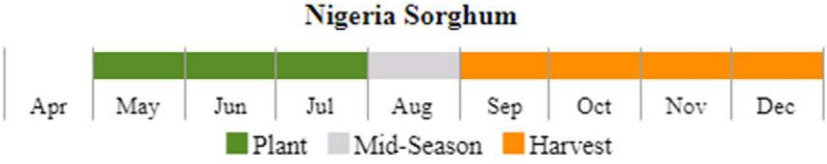
Forage sorghum typically grows 8 to 15 feet tall and is grown for grazing, hay, silage, and green chops. Sweet sorghum is used for syrup, and the stems are used like sugar cane.

Although the data is a little old, the sorghum production areas are shown in Figure 14. Figure 15 shows the sorghum planting calendar, and Table 3 shows the production area, production volume and yield by state.



Source： USDA[20]

Figure 14 Sorghum production areas in Nigeria



Source： USDA[21]

Figure 15 Sorghum Planting Calendar in Nigeria

[19] Nitrogen(N), phosphorus(P), potassium(K)
[20] https://ipad.fas.usda.gov/countrysummary/Default.aspx?id=NI&crop=Rice (Accessed:31 Jul., 2023)
[21] https://ipad.fas.usda.gov/countrysummary/Default.aspx?id=NI&crop=Rice (Accessed:31 Jul., 2023)

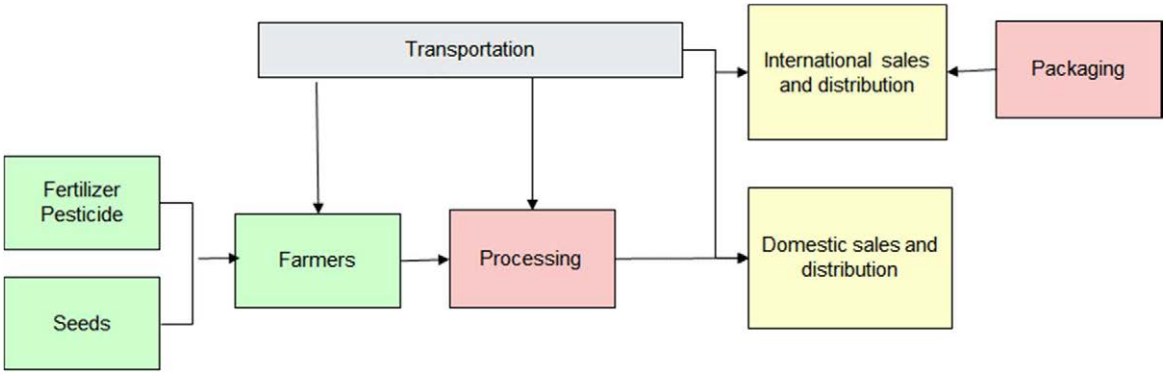
Table 3 Sorghum Production Area, Production Volume, and Yield by Production State

State	Land Area ('000) Ha			Production ('000) MT			Yield (Ton/Ha)	
	2020	2021	% Change	2020	2021	% Change	2020	2021
Adamawa	261.2	271.6	4.0	288.0	292.0	1.40	1.10	1.08
Bauchi	406.9	427.2	5.0	425.9	447.2	5.00	1.05	1.05
Benue	192.1	196.1	2.1	195.4	204.8	4.83	1.02	1.04
Borno	335.4	351.8	4.9	332.9	347.5	4.39	0.99	0.99
Enugu	13.1	13.4	2.8	13.8	14.2	2.89	1.06	1.06
FCT	107.2	110.2	2.8	129.0	132.9	3.01	1.20	1.21
Gombe	335.9	336.5	0.2	324.9	331.3	1.98	0.97	0.99
Jigawa	293.7	293.7	0.0	350.9	351.6	0.19	1.20	1.19
Kaduna	410.5	426.0	3.8	425.9	446.2	4.76	1.04	1.05
Kano	576.8	593.2	2.9	584.1	618.6	5.89	1.01	1.04
Katsina	322.6	339.8	5.3	381.4	357.6	-6.25	1.18	1.05
Kebbi	327.3	336.0	2.7	389.7	406.5	4.32	1.19	1.21
Kogi	95.9	102.3	6.7	127.5	129.9	1.85	1.33	1.27
Kwara	103.4	106.5	3.0	147.3	151.7	3.00	1.42	1.42
Nasarawa	91.2	92.5	1.5	161.6	165.1	2.20	1.77	1.79
Niger	401.8	417.4	3.9	567.6	549.7	-3.15	1.41	1.32
Oyo	49.6	51.7	4.2	59.0	64.9	10.03	1.19	1.25
Plateau	199.0	201.9	1.4	300.6	311.7	3.69	1.51	1.54
Sokoto	274.8	275.8	0.3	370.5	376.8	1.70	1.35	1.37
Taraba	311.8	324.3	4.0	336.1	340.7	1.40	1.08	1.05
Yobe	252.7	251.9	-0.3	264.9	271.0	2.29	1.05	1.08
Zamfara	436.7	411.1	-5.9	413.6	413.6	0.00	0.95	1.01
National	5799.6	5931.1	2.3	6590.4	6725.4	2.05	1.14	1.13

Source：APS

- Distribution

The distribution route of sorghum is shown in the figure below. From farmers to consumers through processors, wholesalers and retailers. Processed sorghum is used as food and beverages, as well as livestock feed, ethanol, and building materials.



Source: Prepared by the Study Team based on "USAID Nigeria Sorghum Value Chain Analysis 2012"

Figure 16 Sorghum; Distribution and Value Chain

- Processing

Most of the Nigerian sorghum is used for household consumption and feed, but there are three ways to process it. Primary processing includes fermentation, malting, wet and dry milling, boiling, roasting, and popping. Secondary processing is brewing, production of beverages, confectionery, steaming and extrusion (for pastes and noodles). Tertiary processing includes composite flour, as well as chemical strengthening with additives.

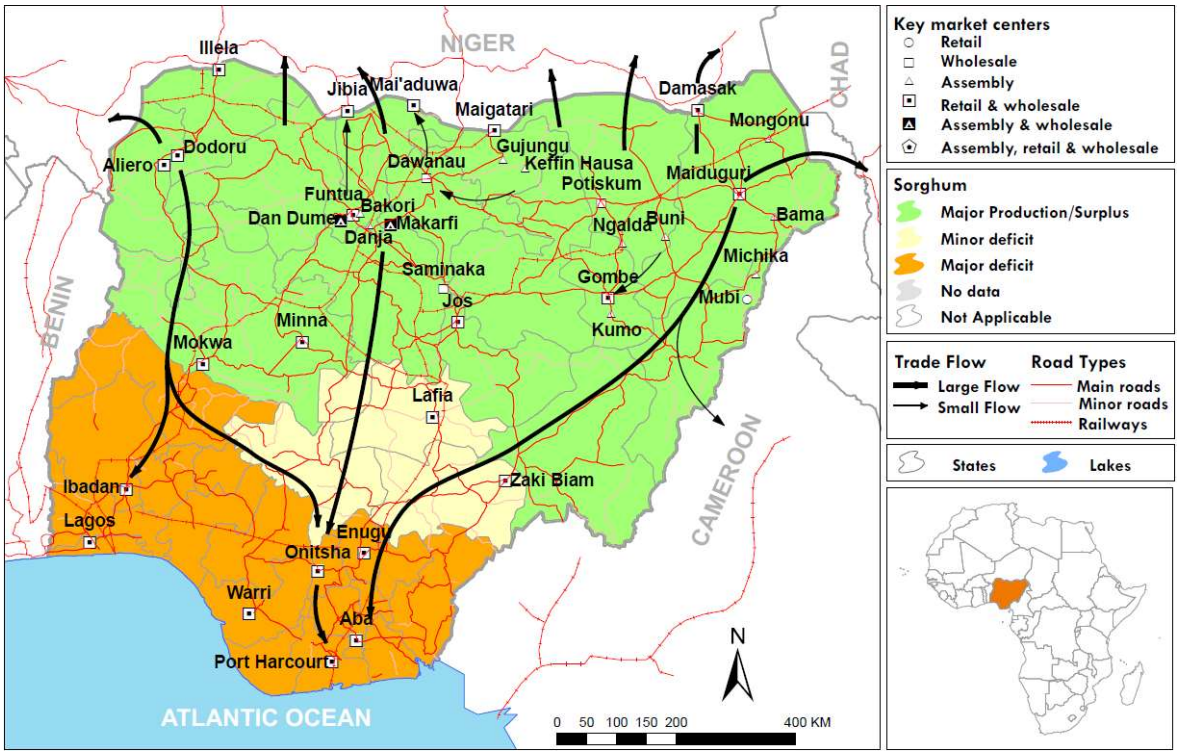
Figure 17 Sorghum[22], Sorghum flour[23], Sorghum beverage[24], building materials[25]

- Market

Most of Nigeria's sorghum is traded in the country's main markets and is mainly transported by road.

Sorghum is transported by land from agglomerations and wholesale markets such as Makarfi in Kaduna, Maiduguri in Borno and Dodoru in Kebbi to consuming areas in the south. Sorghum market centres and transportation routes are shown in the figure below.

[22] https://independent.ng/economies-sorghum-farming-2/ (Accessed: May 9, 2023)
[23] https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcQtplElloUj1sOJJRS0bds2sfzLeE0B-TBwuHaiCu2I5HRSm9h8JBOHH0hSMmLgrxGUuyA&usqp=CAU (Accessed: May 9, 2023)
[24] https://niselo.com/shop-1 (Accessed: May 9, 2023)
[25] https://materials.soa.utexas.edu/search/materials/details/t/product/id/2211 (Accessed:2 Aug., 2023)



Source: USAID, Production and Market Flow Map: Nigeria Sorghum

Figure 18 Aggregate Markets and Transport Routes for Sorghum in Nigeria

- Trade

According to Food Balance, the import of sorghum is 1,000 tons (2020), and according to ComTrade, the seed is 1,580 tons (2020) and flour is 4,000 tons (2021). Main import sources are China, UK, etc. On the other hand, according to Food Balance, exports are 2,990 tons (2020), and according to ComTrade, seed is 1,170 tons (2019) and flour is 1,140 tons (2021). Main export destinations are Ghana, UK and US. Most of the production is used to meet domestic demand, with very little surplus available for export.

- Opportunities and challenges

Sorghum is in great demand in the livestock feed industry, ethanol industry, beer industry, food and beverage industry. In addition, new markets for sorghum are expanding due to its wide range of uses such as building materials, ornamental flowers, brooms, and pet food. In addition, as climate change limits the production of maize as a food crop, sorghum, which is resistant to harsh climates, is expected to be a substitute for maize. [26]

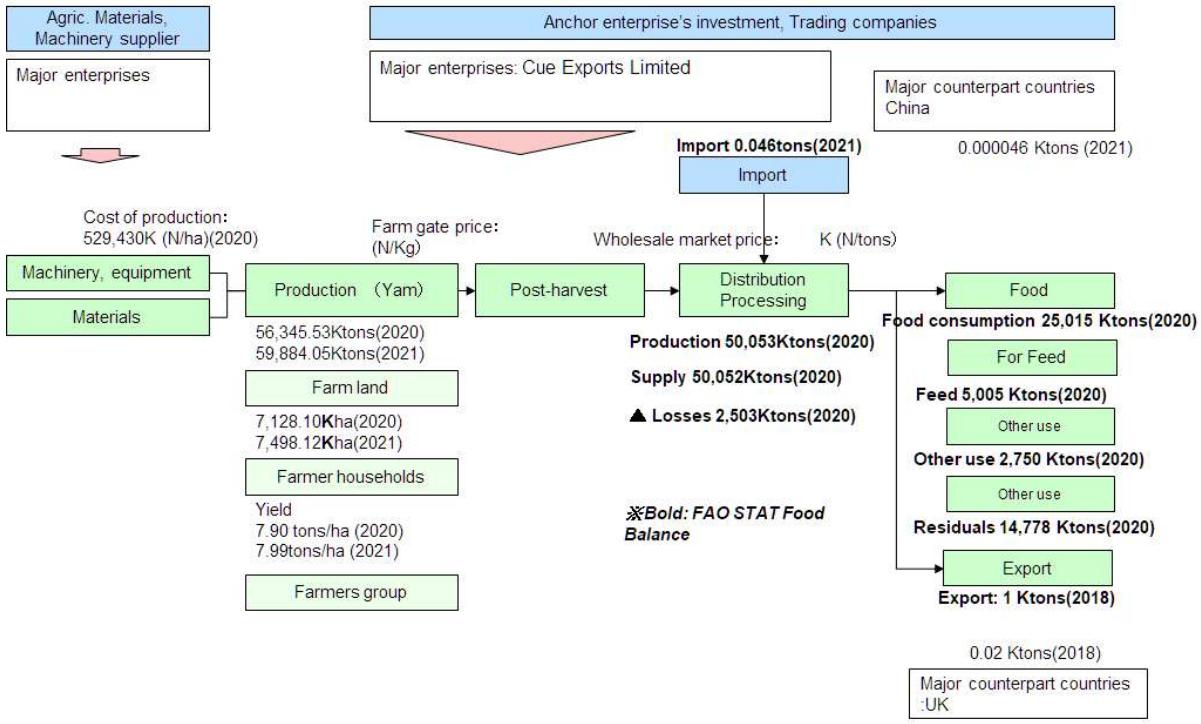
[26] https://independent.ng/economies-sorghum-farming-2/ (Accessed:2 Aug., 2023)

(4) Yam[27]

- Overview

Nigeria is one of the world's leading yam producers, with production of 56,346,000 tons (2020) and 59,884,000 tons (2021).

Including related products, supply amount is 50,052,000 tons (2020), consumption as food is 25,015,000 tons (2020), feed is 5,005,000 tons (2020), and other uses are 2,750,000 tons (2020), and the rest are disposal. Imports and exports are small[28].



Source: Prepared by the study team based on FMARD APS, FAO STAT, ComTrade, etc.

Figure 19 Overview (Yam and products)

- Production[29]

Nigeria's yam cultivating regions are Southwest, South-south, Southeast and North-central.

The cultivation of yams is generally done manually, and mostly with family labor, but there is also wage labour, such as employment on large farms. Yam is planted in new fields each year in order to allow the old fields to rest.

The first step in yam cultivation is to level the land and create a mound called a "heap" for each seed yam. This is the most difficult part of the cultivation process. This mound is made at the end of

[27] Regarding yam, unless otherwise noted, it is mainly based on JETRO "Promising foreign business industries in the agricultural, fishery, and food processing fields of major African countries (African food guidebook), Nigeria, 2003.
[28] FAOSTAT
[29] The Yam Value Chain: Constrains and Opportunities for small-scale Farmers, International Institute of Social Studies, The Hague, The Netherlands, 2012

the rainy season when the soil is still soft. Next, seedlings are planted at the beginning of the rainy season in April. Herbicides are applied in May, just before the seed yams have fully germinated. Fertilizer application is done in June after herbicide application.

Yams are planted one per mound, but at the end of the season, there are tubers of various sizes, some producing one very large tuber, others two or three tubers each. Harvesting takes place between December and January, after which the yams are covered with grass in the fields for several weeks. They are then sold at the market or stored covered with dry grass around farmer's houses. The planting calendar for yam is shown in Figure 20.

	Planting	Herbicides	Fertilizer						Harvest	Harvest
Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan

Source： Prepared by the JICA Team based on "The Yam Value Chain: Constraints and Opportunities for small-scale Farmers, International Institute of Social Studies, The Hague, The Netherlands, 2012"

Figure 20 Yam planting calendar in Nigeria

The table below shows the production area, production volume and yield for each province.

Table 4 Yam Production Area, Production Volume, and Yield by Production State

State	Land Area ('000) Ha			Production ('000) MT			Yield (Ton/Ha)	
	2020	2021	% Change	2020	2021	% Change	2020	2021
Abia	309.10	357.17	15.55	2152.67	2416.37	12.25	6.96	6.77
Akwa Ibom	287.19	302.76	5.42	2.24	2.54	13.17	0.01	0.01
Anambra	159.45	164.76	3.33	877.79	899.73	2.50	5.51	5.46
Bayelsa	330.10	330.03	-0.02	1295.48	1295.09	-0.03	3.92	3.92
Benue	195.88	210.61	7.52	2881.66	3158.30	9.60	14.71	15.00
C/Rivers	351.64	356.49	1.38	3019.06	3074.31	1.83	8.59	8.62
Delta	165.75	168.88	1.89	1382.62	1428.66	3.33	8.34	8.46
Ebonyi	288.73	329.99	14.29	2888.37	3110.49	7.69	10.00	9.43
Edo	465.10	454.64	-2.25	3408.27	3372.48	-1.05	7.33	7.42
Ekiti	197.99	228.48	15.40	1472.55	1724.36	17.10	7.44	7.55
Enugu	246.33	270.96	10.00	3099.66	3432.87	10.75	12.58	12.67
FCT	734.11	755.11	2.86	3022.46	3113.44	3.01	4.12	4.12
Imo	90.42	96.19	6.38	304.07	329.92	8.50	3.36	3.43
Kaduna	201.85	202.86	0.50	2756.54	2783.28	0.97	13.66	13.72
Kebbi	156.86	162.15	3.37	973.35	997.00	2.43	6.21	6.15
Kogi	191.24	203.29	6.30	1673.84	1815.45	8.46	8.75	8.93
Kwara	255.52	263.19	3.00	2196.14	2278.71	3.76	8.59	8.66
Nasarawa	202.23	222.70	10.12	3829.54	4307.47	12.48	18.94	19.34
Niger	353.00	385.83	9.30	5651.49	6261.85	10.80	16.01	16.23
Ogun	169.86	165.61	-2.50	1028.14	1012.72	-1.50	6.05	6.11
Ondo	226.19	237.50	5.00	2167.68	2276.06	5.00	9.58	9.58
Osun	209.77	217.57	3.72	2421.27	2537.49	4.80	11.54	11.66
Oyo	329.19	354.37	7.65	1572.05	1673.45	6.45	4.78	4.72
Plateau	136.17	136.96	0.58	1732.66	1755.01	1.29	12.72	12.81
Rivers	555.66	585.44	5.36	1348.49	1396.36	3.55	2.43	2.39
Taraba	318.75	334.59	4.97	3187.44	3430.64	7.63	10.00	10.25
National	7128.10	7498.12	5.19	56345.53	59884.05	6.28	7.90	7.99

Source：APS

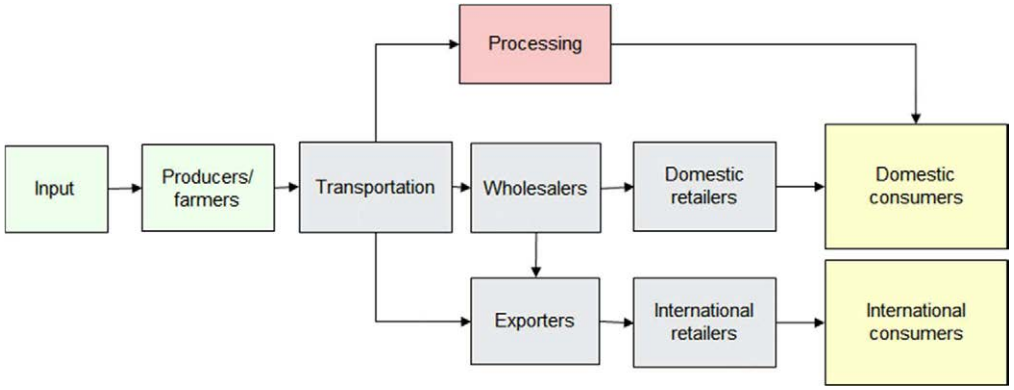
- Distribution

The distribution route of yam is shown in the figure below. From farmers through transporters/intermediaries to processors, wholesalers and retailers to consumers.

Some farmers bring their own yams to the market and sell them to market intermediaries. However, some small farmers leave their yams on the farm waiting for someone to buy them, due to their geographical location and the cost of transportation due to poor road networks. Farmers typically communicate only with intermediaries and have few relationships with other actors in the value chain. Most payments between farmers and intermediaries are made on mutual trust. Intermediaries then sell

to various customers as well as processors. [30]

Improving distribution transportation will have the potential to stimulate yam productivity and benefit more consumers, as yam is increasingly used for processing new foods and ready-to-eat foods.



Source: The Yam Value Chain: Constraints and Opportunities for small-scale Farmers, International Institute of Social Studies, The Hague, The Netherlands, 2012

Figure 21 Yam; Distribution and Value Chain

- Processing

In Nigeria, there are almost no yam-processing factories in the country due to the limited technology required for the production of yam-processed foods. Very little is marketed as a processed product, and the majority is eaten in the form of boiled yam, roasted yam, fried yam, pound yam, etc., according to ethnic and sociocultural customs. Yam flour is often reconstituted in boiling water and eaten in soup.

Figure 22 Yam[31], Roast yam[32], Yam porridge[33], Pounded Yam[34]

- Market

In southern Nigeria, yams are the second staple food after cassava. In most areas of the South, yam consumption is seasonal, with peak consumption during the harvest season, November-January. Cassava products and other supplements then take over. In the central region, yams are the staple food

[30] The Yam Value Chain: Constrains and Opportunities for small-scale Farmers, International Institute of Social Studies, The Hague, The Netherlands, 2012

[31] https://upload.wikimedia.org/wikipedia/commons/thumb/e/eb/YamsatBrixtonMarket.jpg/375px-YamsatBrixtonMarket.jpg (Accessed: 10 May, 2023)

[32] https://www.myactivekitchen.com/wp-content/uploads/2015/11/roasted-yam-3-1-e1558650325399.jpg (Accessed:10 May, 2023)

[33] https://www.myactivekitchen.com/wp-content/uploads/2019/05/asaro-image-7-360x540.jpg (Accessed: 10 May, 2023)

[34] By Shardayyy - 044:365 - 06/13/2012 - Iyan & Efo-Riro, CC BY 2.0, https://commons.wikimedia.org/w/index.php?curid=53949368 (Accessed:31 Jul., 2023)

in most regions, followed by cassava. 60 % of the yams are self-consumed and 40 % are sold.

- Trade

There are few imports and exports of Nigerian yams. The reason why exports are not progressing even though there is a considerable production scale is that most of the yams grown in Nigeria do not meet the quality requirements of importing countries. Pauna, exported by neighbouring Ghana, is said to be of the highest quality of any Nigerian cultivar. Cadbury Nig. Ltd. produces an instant powder product under the Poundo-yam brand, which mashes and grinds yams. Others include OFI Foods and Olu-Olu Foods, both of which export pounded yam flour to the United Kingdom, the Netherlands and the United States.

- Opportunities and challenges

As the ready-to-eat food market expands, potential investors in the yam processing industry hope to research and develop methods of preserving yams in the form of chips that maintain high quality throughout the year and are ready for frying. The International Institute of Tropical Agriculture (IITA) has developed a new technology to produce ready-to-eat yams (similar to French fries) that are either heated in an oven or fried in a small amount of oil at a fast food restaurant. Commercialization of products based on the new technology is expected.

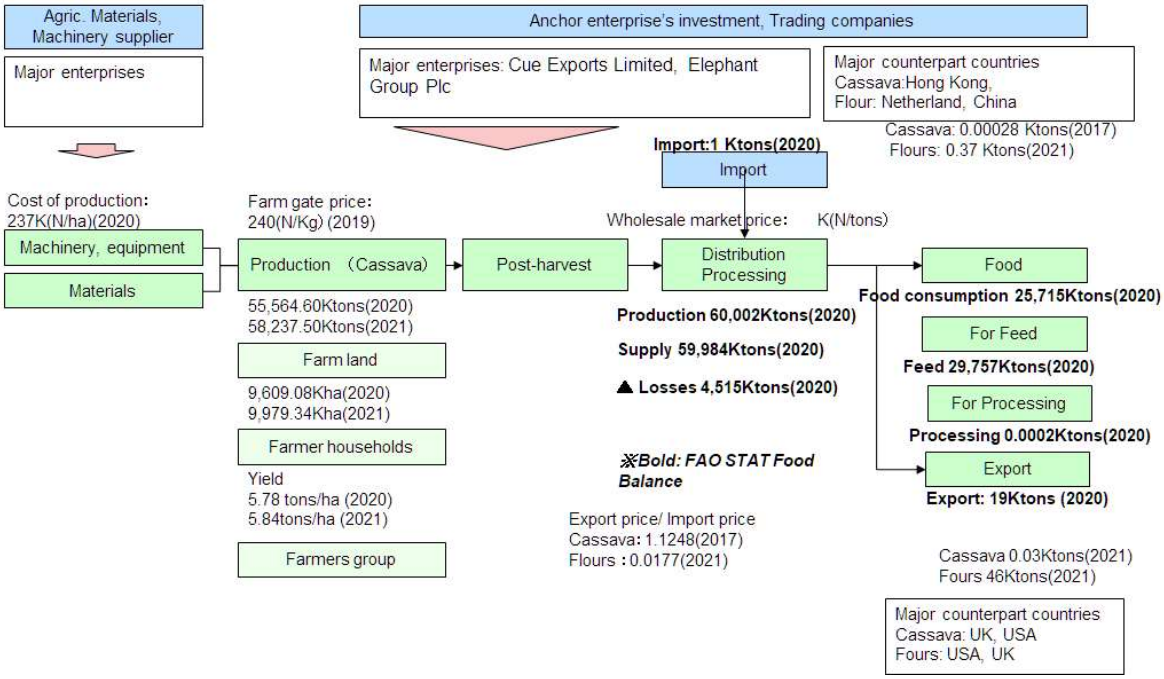
(5) Cassava[35]

- Overview

Cassava production is 55,565,000 tons (2020) and 58,238,000 tons (2021). Including related products, the supply amount is 59,984,000 tons (2020), consumption as food is 25,715,000 tons (2020), and the rest is disposal. Both imports and exports are small[36]。

Nigeria is the world's largest cassava producer, accounting for 20% of global production and growing at an average annual rate of 3% from 2007 to 2017. However, the cassava value chain is highly fragmented, with about 90% of producers being smallholder farmers and primary processors being small rural factories. Cassava has more calories per acre than any grain and is considered a staple food in Nigeria's domestic market, with 98 % of cassava currently destined for domestic consumption.

[35] NIPC, UKaid, Nigerian Cassava Investment opportunities , 2020
[36] FAOSTAT



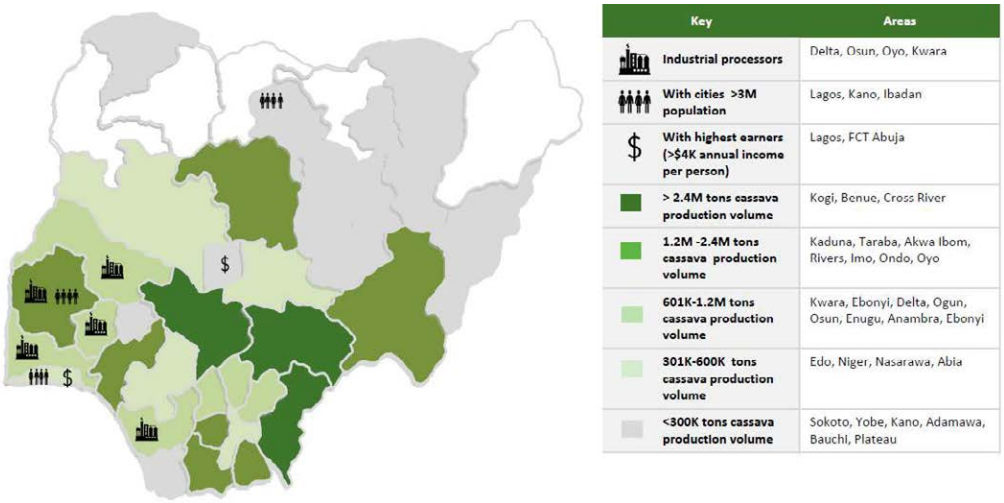
Source: Prepared by the study team based on FMARD APS, FAO STAT, Comtrade, etc.

Figure 23 Overview (Cassava and products)

- Production

Cassava production areas are the southwest, south-south, southeast and north-central regions. Production is generally small-scale, with over 90% of production by small farmers. Small farmers adopt inefficient farming practices due to a lack of knowledge about cultivation and limited incentives to improve yields due to cassava price volatility. Yields are also considered low by international standards due to lack of access to suitable agricultural inputs such as improved seed varieties, herbicides and fertilizers.

Figure 24 shows cassava production areas, and Table 5 shows the production area, production volume and yield by state.



Source： Nigerian Cassava Investment Opportunities, Africa Investment Summit, London, January 2020, NUKAID, NIPC

Figure 24 Cassava production areas in Nigeria

Table 5 Cassava Production Area, Production Volume, and Yield by Production State

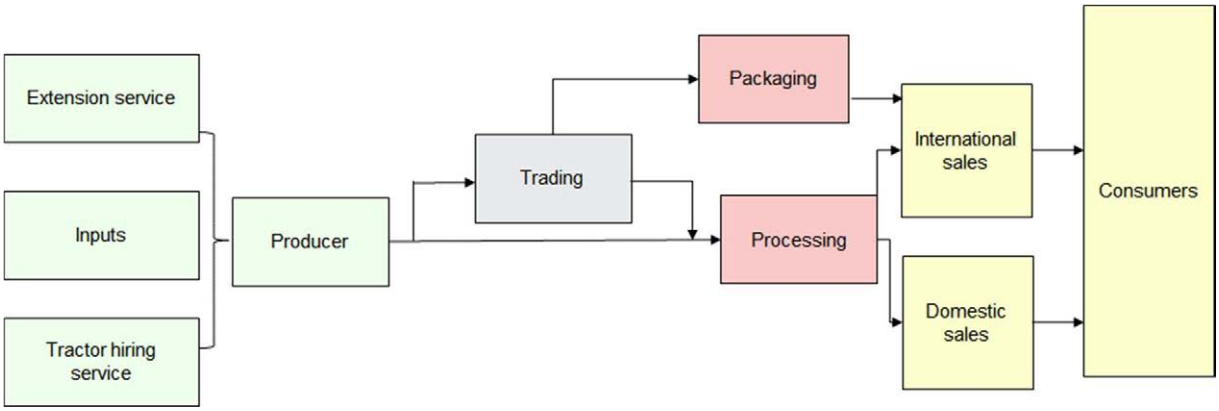
State	Land Area ('000) Ha			Production ('000) MT			Yield (Ton/Ha)	
	2020	2021	% Change	2020	2021	% Change	2020	2021
Abia	41.07	49.60	20.77	296.34	376.86	27.17	7.22	7.60
Akwa Ibom	44.00	48.40	10.01	418.30	476.86	14.00	9.51	9.85
Anambra	102.74	113.01	10.00	561.87	646.15	15.00	5.47	5.72
Bayelsa	80.53	98.84	22.74	533.16	670.50	25.76	6.62	6.78
Benue	29.54	30.04	1.68	126.48	127.76	1.01	4.28	4.25
Borno	19.09	20.04	5.00	5.15	5.30	3.00	0.27	0.26
C/Rivers	34.89	35.91	2.93	423.75	435.62	2.80	12.15	12.13
Delta	39.91	40.99	2.71	200.51	205.80	2.64	5.02	5.02
Ebonyi	139.81	146.95	5.11	281.83	310.94	10.33	2.02	2.12
Edo	55.41	53.47	-3.51	332.91	312.77	-6.05	6.01	5.85
Ekiti	44.36	45.25	2.00	502.36	512.41	2.00	11.32	11.32
Enugu	90.42	74.14	-18.00	776.66	582.50	-25.00	8.59	7.86
Imo	101.90	109.86	7.81	526.31	571.99	8.68	5.16	5.21
Kogi	20.55	21.60	5.12	209.05	215.47	3.07	10.17	9.97
Kwara	50.72	53.75	5.97	153.45	158.41	3.23	3.03	2.95
Lagos	40.87	42.67	4.40	144.34	146.49	1.49	3.53	3.43
Nasarawa	27.61	30.50	10.48	184.94	211.59	14.41	6.70	6.94
Niger	26.26	26.88	2.36	261.90	270.49	3.28	9.97	10.06
Ogun	31.67	31.19	-1.50	343.06	340.08	-0.87	10.83	10.90
Ondo	35.23	36.26	2.92	550.22	566.29	2.92	15.62	15.62
Osun	42.82	41.11	-4.00	349.66	342.67	-2.00	8.17	8.34
Oyo	51.17		0.77	131.06	131.13	0.05	2.56	2.54
Plateau	16.23	18.17	11.94	80.88	92.49	14.36	4.98	5.09
Rivers	34.47	35.49	2.96	256.94	274.31	6.76	7.45	7.73
Taraba	130.76	133.38	2.00	216.04	217.77	0.80	1.65	1.63
National	1332.03	1389.08	4.28	7867.18	8202.63	4.26	5.91	5.91

Source：APS

- Distribution

Raw cassava has a shelf life of 48 hours after being harvested from the ground until it spoils. Due to this time constraint, the price of cassava is subject to market conditions at the time of sale. Farmers may face unfavourable pricing from intermediaries and cooperatives who know they have time constraints when trying to sell their raw cassava.

In addition, farmers' locations are remote from buyers, such as processors or intermediaries, and thus effectively bear high transportation costs. There is also the risk of cash handling, as farmers prefer cash payments due to distrust of financial services.



Source: Prepared by the Study Team based on "Nigeria Cassavas Value Chain Analysis, USAID 2012"

Figure 25 Cassava; Distribution and Value Chain

- Processing

Cassava is a highly versatile crop with a wide range of uses and profitable derivative products.

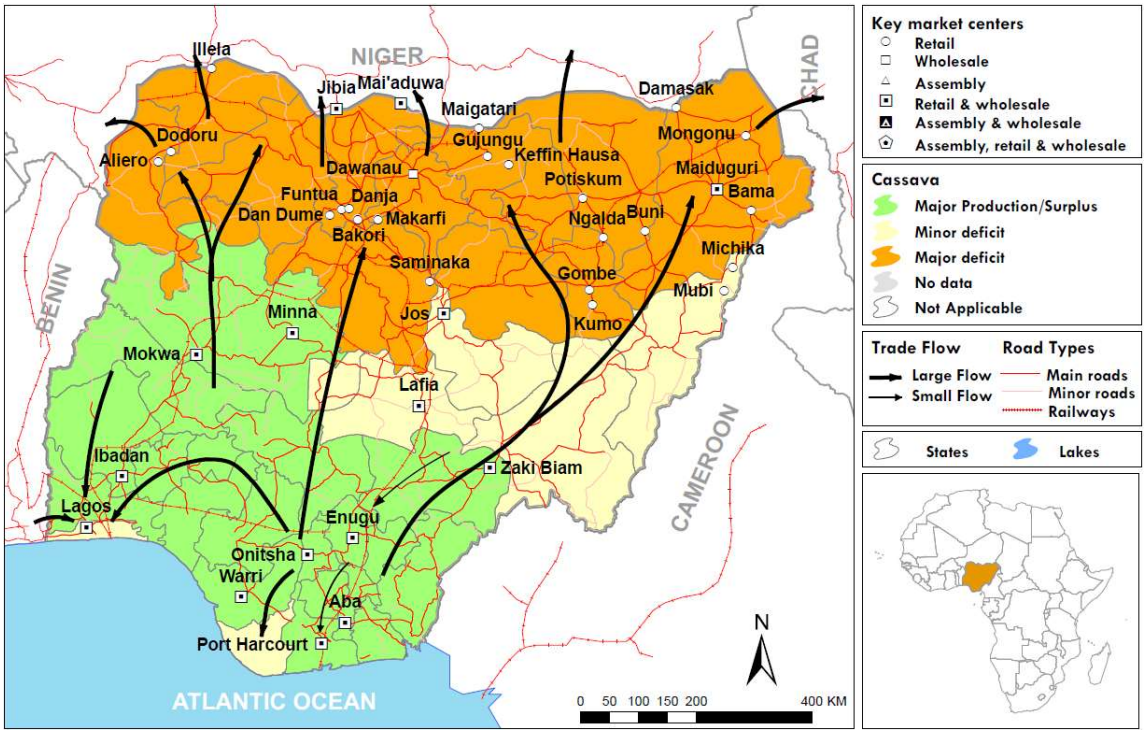
Dried cassava chips are mainly exported and used in the production of pharmaceuticals, beverages and ethanol for biofuels. Cassava chips are also used in domestic animal feed. Cassava can also produce absolute ethanol of up to 99.5% purity, which can be blended with water and flavourings to make alcoholic beverages or used as fuel. The natural starch extracted from the further ground root pulp and dried can be used as is in the production of food and beverages or further processed to produce glucose, dextrin and sorbitol. Dried cassava chips can also be ground and the sieved cassava flour can be blended with wheat flour to make a composite flour used in pasta and bakery/confectionery.

Figure 26 Cassava[37], Cassava chips[38], Fufu (Dough made by kneading flour with hot water)[39]

[37] https://www.businessamlive.com/wp-content/uploads/2020/12/cassava.jpg (Accessed: May 10, 2023)
[38] https://www.enibest.com.ng/wp-content/uploads/2020/06/images2.jpg (Accessed: May 10, 2023)
[39] https://www.preciouscore.com/wp-content/uploads/2017/07/cassava-fufu.jpg (Accessed: May 10, 2023)

- Market

Most of Nigeria's cassava is traded in the country's main markets and is transported by road. It is transported from the south of the main production area to the consumption area in the north where the production is small. Cassava market centres and transportation routes are shown in the figure below.



Source: USAID, Production and Market Flow Map: Nigeria Cassava

Figure 27 Aggregate Markets and Transport Routes for Cassava in Nigeria

- Trade

Both the import and export volume of cassava is small in Nigeria. Nigeria is the world's largest cassava producer, but 98% of cassava is destined for domestic consumption.

- Opportunities and challenges

Although Nigeria currently utilizes 98% of its cassava production for low-value food products, cassava starch for value-added industrial use is expected to develop in both domestic and international markets. Cassava starch can be used as a thickener for soups and cakes in the confectionery industry, as a coating agent for tablets in the pharmaceutical industry, as a rubber filler in the plywood industry, and as a base material for adhesives in paper mills, etc. There are many possibilities in the industrial field.

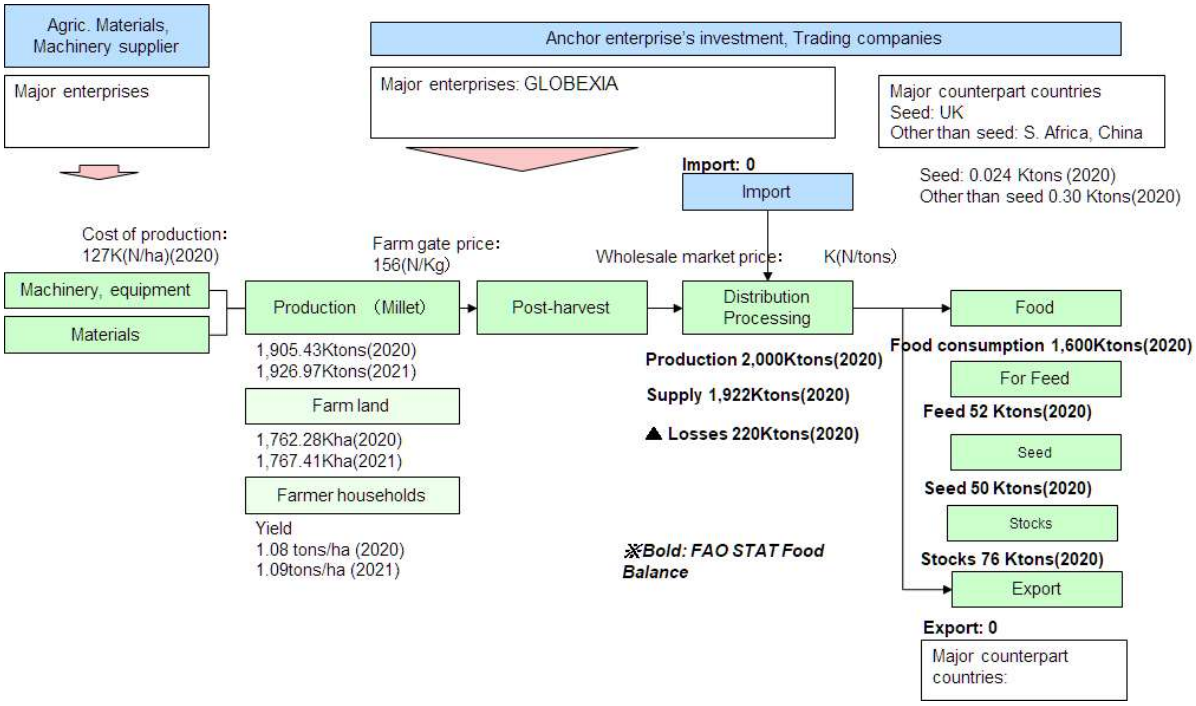
Ethanol production is expected to increase due to the expected increase in consumption of alcoholic

beverages and biofuels. Nigeria currently imports a large amount of wheat, and increased production of cassava flour, which is blended with wheat flour and used in pasta and bakery/confectionery manufacturing, is expected to reduce import costs.

(6) Millet

- Overview

The total land area dedicated to millet in Nigeria increased slightly by 0.29% from 1,762,280 ha in 2020 to 1,767,410 ha in 2021. Millet production is 1,905,000 tons (2020) and 1,927,000 tons (2021). In addition, when related products are added, the supply volume including imports and domestic production is 1,922,000 tons (2020), the consumption of food is 1,600,000 tons (2020), and the consumption as feed is 52,000 tons (2020), consumption as seeds is 50,000 tons (2020), and the rest is disposal. Both imports and exports are small.



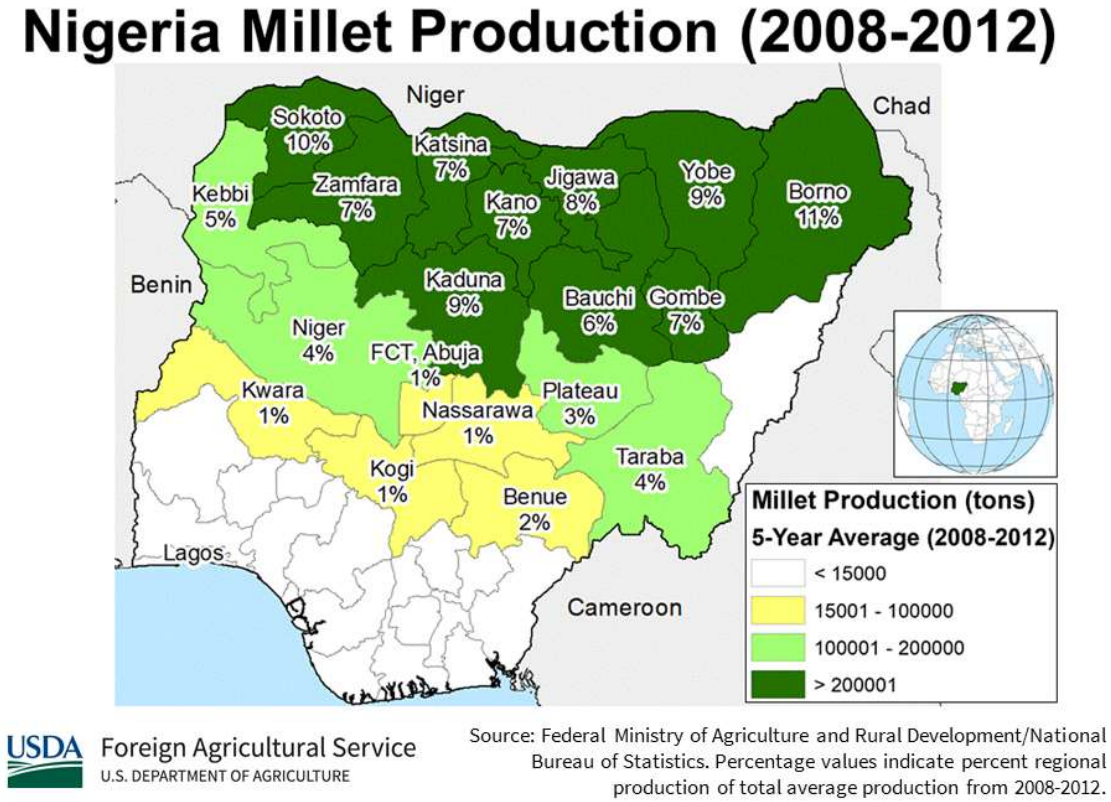
Source: Prepared by the study team based on FMARD APS, FAO STAT, ComTrade, etc.

Figure 28 Overview (Millet and products)

- Production

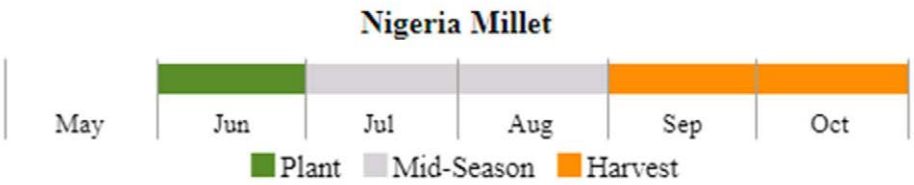
The main producers of millet in Nigeria are the states of Kaduna, Yobe, Kano and Borno in the north. Figure 29 **Millet production areas in Nigeria** shows millet production areas, although the data is a little old. Figure 30 shows the millet cropping calendar, and Table 6 **Millet Production Area, Production Volume, and Yield by Production State** shows the production area, production volume

and yield by province.



Source： USDA[40]

Figure 29 Millet production areas in Nigeria



Source： USDA[41]

Figure 30 Millet planting calendar in Nigeria

[40] https://ipad.fas.usda.gov/countrysummary/Default.aspx?id=NI&crop=Rice (Accessed:31 Jul., 2023)
[41] https://ipad.fas.usda.gov/countrysummary/Default.aspx?id=NI&crop=Rice 2 (Accessed:31 Jul., 2023)

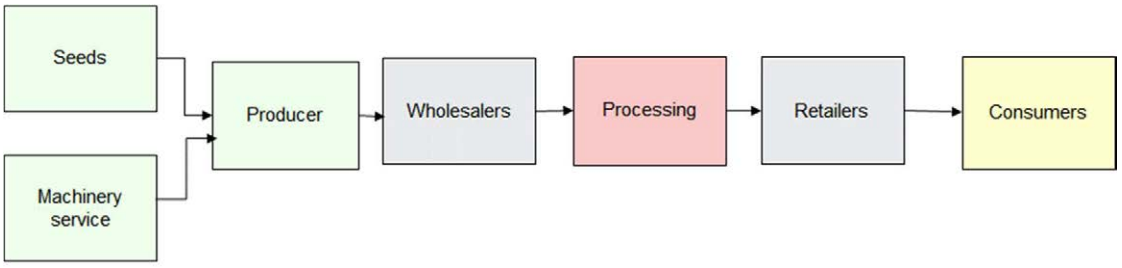
Table 6 Millet Production Area, Production Volume, and Yield by Production State

State	Land Area ('000) Ha			Production ('000) MT			Yield (Ton/Ha)	
	2020	2021	% Change	2020	2021	% Change	2020	2021
Adamawa	135.26	137.88	1.94	163.66	166.80	1.92	1.21	1.21
Bauchi	88.22	88.25	0.04	76.56	76.61	0.06	0.87	0.87
Benue	108.82	112.31	3.21	78.67	86.94	10.52	0.72	0.77
Borno	95.96	98.63	2.78	75.20	78.13	3.89	0.78	0.79
FCT	50.44	49.48	-1.91	55.54	57.16	2.93	1.10	1.16
Gobe	121.21	123.03	1.50	117.32	118.73	1.20	0.97	0.97
Jigawa	94.19	94.19	0.00	70.89	71.08	0.27	0.75	0.76
Kaduna	63.78	63.49	-0.45	51.94	51.60	-0.65	0.81	0.81
Kano	52.24	54.27	3.89	87.56	88.42	0.99	1.68	1.63
Katsina	151.92	137.85	-9.26	166.45	153.07	-8.04	1.09	1.11
Kebbi	80.42	81.50	1.34	73.45	75.57	2.89	0.91	0.93
Kogi	39.74	39.96	0.56	38.59	38.76	0.43	0.97	0.97
Kwara	31.62	32.56	2.98	30.03	30.92	2.97	0.95	0.95
Nasarawa	24.17	24.38	0.90	31.45	31.73	0.90	1.30	1.30
Niger	108.66	103.49	-4.76	120.21	113.61	-5.49	1.11	1.09
Plateau	79.99	83.10	3.89	72.01	74.81	3.90	0.90	0.90
Sokoto	81.40	81.40	0.00	183.26	188.53	2.88	2.25	2.32
Taraba	108.50	110.60	1.94	92.01	93.78	1.92	0.85	0.85
Yobe	208.24	210.94	1.30	240.43	245.26	2.01	1.16	1.16
Zamfara	37.50	40.08	6.89	80.20	85.44	6.53	2.14	2.13
National	1762.28	1767.41	0.29	1905.43	1926.97	1.13	1.08	1.09

Source：APS

- Distribution

The distribution route of millet is shown in the figure below. From farmers to consumers via wholesalers, processors and retailers. Processed millet is used as food, beverage, livestock feed, etc.



Source: U, Gokul & Parasuraman, Balaji & S.D, Sivakumar. (2019). Role of Actors in Farmer Producer Organization (FPO) based Millet Value Chain. Madras Agricultural Journal. 106.

Figure 31 Millet; Distribution and Value Chain

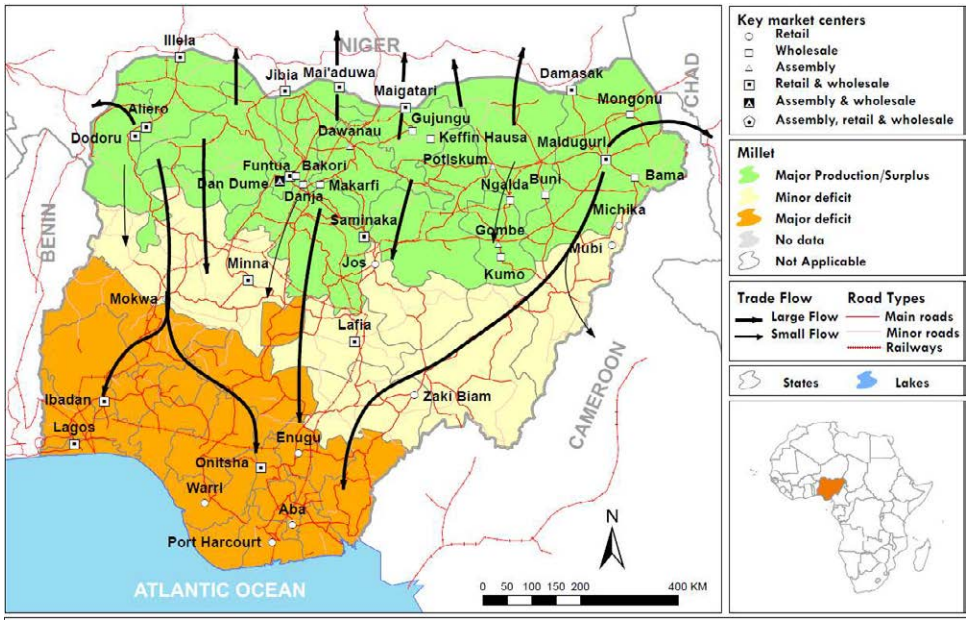
- Processing

Millet is processed into various products. For example, there are millet flour, processed products for using millet grains as food, production of beer using millet malt, and feed for livestock.

Figure 32 Rice husk by wind[42], Millet flour[43], Millet porridge[44]

- Market

Most of Nigeria's millet is traded in the country's main markets and is transported by road. It is transported from the north of the main production area to the consumption areas in the south where the production is low. Millet's market centres and transport routes are shown in the figure below.



Source: USAID, Production and Market Flow Map: Nigeria Millet

Figure 33 Aggregate Markets and Transport Routes for Millet in Nigeria

[42] https://cdn.britannica.com/21/93621-004-FBAAAC57.jpg (Accessed: 10 May, 2023)
[43] http://negconnect.com/wp-content/uploads/2020/09/LogoLicious_20200808_215056-300x169.png (Accessed: 10 May, 2023)
[44] http://www.gratednutmeg.com/wp-content/uploads/2015/01/DSC_0050-600x399.jpg (Accessed: 10 May, 2023)

- Trade

Almost no exports or imports.

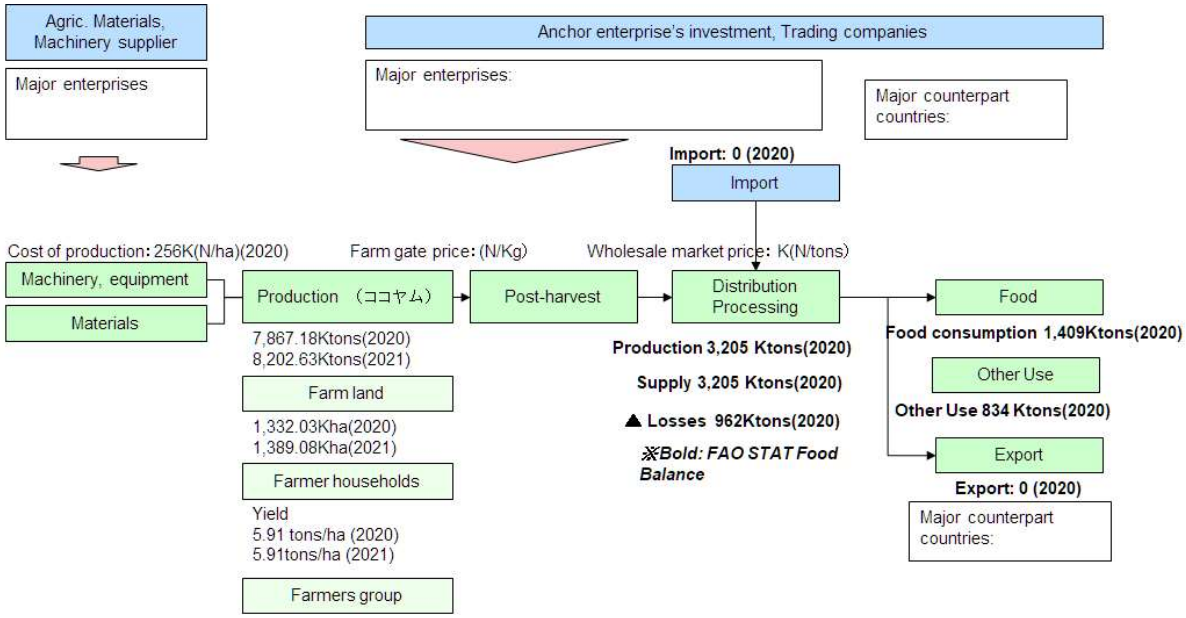
- Opportunities and challenges

If millet production is stabilized and demand for beer malt, livestock feed, millet flour, etc. is expanded, added value can be increased, which has the potential to be highly economical.

(7) Cocoyam[45]

- Overview

Nigeria is the world's largest producer of cocoyam, with production of 7,867,000 tons (2020) and 8,203,000 tons (2021). The cultivated land area is 1,332,000 ha (2020) and 1,389,000 ha (2021). Domestic production is 3,205,000 tons (2020). In addition, consumption as food is 1,409,000 tons (2020), other uses are 834,000 tons (2020), and the rest is disposal.[46]



Source: Prepared by the study team based on FMARD APS, FAO STAT, Comtrade, etc.

Figure 34 Overview (Cocoyam and products)

- Production

The major production areas of cocoyam in Nigeria are the southwest, south-south, southeast and north-central regions. The table below shows the production area, production volume and yield for each province.

[45] Temidayo Gabriel Apata1, et al, "Value chain analysis of cocoyam enterprise in southwest region, Nigeria", Journal of the Austrian Society of Agricultural Economics (JASAE),Volume 17, Issue 03, March, 2021
[46] FMARD, 2020 Wet Season Agricultural Performance in Nigeria

Cocoyam is a perennial crop grown primarily for food. Cocoyam is a member of the Araceae family and is rich in digestible starch, high-quality protein, vitamin C, thiamin, riboflavin, niacin, high-scoring protein and essential amino acids.

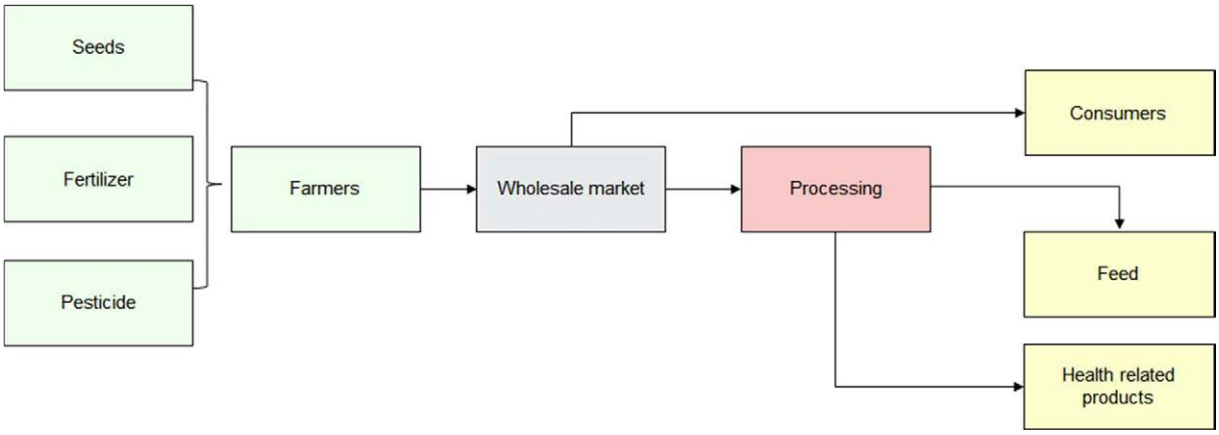
Table 7 Cocoyam Production Area, Production Volume, and Yield by Production State

State	Land Area ('000) Ha			Production ('000) MT			Yield (Ton/Ha)	
	2020	2021	% Change	2020	2021	% Change	2020	2021
Abia	41.07	49.60	20.77	296.34	376.86	27.17	7.22	7.60
Akwa Ibom	44.00	48.40	10.01	418.30	476.86	14.00	9.51	9.85
Anambra	102.74	113.01	10.00	561.87	646.15	15.00	5.47	5.72
Bayelsa	80.53	98.84	22.74	533.16	670.50	25.76	6.62	6.78
Benue	29.54	30.04	1.68	126.48	127.76	1.01	4.28	4.25
Borno	19.09	20.04	5.00	5.15	5.30	3.00	0.27	0.26
C/Rivers	34.89	35.91	2.93	423.75	435.62	2.80	12.15	12.13
Delta	39.91	40.99	2.71	200.51	205.80	2.64	5.02	5.02
Ebonyi	139.81	146.95	5.11	281.83	310.94	10.33	2.02	2.12
Edo	55.41	53.47	-3.51	332.91	312.77	-6.05	6.01	5.85
Ekiti	44.36	45.25	2.00	502.36	512.41	2.00	11.32	11.32
Enugu	90.42	74.14	-18.00	776.66	582.50	-25.00	8.59	7.86
Imo	101.90	109.86	7.81	526.31	571.99	8.68	5.16	5.21
Kogi	20.55	21.60	5.12	209.05	215.47	3.07	10.17	9.97
Kwara	50.72	53.75	5.97	153.45	158.41	3.23	3.03	2.95
Lagos	40.87	42.67	4.40	144.34	146.49	1.49	3.53	3.43
Nasarawa	27.61	30.50	10.48	184.94	211.59	14.41	6.70	6.94
Niger	26.26	26.88	2.36	261.90	270.49	3.28	9.97	10.06
Ogun	31.67	31.19	-1.50	343.06	340.08	-0.87	10.83	10.90
Ondo	35.23	36.26	2.92	550.22	566.29	2.92	15.62	15.62
Osun	42.82	41.11	-4.00	349.66	342.67	-2.00	8.17	8.34
Oyo	51.17		0.77	131.06	131.13	0.05	2.56	2.54
Plateau	16.23	18.17	11.94	80.88	92.49	14.36	4.98	5.09
Rivers	34.47	35.49	2.96	256.94	274.31	6.76	7.45	7.73
Taraba	130.76	133.38	2.00	216.04	217.77	0.80	1.65	1.63
National	**1332.03**	**1389.08**	**4.28**	**7867.18**	**8202.63**	**4.26**	**5.91**	**5.91**

Source：APS

- Distribution

The distribution route of cocoyam is shown in the figure below. From farmers to wholesale markets to consumers. Some are processed by processors and become fertilizers and health-related products.



Source: Prepared by the Study Team based on "Value Chain Analysis of Cocoyam Enterprise in Southwest region, Journal of the Austrian Society of Agricultural Economics (JASAE), Volume 17, Issue 03, Nigeria, March 2021"

Figure 35 Cocoyam; Distribution and Value Chain

Figure 36 Cocoyam[47], Cocoyam chips[48]

- Processing

Cocoyam can be used in confectionery such as chips, alcohol, pharmaceuticals, cocoyam flour and starch.

- Market

Cocoyam farming in Nigeria is mainly practiced at the subsistence level. Due to the small scale of the cocoyam farms, most of the production is consumed locally.

[47] https://t4.ftcdn.net/jpg/03/18/64/79/240_F_318647907_YyXwNkGgrr1dAlEhon0BLpCFfcxevYsJ.jpg (Accessed: 10 May , 2023)

[48] https://d38ua33b9armg0.cloudfront.net/images/thumb/judi-cocoyam-chips-60g-0.jpg?w=1920&q=75(Accessed: 10 May , 2023)

- Trade

Neither exports nor imports are carried out.

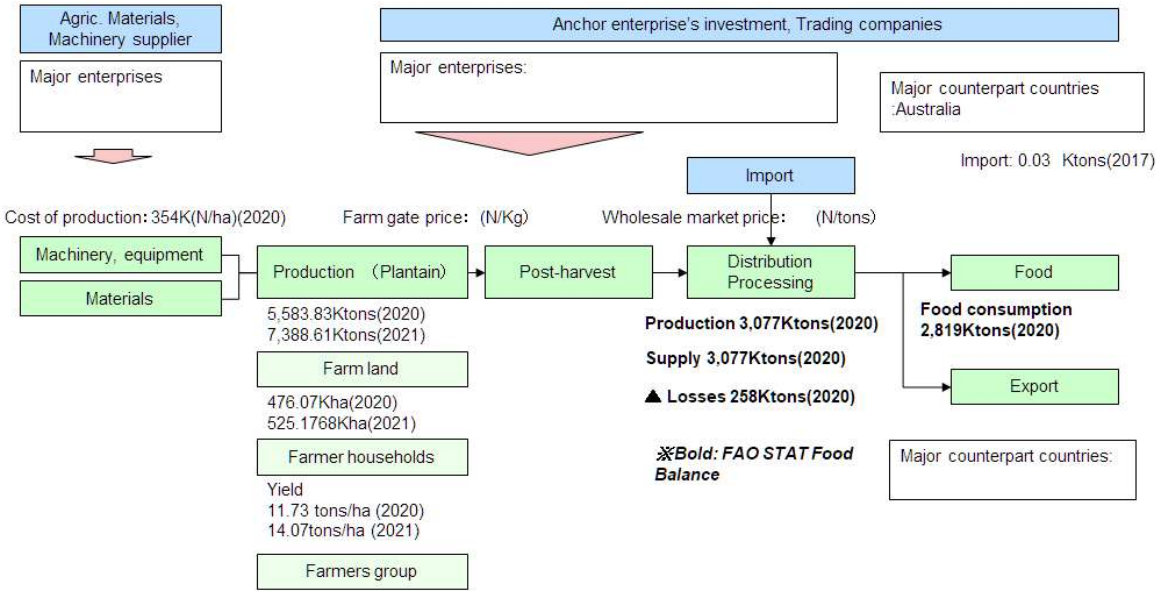
- Opportunities and challenges

If the production of cocoyam is stabilized and the demand for confectionery products such as chips, alcohol, pharmaceuticals, cocoyam flour, and starch is expanded to increase added value, there is a possibility of high economic efficiency.

(8) Plantain[49]

- Overview

Plantain production is 5,584,000 tons (2020) and 7,389,000 tons (2021). In addition, when related products are added, the supply volume including imports and domestic production is 3,077,000 tons (2020), consumption as food is 2,819,000 tons (2020), and the rest is disposal. Imports are negligible and exports are non-existent.[50]



Source: Prepared by the study team based on FMARD APS, FAO STAT, Comtrade, etc.

Figure 37 Overview (Plantain and products)

- Production

The main producers of plantain are the southwest, south south and southeast of Nigeria. Good quality plantains are mainly produced from October to February every year. Plantain farmers are

[49] Ayanwale A.B, Fatunbi A.O and Ojo M (2016). Innovation Opportunities in Plantain Production in Nigeria. Guide Book 1. Forum for Agricultural Research in Africa (FARA), Accra Ghana
[50] FAOSTAT

mainly small-scale, and only a few farmers are involved in large-scale commercial plantain cultivation. Farmers usually grow plantains along with cocoa, cocoyam, cassava, oil palm, etc.

The table below shows the production area, production volume and yield for each province.

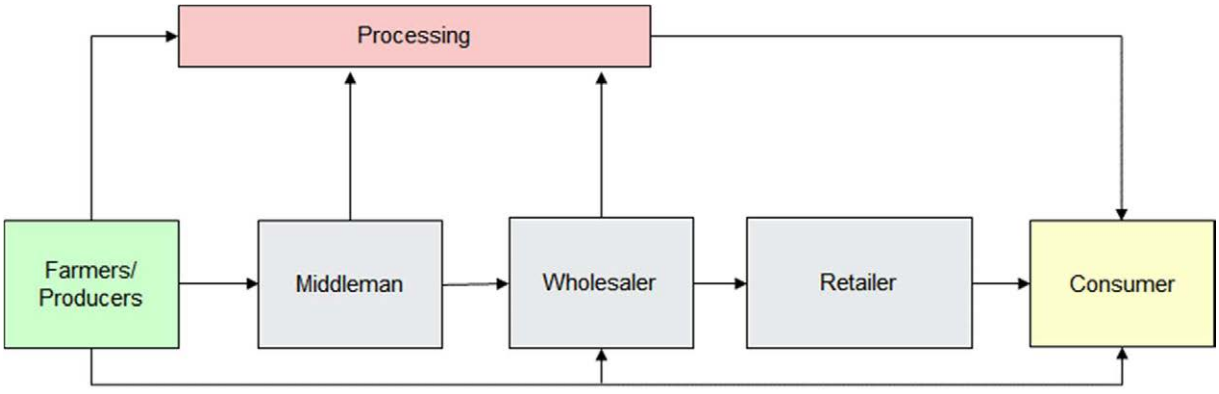
Table 8 Plantain/Banana Production Area, Production Volume, and Yield by Production State

State	Land Area ('000) Ha			Production ('000) MT			Yield (Ton/Ha)	
	2020	2021	% Change	2020	2021	% Change	2020	2021
Abia	18.8	18.8	0	139	139	0	7.39	7.39
A/Ibom	54.08	54.62	1	2005	2025.05	1	37.07	37.07
Bayelsa	67.12	80.54	20	391.1	496.70	27	5.83	6.17
Ebonyi	-	65.65	-	-	2104.20	-	-	53.42
Edo	153	120.87	-21	2295	1813.05	-21	15	15.00
Imo	40.55	42.17	4	355.5	412.38	16	8.77	9.78
Kwara	142.52	142.52	0	398.23	398.23	0	2.79	2.79
National	476.07	525.1768	10.32	5583.83	7388.61	32.32	11.73	14.07

Source：APS

- Distribution

Farmers near highways harvest their crops when the plantains are still green and sell them along the road or transport them to nearby markets to sell directly to small wholesalers, retailers and consumers. Also, collectors move farms, collect produce from farmers, transport it to cities, and deliver it to wholesalers, who in turn deliver the produce to retailers or vendors.



Source: Innovation Opportunities in Plantain Production in Nigeria, FARA, 2016

Figure 38 Plantain; Distribution and Value Chain

- Processing

Plantains are processed into various types of products such as plantain chips, plantain flour, plantain balls and biscuits.

Plantain chips are slices of unripe or slightly ripe plantain pulp fried in vegetable oil and distributed in plastic or aluminum sachets. Plantain chips are the most popular plantain product in Nigeria and are sold by street vendors and supermarkets.

Plantains are also ground by peeling, chopping the pulp into pieces, air drying, and grinding the dried pulp in a wooden mortar or corn grinder. Plantain flour is used to make fufu, bread, biscuits, baby food, or cakes.

The advantages of plantain chips or flour are long shelf life and easy transportation.

Processors buy directly from collectors and farmers and mostly operate on a small scale using rudimentary equipment. Processed plantain products are widely marketed locally, but little is done about international standards and traceability.

Figure 39 Roast Plantain[51], Plantain flour[52], Plantain chips[53]

- Market

Plantains are consumed in many households in Nigeria. In urban areas, they are usually eaten in convenient forms such as 'dodo' (fried ripe flesh), chips (fried immature flesh) and plantain flour. Plantain flour contains protein, minerals and vitamins, making it nutritionally superior to other starchy foods.

Medically, it is used to treat certain ailments such as sore throat, tonsillitis, diarrhea, and vomiting.

- Trade

Currently, there are few imports and no exports.

- Opportunities and challenges

Plantains are an important source of income for smallholder farmers, as they require less labour to produce and have a higher return on investment than other crops such as cassava, rice, maize and yams. Processed plantains also provide employment for the vendors who sell them. It is expected to earn foreign currency by converting platen production from a self-sufficient stage to a market-oriented

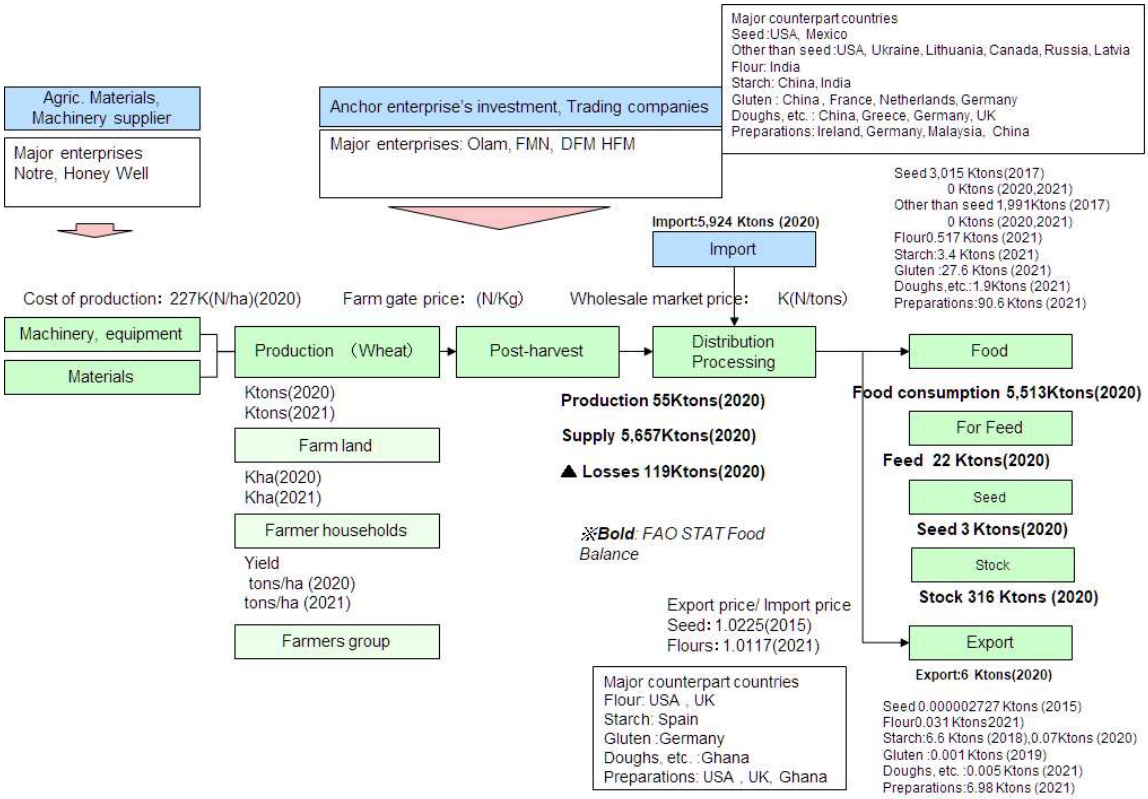
[51] https://upload.wikimedia.org/wikipedia/commons/a/a4/Boli_and_Groundnut.png (Accessed: 10 May, 2023)
[52] https://www.oluolufoods.com/wp-content/uploads/2022/12/plantain_flour_grouped.png (Accessed: 10 May, 2023)
[53] https://hallmarknews.com/wp-content/webpc-passthru.php?src=https://hallmarknews.com/wp-content/uploads/2017/10/chip.jpg&nocache=1 (Accessed: 10 May, 2023)

approach and exporting it.

(9) Wheat[54]

- Overview

The production of wheat in Nigeria is small, and adding related products, the total supply of imports and domestic production is 5,657,000 tons (2020), the consumption as food is 5,513,000 tons (2020), and the rest is feed, seed, inventory, disposal and export[55]。



Source: Prepared by the study team based on FMARD APS, FAO STAT, ComTrade, etc.

Figure 40 Overview (Wheat and products)

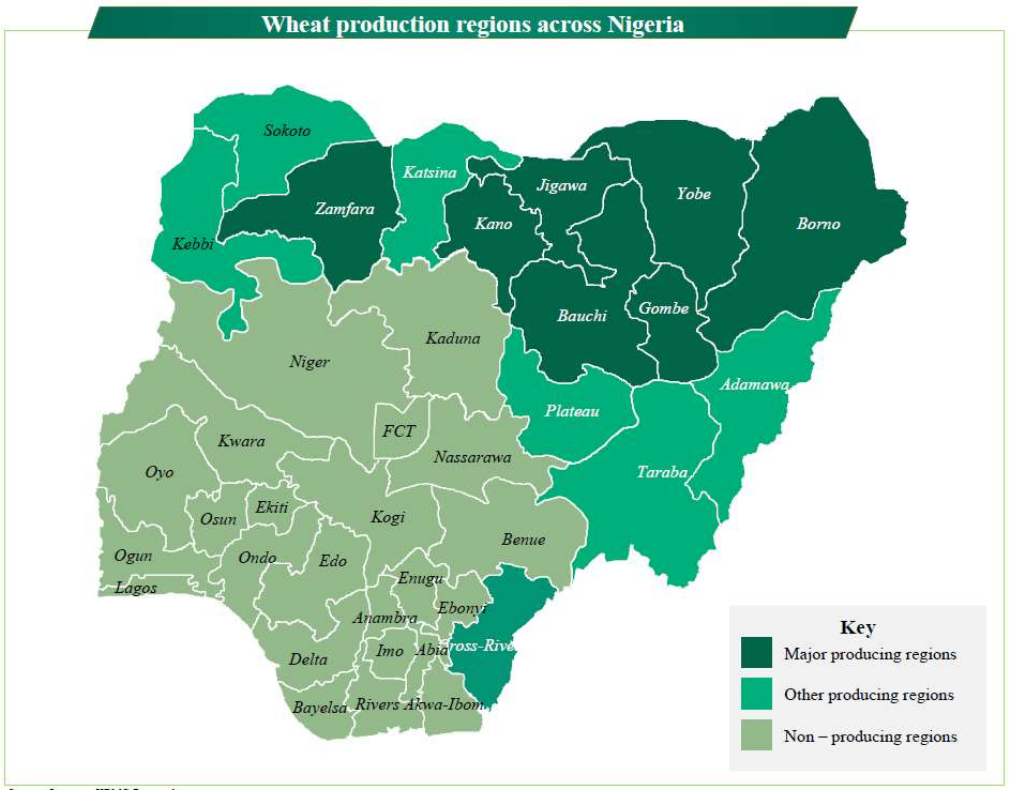
- Production

Wheat production in Nigeria is concentrated mainly in the northern regions, where the average temperature is 15-20°C. However, wheat production in Nigeria is small. The main factor is farmers' use of non-breed seeds due to the inconsistent supply of high-yielding seeds suitable for Nigeria's climate. There are no private companies involved in certified wheat seed production in Nigeria. Farmers also lack access to mechanized equipment and the latest agricultural technology. Furthermore,

[54] NIPC, UKaid, Nigerian Wheat Investment opportunities , 2020
[55] FAOSTAT

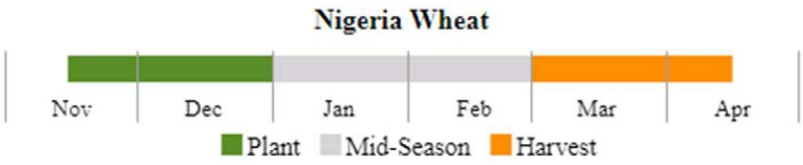
Nigeria's agricultural production is primarily rain-fed, but only 10% of the land available for wheat production is irrigated. Inadequate public irrigation systems, lack of access for farmers to irrigation equipment such as drip systems, and low levels of irrigation also contribute to low production.

Wheat production areas are shown in Figure 41 and the cropping calendar for wheat is shown in Figure 42.



Source： NIPC, UKaid, Nigerian Wheat Investment Opportunities, 2020

Figure 41 Wheat production areas in Nigeria



Source： USDA[56]

Figure 42 Wheat planting calendar in Nigeria

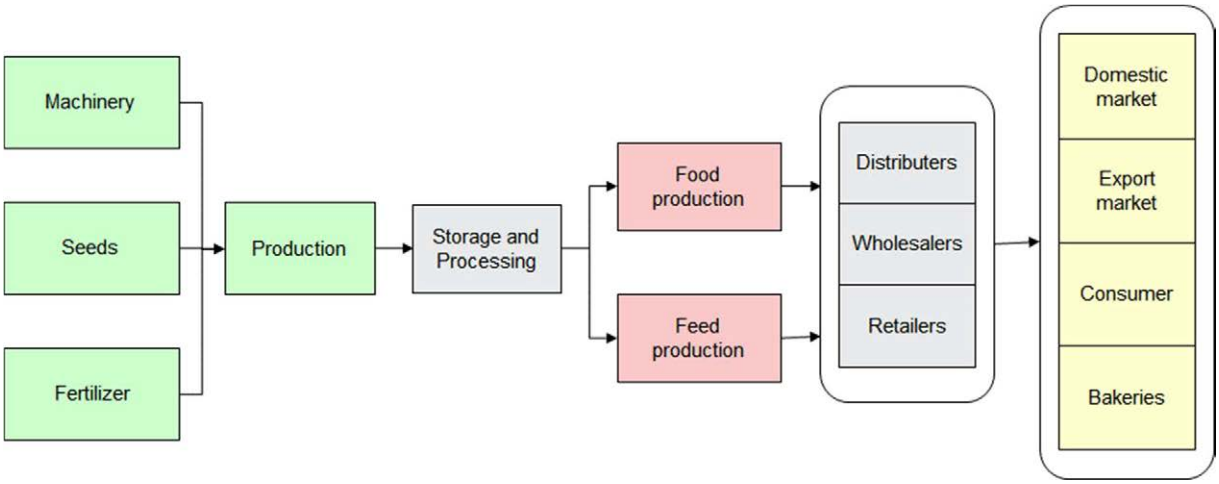
- Distribution

There is no dedicated distribution channel for wheat grains in the Nigerian wheat value chain.

[56] https://ipad.fas.usda.gov/countrysummary/Default.aspx?id=NI&crop=Rice (Accessed:31 Jul., 2023)

Therefore, the cost of wheat is high. Wheat flour is packaged and distributed in bags of various sizes, but the most common size is the 50 kg bag. Other wheat flour based products such as pasta, semolina and noodles are sold in their standard packaging through major distributors and wholesalers.

In addition, the limited existing grain storage facilities result in high post-harvest losses and poor grain quality. The government owns storage facilities (25-100 TMT capacity) dedicated to grain, but most of these are inefficiently managed for leasing to private companies.



Source: Prepared by the Study Team based on "Investment Opportunities in Nigeria's Wheat Value Chain, January 2020, Ukaid, and KPMG"

Figure 43 Wheat; Distribution and Value Chain

- Processing

Wheat is processed in mills, food processing plants, and feed production plants. The milled flour is processed into noodles, pasta, cereals, etc., and into confectionery such as bread and biscuits. Flour Mills of Nigeria (FMN), Olam Nigeria Limited, Dangote Flour Mills, and Honeywell Flour Mills are the major flour milling, processing and marketing companies in Nigeria. Each has its own flour mill in Lagos.

Source： NIPC, UKaid, Nigerian Wheat Investment Opportunities, 2020

Figure 44 Examples of processed wheat products (Olam Nigeria Limited,)

- Market

Nigeria is the third largest wheat consumer in Africa, and consumption is projected to grow by 38% between 2018 and 2028. However, production levels are low and domestic supply meets only 2% of consumption. Nigeria is also currently the 11th wheat importer in the world, with a consumption-to-import ratio of 90%.

Wheat is mainly consumed in wheat flour-based foods, and consumption is on the rise. Bread, pastries and biscuits are popular wheat flour-based products in Nigeria, with a market size of US$965 million in 2019. The biscuit market is dominated by three Nigerian companies: OK Foods, Yale Foods and Pladis. Domestic consumption is expected to increase on the back of rising Nigerian public demand for wheat flour-based products such as bread, semolina and pasta.

- Trade

Nigerian wheat is either sold domestically or exported to neighbouring countries such as Niger, Chad, Mali and Burkina Faso. Imported wheat is sourced mainly by major millers in Russia, Canada, the United States and Australia, although some major millers enter into contract farming schemes with local farmers to supply domestic wheat.

Due to low wheat production levels, Nigeria spent $1.7 billion on wheat imports in 2018, and imports are projected to grow at a compound annual growth rate of 2% between 2020 and 2028.

The Nigerian government continues to introduce trade-restrictive measures, such as high tariffs and foreign exchange controls, to reduce its dependence on wheat imports. Examples include a 5% tariff

on wheat imports and an additional 15% tariff for national wheat development programs.

- Opportunities and challenges

To reduce dependence on wheat imports and to invest in export-oriented wheat production, the private sector will provide farmers with inputs such as high-quality seeds, fertilizers and machinery, and increase the availability of wheat grains of a particular quality and price range. A contract farming scheme to obtain supply is conceivable. This will reduce grain input costs by 85%.

Also, to increase wheat production, the private sector can provide farmers with the most efficient irrigation system, such as a drip irrigation system. In 2018, several major Nigerian millers contracted wheat farmers to provide irrigation systems to boost local production.

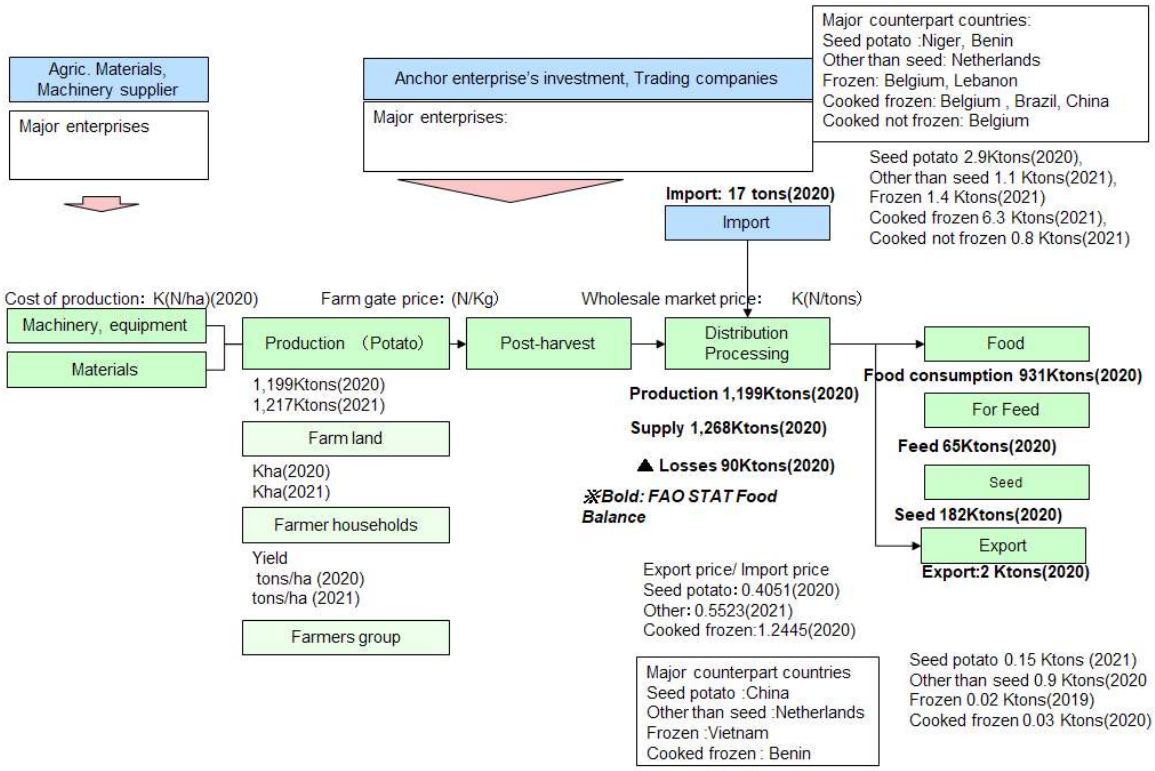
In order to maintain the quality of wheat, investment in government-owned storage facilities and development of private storage facilities can be considered. In one instance, 19 out of 33 government-owned storage facilities were transferred to a private Nigerian agricultural company. It is also expected to build a dedicated storage facility with a warehouse management system for storage of wheat grains. It is also expected to increase investment in the production of wheat flour-based biscuits, which are popular with consumers.

(10) Potato[57]

- Overview

Potato production is 1,199,000 tons (2020) and 1,217,000 tons (2021). In addition, when related products are added, the supply volume including imports and domestic production is 1,268,000 tons (2020), the consumption of food is 931,000 tons (2020), and the consumption of feed is 65,000 tons (2020), consumption as seed potatoes is 182,000 tons (2020), and the remainder is disposal and exported.

[57] Christine Plaisier, Youri Dijkxhoorn, Fédes van Rijn, Johann Bonnand and Olufolajimi Talabi, 2019. *The vegetable and potato sector Nigeria; An overview of the present status.* Wageningen, Wageningen Economic Research, Report 2019-119.



Source: Prepared by the study team based on FMARD APS, FAO STAT, ComTrade, etc.

Figure 45 Overview (Potato and products)

- Production

Nigeria's potato production is the fourth largest on the African continent, with Plateau producing about 45% of the domestic production, and other states such as Taraba, Cross River, Kaduna, Borno and Enugu.

Potatoes are a cool season crop, growing best during warm days and cool nights, and the growing season in Nigeria is divided into the rainy season from April to August and the dry season from September to March in which the irrigation is conducted. Potatoes are usually grown by small farmers.

There is a strong demand for seed potatoes, but the only seed potatoes available come from occasional imports from European seed potato suppliers. Farmers cannot also increase the number of imported seed potatoes. Therefore, the seed potato supply is unstable. For this reason, farmers must continually recycle their own seed potatoes or buy similar regenerated potatoes from the market.

In addition, farmers, extension workers and pesticide dealers also lack the basic knowledge necessary to manage viral diseases, bacterial wilt, and epidemics.

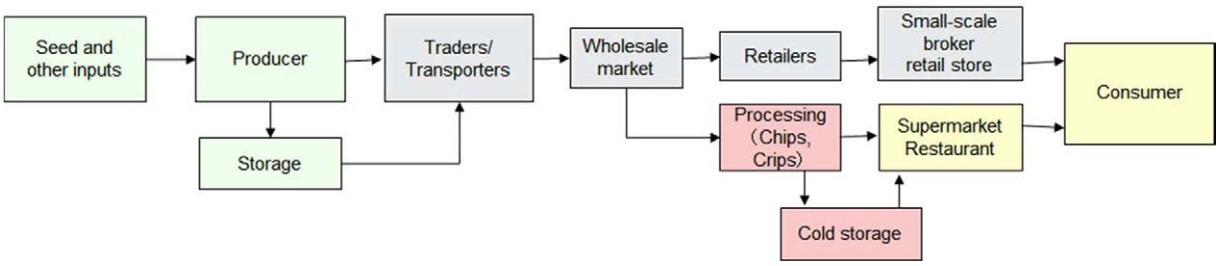
- Distribution

Potatoes are traded at specific potato wholesale markets. Farmers transport potatoes to these markets.

Trading is usually done through market brokers who connect producers and traders. Potato quality grades are informal and based on size and skin firmness.

Inexpensive non-woven polyethene bags used to pack potatoes are not breathable and allow heat build-up and moisture build-up, allowing the potatoes to rot. Bokos Market, the largest market, has branded bags dedicated to potatoes produced in the Bokos region.

In addition, since farmers do not have short-term storage facilities for unsold potatoes, farmers sell unsold potatoes at low prices in the market. There is also a serious risk to local traders who have unsold inventory that they cannot store properly, leading to increased margins.



Source: The Vegetable and Potato Sector Nigeria, Wageningen Economic Research, Netherland Enterprise Agency, Ministry of Economic Affairs and Climate Policy, the Hague, the Netherland, 2019

Figure 46 Potato; Distribution and Value Chain

- Processing

In Nigeria, potato processing is confined to restaurants and a few small processors, and no other potato processing takes place. For example, most French fries and chips are imported. As a result, the potato sector lacks knowledge and experience regarding added value.

- Market

About 7 kg of potato is consumed per person per year. Shipping and retail prices vary by season and state. The average market price as of 2019 was N140 per kg for farm shipment, N160 for roadside and N400 for the modern open market in Abuja.

- Trade

According to FAO (2008) and the National Root Crops Research Institute (NRCRI, 2010), total potato imports (products, seeds and processed potatoes) range from 40,000 to 60,000 tons. Due to a lack of storage capacity, imports are small and mainly done in the off-season. Fresh and frozen potatoes and seed potatoes are mainly imported from Belgium, the Netherlands, the United Kingdom and South Africa.

The most rapid and effective way to increase access to high-quality seed potatoes that are in strong

demand at production sites is to promote the import and retail sale of seed potatoes produced in other countries. There are specialized international companies in Germany, France and Holland with expertise in supplying high quality seed potatoes, supplying varieties that perform under Nigerian conditions. However, current regulations and practices do not facilitate the importation of seed potatoes, resulting in erratic supply, limited availability, high prices, and reluctant trading partners (exporters and importers). Importation of seed potatoes is limited to a few traders who have the approval to import certain quotas, and even with these quotas, the customs clearance of seed potatoes is very complicated and inefficient.

- Opportunities and challenges

To increase productivity, improve pre- and post-harvest management and develop an overall competitive potato value chain, the following activities can be considered:[58]

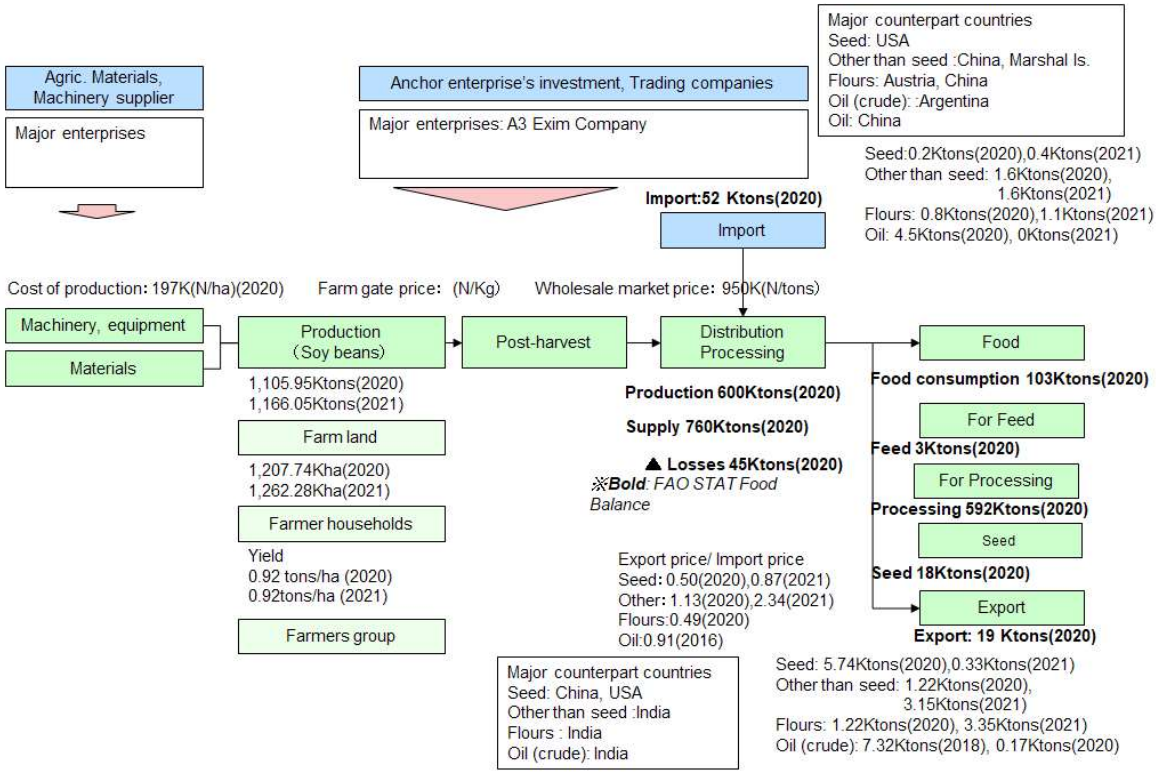
- Improving and strengthening access to seed potatoes
- Crop protection and disease control
- Strengthen mechanization
- Improvement of the processing industry
- Efficient collaboration between farmers, processors and retailers
- Development of storage facilities
- Provision of extension services
- Strengthening the institutional environment for the potato sector value chain

(11) Soybean

- Overview

Soybean production is 1,106,000 tons (2020) and 1,166,000 tons (2021). Including related products, the supply amount including imports and domestic production is 760,000 tons (2020), the consumption of food is 103,000 tons (2020), the consumption of feed is 3,000 tons (2020), consumption for processing is 592,000 tons (2020), consumption as seeds is 18,000 tons (2020), and the rest is disposal and exported. Average soybean yield is 0.92 tons/ha (2021)[59]。

[58] Sylvanus Mahannan Ayuba, Michael Kitsche with support of : Folarin Ranson Oguntolu (Potato Initiative Africa) "Promotion of Potato Value Chains in Nigeria", 2014
[59] FAOSTAT



Source: Prepared by the study team based on FMARD APS, FAO STAT, ComTrade, etc.

Figure 47 Overview (Soybean and products)

- Production

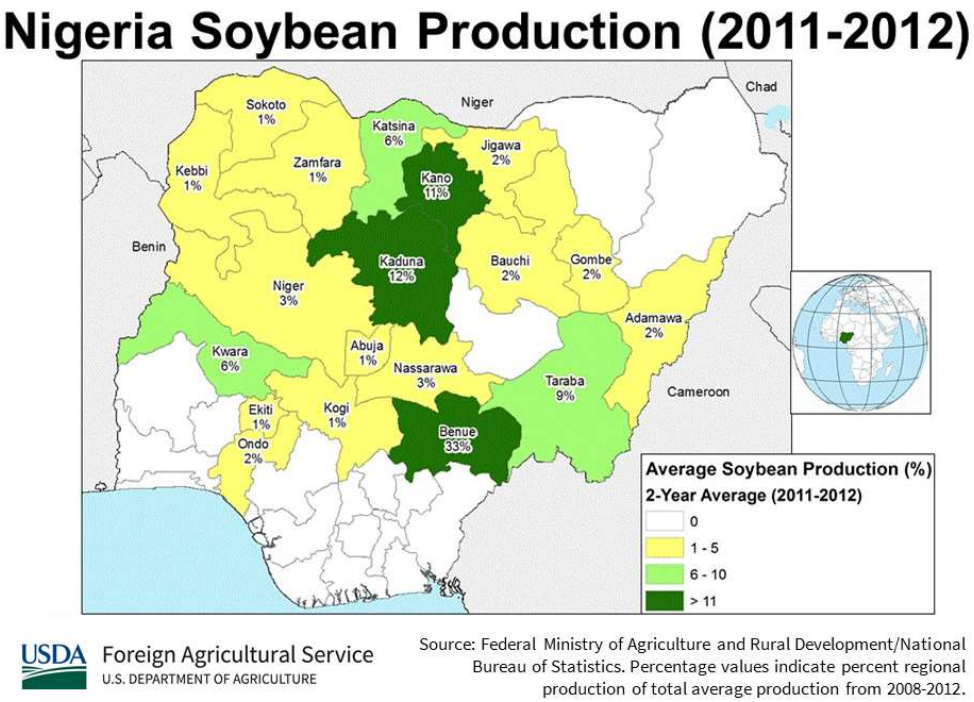
Nigeria is one of the largest soybean producers in sub-Saharan Africa, but its production scale is relatively small, smaller than that of maize and sorghum. This was mainly because the market was not very profitable and the incentives for farmers to grow soybeans were limited. Insufficient soybean grinding capacity has also limited demand from the livestock feed industry, a major user of soybeans in Nigeria.

However, there is a need to increase soybean yields and production to meet the demands of recent growth in industrial sectors such as soybean oil production and feed production.

The availability and cost of chemical fertilizers are major constraints on crop production in Nigeria, but soybean is a suitable crop for Nigeria because it is resistant to diseases and pests and requires less fertilizer. Due to its nitrogen-fixing properties, it is also used as a rotation crop with maize, sorghum and cotton.[60]

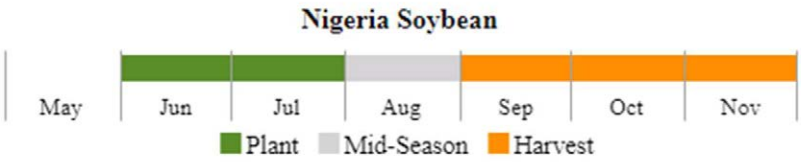
Although the data is a little old, soybean production areas are shown in Figure 48. Figure 49 shows the soybean planting calendar, and Table 9 shows the production area, production volume, and yield by state.

[60] Olam Grains, Nigeria Soybeans Factsheet, supporting Nigeria's Agricultural Change and Food Security Agenda



Source： USDA[61]

Figure 48 Soybean production areas in Nigeria



Source： USDA[62]

Figure 49 The Soybean planting calendar in Nigeria

[61] https://ipad.fas.usda.gov/countrysummary/Default.aspx?id=NI&crop=Rice (Accessed:31 Jul., 2023)
[62] https://ipad.fas.usda.gov/countrysummary/Default.aspx?id=NI&crop=Rice (Accessed:31 Jul., 2023)

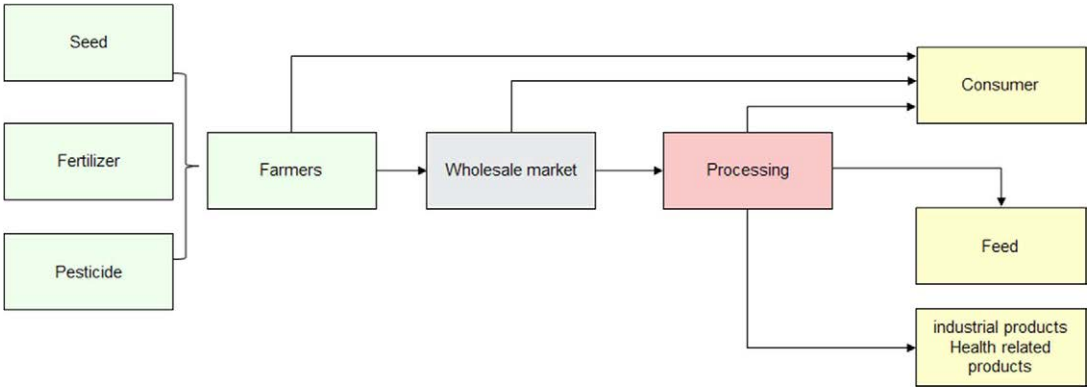
Table 9 Soybean Production Area, Production Volume, and Yield by Production State

State	Land Area ('000) Ha			Production ('000) MT			Yield (Ton/Ha)	
	2020	2021	% Change	2020	2021	% Change	2020	2021
Adamawa	60.99	62.92	3.16	54.86	57.14	4.16	0.90	0.91
Bauchi	39.82	41.81	5.00	27.16	28.95	6.58	0.68	0.69
Benue	97.59	100.35	2.83	240.46	247.87	3.08	2.46	2.47
Borno	24.92	27.84	11.73	17.57	19.07	8.55	0.71	0.68
Ekiti	26.28	26.41	0.50	9.02	9.05	0.33	0.34	0.34
FCT	64.43	66.34	2.96	36.49	37.58	3.00	0.57	0.57
Gombe	69.46	71.88	3.49	58.24	59.70	2.50	0.84	0.83
Jigawa	43.16	44.18	2.37	34.80	35.39	1.69	0.81	0.80
Kaduna	102.43	105.55	3.05	100.50	105.06	4.54	0.98	1.00
Kano	65.98	68.29	3.50	72.99	76.20	4.40	1.11	1.12
Katsina	58.22	64.39	10.60	38.56	43.24	12.13	0.66	0.67
Kebbi	45.83	46.83	2.18	40.65	42.85	5.42	0.89	0.92
Kogi	58.30	59.48	2.02	46.46	48.96	5.39	0.80	0.82
Kwara	65.79	67.77	3.01	60.24	62.04	2.98	0.92	0.92
Nasarawa	36.73	37.16	1.16	28.48	29.67	4.17	0.78	0.80
Niger	126.84	143.96	13.50	66.54	74.76	12.35	0.52	0.52
Oyo	44.76	49.13	9.76	30.27	33.34	10.14	0.68	0.68
Plateau	48.84	50.04	2.45	29.49	32.61	10.57	0.60	0.65
Sokoto	39.68	43.11	8.65	32.28	37.22	15.30	0.81	0.86
Taraba	54.98	57.17	3.98	68.08	73.59	8.10	1.24	1.29
Zamfara	32.71	27.67	-15.42	12.78	11.77	-7.91	0.39	0.43
National	**1207.74**	**1262.28**	**4.52**	**1105.95**	**1166.05**	**5.43**	**0.92**	**0.92**

Source：APS

- Distribution

The distribution channel of soybeans is shown in the figure below. There are routes from farmers directly to consumers, routes through wholesalers, and routes through processors. Processed soybeans are used not only for food but also for livestock feed and industrial products.



Source: Prepared by the Study Team based on "Aremu, Fakunle & John, (2020). Policy Constraints to Production, Processing and Marketing in Soybean Value Chain in Kaduna State, Nigeria"

Figure 50 Soybean; Distribution and Value Chain

- Processing

In Nigeria, soybean consumption is increasing year by year, driven by poultry, fish farming and cooking oil industries. Soybean meal is a protein source for mixed feed, and is used as poultry feed and fish feed. Additionally, soybean oil is now being recognized as an alternative to palm oil in various industries, and soybean consumption is on the rise. In addition to cooking oil, soybean oil is processed into various products such as lubricants, paints, inks, fibres, coating agents, and health-related products.

Soybeans are currently processed by SALMA Oil Mills in Kano, Grand Cereals and ECWA Feeds in Plateau, KARMA FOOD Ltd in Gwagwalada in FTC, AFCOT Oil Seed Processors in Amadawa and P.S. Mandrides in Kano.[63]



Figure 51 Soybean meal for feed (Japan)[64], Soybean oil press machine[65], Soybean oil[66]

- Market

Over the past few years, the growth of industrial sectors such as soybean oil production and feed production has led to the rapid expansion of soybean production and consumption, and Nigeria's soybean market is growing rapidly.

Also, the global soybean market is expected to grow at a compound annual rate of 5% from 2017 to 2025, with a total market value of US$214.36 billion. This could help balance the existing oversupply once market conditions recover from the coronavirus-related turmoil.

- Trade

Soybean imports are 52,000 tons (2020) according to Food Balance, and soybean oil is 4,500 tons (2020) according to Comtrade, and the main import source is China. On the other hand, exports are 19,000 tons (2020) according to Food Balance, and according to Comtrade, 5,740 tons of seeds (2019)

[63] "Product Profile: SOYA BEANS", NEPC
[64] https://hokkaido-feed-one.co.jp/wp-content/uploads/2021/01/daizukasu-min-2048x1536.jpg (Accessed: 10 May, 2023)
[65] https://www.bestoilmillplant.com/uploads/allimg/10-tpd-soybean-oil-refinery-plant.jpg (Accessed: 10 May, 2023)
[66] https://doublebventures.com/wp-content/uploads/2020/06/Bow-Pure-Soya-oil-5ltrs.png (Accessed: 10 May, 2023)
[66] https://doublebventures.com/wp-content/up (Accessed: 10 May, 2023)

and 7,320 tons of crude soybean oil (2018). Main export destinations are China, the United States, India, etc.

- Opportunities and challenges

Nigeria has a niche demand in the global soybean market with the advantage of being a country that only allows non-genetically modified crops[67]. Private companies are expected to tap into this niche demand.

It is also estimated that by 2040, the need for soy to meet the growing needs of feeders, poultry farmers and others will increase to 3,000-3,500 TMT.

Demand for soybeans in Nigeria is projected to continue growing at a rapid pace, requiring increased soybean yields and production to meet demand. [68]

2. Vegetables

(12) Tomatoes

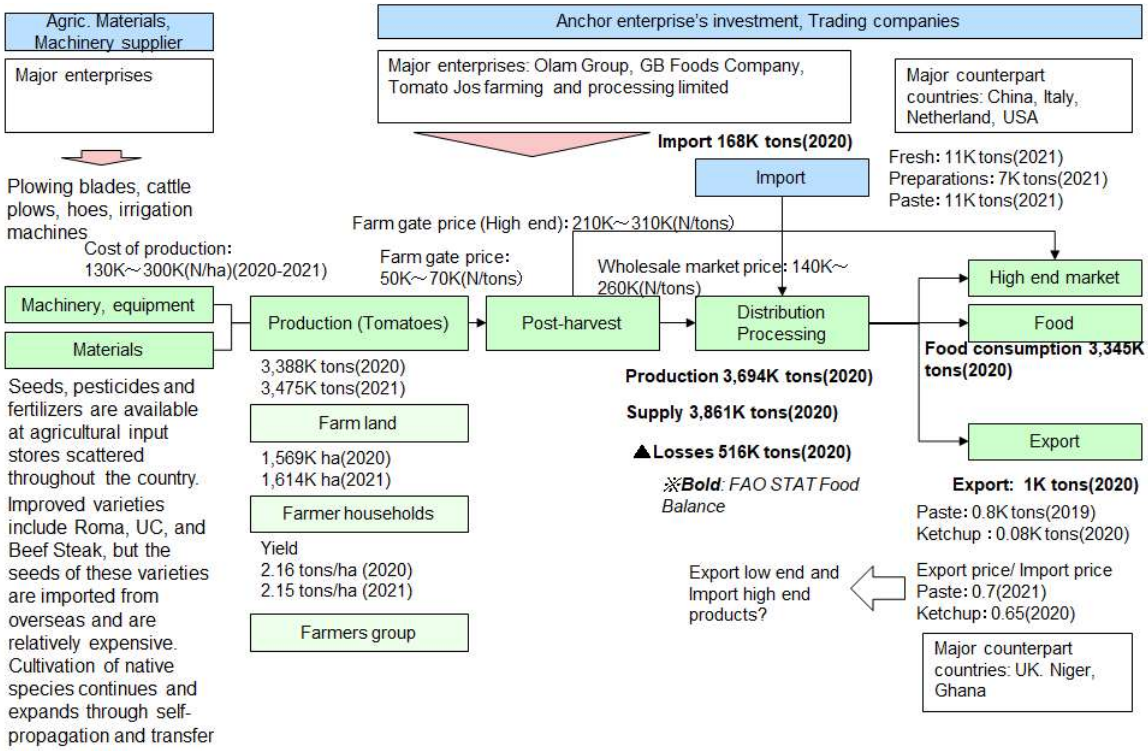
- Overview

Tomatoes are processed to various items such as juice, tomato paste, source and ketchup as well as consumed as fresh vegetables. Juice is produced by condensed or crushing, squeezing raw materials, and added with ingredients. Ketchup is manufactured by concentrating and seasoning tomatoes, and sometimes processed form paste and puree manufactured as primary products at a separate factory (company)[69]. Production volume of tomatoes is 3,388 thousand tons in 2020, and 3,475thousand tons in 2021. Total domestic supply including the processed products with import and domestic products is 3,861thousand tons in 2020. The food consumption from the supply is 3,345thousand tons while the residuals are exported or wasted in 2020.

[67] Olam Grains, Nigeria Soybeans Factsheet, supporting Nigeria's Agricultural Change and Food Security Agenda

[68] "Product Profile: SOYA BEANS", NEPC

[69] Data Collection Survey on Promotion of Agricultural Mechanization through Introduction of Modernized Agricultural Technologies in Sub-Sahara Africa



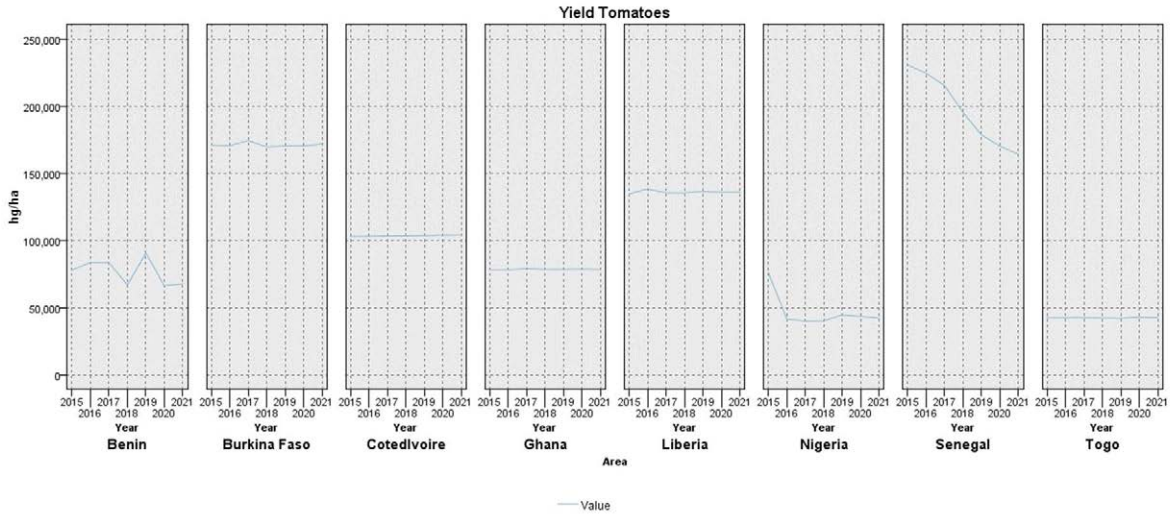
Source: Made by the study team based on FMARD APS, FAO STAT, ComTrade, etc.

Figure 52 Production of tomatoes, the processed food and related food balance

- Production

Tomatoes are produced mainly in states such as Borno, Gombe, Zamfara, Kano, Kaduna, Bauchi, Adamawa, Yobe、Katsina, and Taraba in Nigeria.

The cultivation period of tomatoes from sowing to harvest is about 2.5 to 4 months, and it is possible to cultivate about 3 times a year. As for seeds, improved varieties such as Roma, UC, and Beef Steak are imported, but they are expensive. Seeds account for about 20% of the total cost for irrigated cultivation and about 30% for rainfed cultivation. The cultivation by native varieties is predominant due to such higher costs of the imported seeds through self-propagation and transfer, but the yield is lower than that of improved varieties. For this reason, Nigeria's tomato yield is lower as compared to neighboring countries, which is major challenge in terms of production.



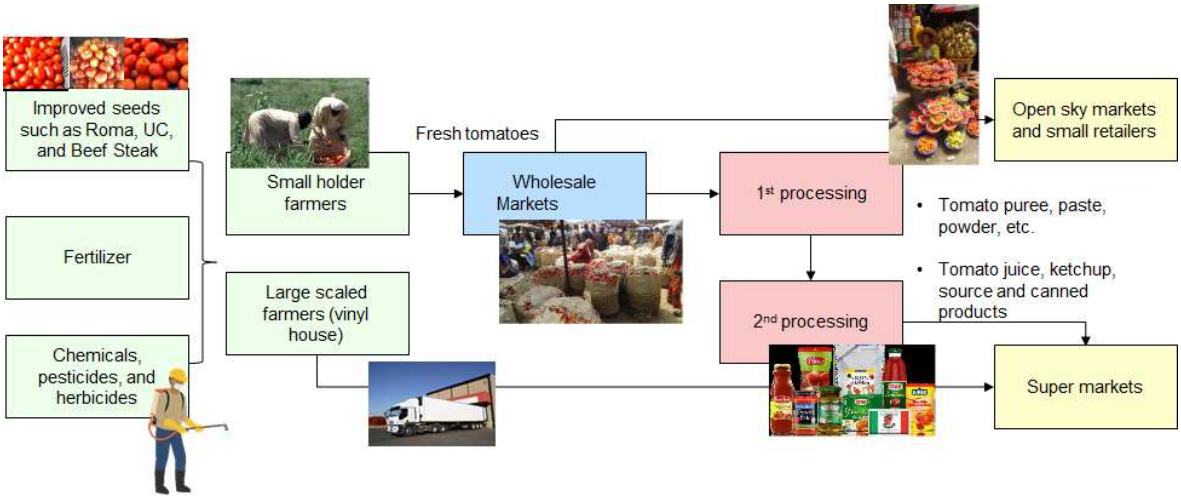
Source: Made by the study team from FAO STAT

Figure 53 Yield of tomatoes in comparison with neighbor countries

- Distribution

Tomato distribution in Nigeria is based on an informal distribution system in which small and medium-sized intermediaries/traders play a major role. Harvested tomatoes are collected by them around tomato farmers (or farmers bring them to traders), who then pack them for transport. Traders use small trucks without refrigeration to transport tomatoes to wholesale markets in major cities.

Tomatoes procured by retail store owners in the wholesale market are transported to each retail store by the store owner's truck or motorcycle. In addition to this low efficiency, road conditions are bad and many tomatoes are crushed during transportation, so the annual waste amount is 516,000 tons. Another challenge for large-scale producers and retailers is the lack of cold chain carriers in the country.



Source: Made by the study team from a previous JICA survey

Figure 54 Distribution of tomatoes and the processed Products

- Processing

Primary processing of tomatoes is the process of processing fresh tomatoes into tomato paste, and secondary processing includes the manufacture of processed products such as tomato sauce, ketchup, and seasonings. Since 2017, the import of fresh tomatoes and tomato paste has been banned, and since then many primary processing factories have been established, some of which also carry out secondary processing. However, those factories are not operating at full capacity due to unstable supply of fresh tomatoes with acceptable prices for the factories, which are raw materials inputs for them.

- Consumption market

Fresh tomatoes and the processed tomato products are sold to consumers through open market vendors and small stores. In large cities such as Lagos, there are some large supermarkets but the products sold through such channels are very limited as compared with the total volumes in distribution. Demand for fresh tomatoes, tomato sauces and seasonings for cooking is high in Nigeria, and is expected to grow in line with the population growth.

- Trading

Imports of tomato-related products amounted to 168 thousand tons (2020), accounting for more than 4% of the domestic supply, with the main import sources being China, Italy, the Netherlands, and the United States. On the other hand, exports are around 1 thousand tons, comprising mainly primary processed products such as paste, and the main export destinations are the United Kingdom, Niger, and Ghana. The relative trade price (export unit price / import unit price) is 0.7 for paste, ketchup, etc., which may imply that those products made in Nigeria are competitive with lower-end products.

- Opportunities and challenges

A steady increase in the domestic market is expected, and the demand may be enhanced by import substitution as well. There is also a chance of developing export markets, mainly in neighboring countries, through trade promotion policies. There is an opportunity to make entire tomato value chain more competitive internationally and more value added, by increasing the yield of tomato farming and reduce costs, improving the efficiency of distribution, and expanding the scope of processing plants to secondary processing. In this regard, it is expected to facilitate grouping of small-scale farmers, provision of appropriate seeds with extension services, and to promote investment by processing companies. Those would upgrade the competitiveness and supply capacity of tomato related products in Nigeria.

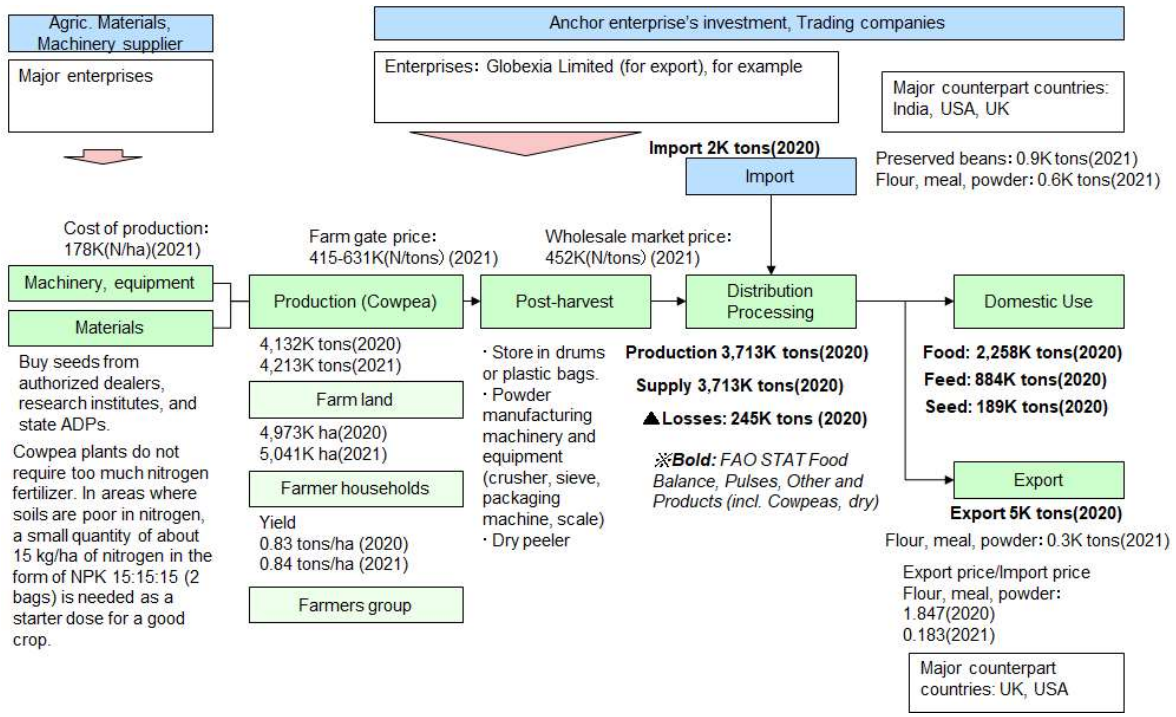
(13) Cowpea

- Overview

Cowpeas are mostly dried and milled after harvest. The output, cowpea flour, is packaged and sold for home and commercial use. Cowpea flour is used in cooking as a dough, skin, etc. Cowpea flour is a low cost food with high nutritional value, as it contains proteins and carbohydrates, so it is actively produced and consumed as a major food ingredient in Nigeria, and Nigeria is one of the world's leading producers.

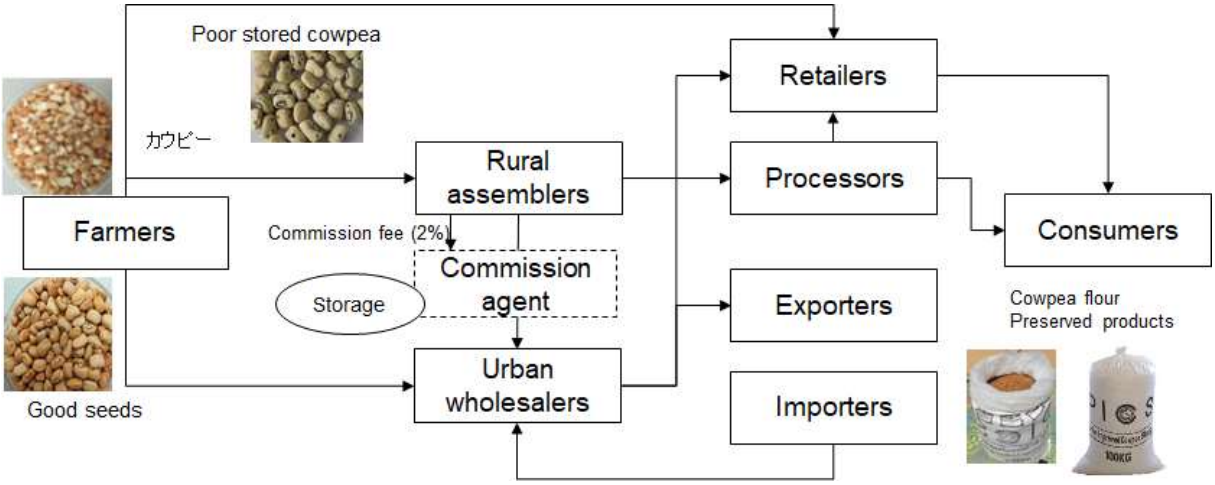
Cowpea production is 4,213 thousand tons (2021). Domestic supply including the dried and processed product comprise of 3,713 thousand tons of domestic production (2020), 2 thousand tons imported, and 245 thousand wasted. On the demand side, food consumption is 2,258 thousand tons (2020), feed is 884 thousand tons (2020), and seeds is 189 thousand tons (2020).

The names of ingredients produced from cowpea flour are Akara (fried cowpea paste), Danwake (cowpea dumplings), Moin-moin (steamed cowpea paste), and the like.



Source: Made by the study team based on FMARD APS, FAO STAT, ComTrade, etc.

Figure 55 Production of cowpeas and Food Balance including the processed products



Source: CONSUMER PREFERENCES FOR QUALITY CHARACTERISTICS ALONG THE COWPEA VALUE CHAIN IN NIGERIA, GHANA AND MALI, USAID "Guide to Cowpea Production in Northern Nigeria"

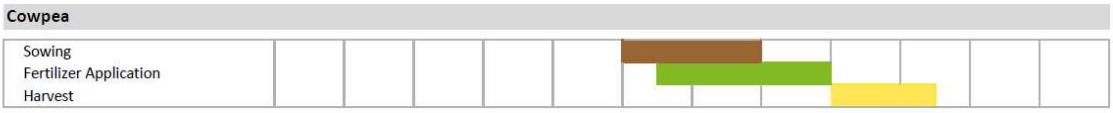
Figure 56 Distribution of Cowpea and the preserved products

- Production

Cowpea is mainly produced in the north region where the climatic conditions are suitable for production (Kano, Kaduna, Gombe, Zamfara, etc.), and most of the product is transported to the south region for sale and consumption. Cowpea is generally adapted to poor soils and its tolerance to drought,

which makes its cultivation attractive to the drier parts of the Nigeria savannas. Cowpea is not a strong competitor with weeds, especially at the early stage of growth[70]. It is harvested in about five months and is best harvested in the dry season. On the other hand, it is necessary to dry the harvested cowpea quickly. The amount of waste is 245 thousand tons, which suggest that there are some challenges of harvest timing and post-harvest processing.

Cowpea is mainly produced by small scale farmers. Cowpea is also a major food product in neighboring countries. Ghana's yield is about twice that of Nigeria's, and Senegal's yield was lower than Nigeria's, but has improved in recent years, and has surpassed Nigeria since 2020. .



Note: The scale is January to December
Source: FUBC "Crop Calendars by Country"

Figure 57 Farming calendar of Cowpea

- Distribution

Farmers sell to rural traders. The traders sell directly to wholesalers or through commission agents. They pay a small percentage of commission when selling through commission agents. Commission agents do not buy the crops, but just provide brokerage and storage in dry warehouses.

- Production

Some of the machinery and equipment required for flour production includes grinders, sieves, packaging machine and weighing scales. Although much of the flour milling is done by private mills and SMEs, larger manufacturers are also entering the market. Major companies are able to use dry peeling and crushing machines to produce better quality products than traditional processing, and they are distributed as high-quality products. Registration with the National Agency for Food and Drug Administration Control (NAFDAC) is required for sales in the domestic markets and exports.

- Consumption markets

Cowpea flour is mostly sold in small shops and open-air markets, although some of the high-quality products milled by major manufacturers are sold in supermarkets. The product would be packaged in plastic bags of different sizes targeting different segments of the market.

- Trading

The Import of cowpea flower is about 2 thousand tons and export is about 5 thousand tons, which

[70] Source: USAID, Guide-to-Cowpea-production-in-Northern-Nigeria

are small compared to the total production volume. For export, registration with the Nigerian Export Promotion Council (NEPC) is required.

- Opportunities and challenges

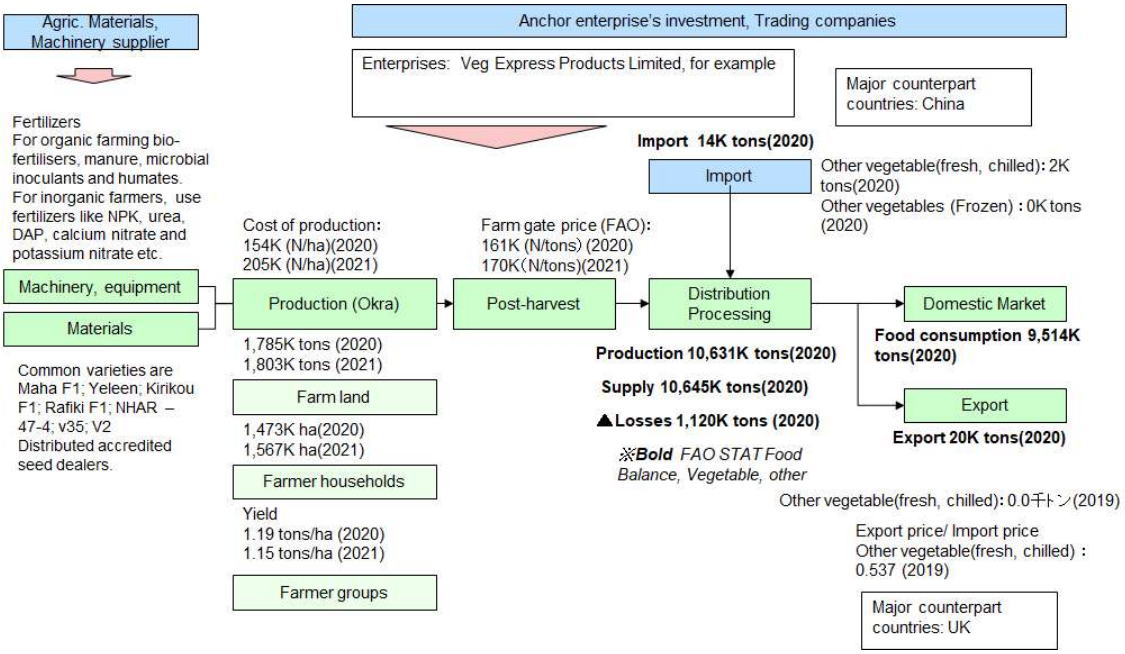
Cowpea is an advantageous crop because it is inexpensive, has a high nutritional value, and is easy to produce. From the viewpoint of food security, the demand for cowpea is expected to increase for food and feed for poultry farming. Besides, cowpea production may has an opportunity to substitute import of other grains since the import of entire grains is still large amount. Improvement of yield would even expand opportunity of exporting cowpea products to neighboring countries. On the other hand, in order to increase yield and reduce waste, it is considered to be a challenge to consolidate small farmers into groups or cooperatives and promote collaboration among actors in the value chain, including feed users.

(14) Okra (Other vegetables[71])

- Overview

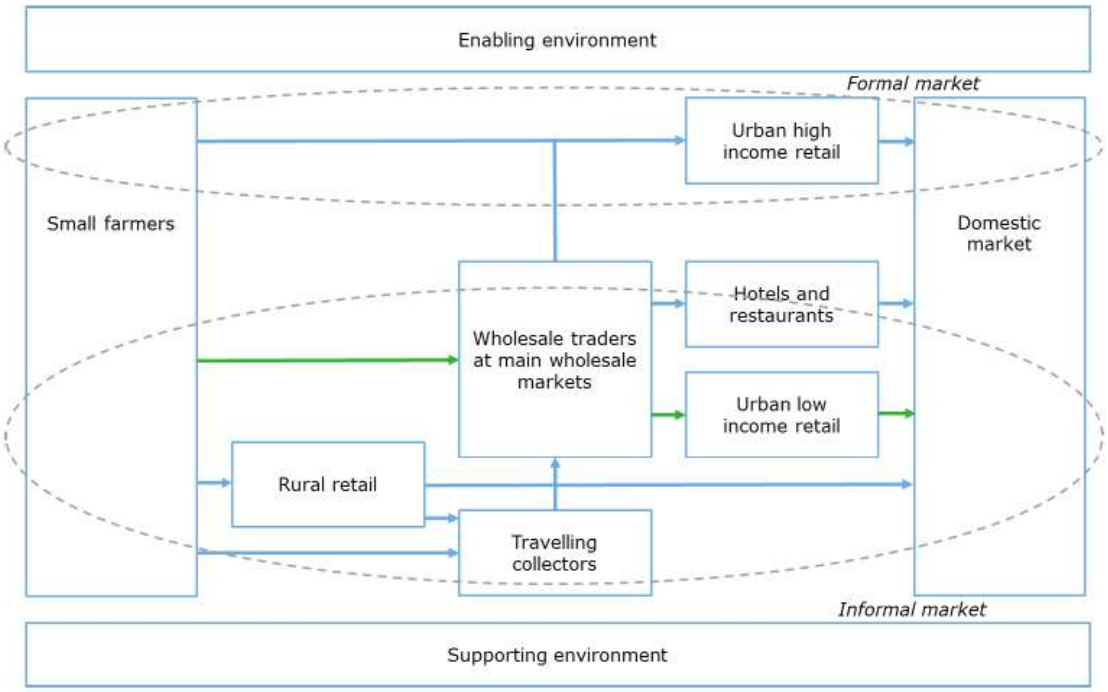
After harvesting by farmers, okra is mainly sold in the consumer market as a fresh/chilled, frozen and prepared vegetable. Okra is produced in most states in Nigeria, with production of 1,803 thousand tons in 2021. Under FAO's Food Balance statistics, okra is bundled in a category of other vegetables, in which domestic production is 10,631 thousand tons, import is 14 thousand tons, waste is 1,120 thousand tons, and the food consumption is 9,514 thousand tons accounting for all of the demand.

[71] The FAO Food Balance (common to all countries) includes the following items: CABBAGES; ARTICHOKES; ASPARAGUS; LETTUCE; SPINACH; CASSAVA LEAVES; CAULIFLOWER; PUMPKIN & SQUASH &GOURDS; CUCUMBER & GHERKINS; EGGPLANTS; CHILLIES & PEPPERS ,GREEN; ONIONS, GREEN; GARLIC; LEEKS; BEANS, GREEN; PEAS, REEN; BROAD BEAN,GRN; STRING BEANS; CARROTS; OKRA; GREEN CORN; SWEET CORN FROZEN; SWEET CORN; PRESERVED; MUSHROOMS; DRIED MUSHROMS; CANNED MUSHROOMS; CHICORY ROOTS; CAROBS; VEGETABLES FROZRN; VEGET DRIED NES; VEGETABLES CANNED NES; JUICE OF VEGETABLES NES; VEGS DEHYDROGENATED; VEGETABLES IN VINEGAR; VEGS PRESERVED NES; VEGETABLES FROZEN; VEGS TEMPORARY PRESERVED; VEGETABLE PREPARATIONS; CHICORY & COFFEE SUBSTITUTES



Note: Figures for Food Balance (bold) and breakdown of trade (sourced from ComTrade) are figures for "other vegetables", including those other than okra too. Production, farmland and yield are figures for okra sourced from APS.
Source: Made by the study team based on FMARD APS, FAO STAT, ComTrade, etc.

Figure 58 Production of Okra and other vegetables and Food Balance



Source: The Vegetable and Potato sector Nigeria
(https://www.rvo.nl/sites/default/files/2020/01/The-Vegetable-and-Potato-sector-Nigeria.pdf)

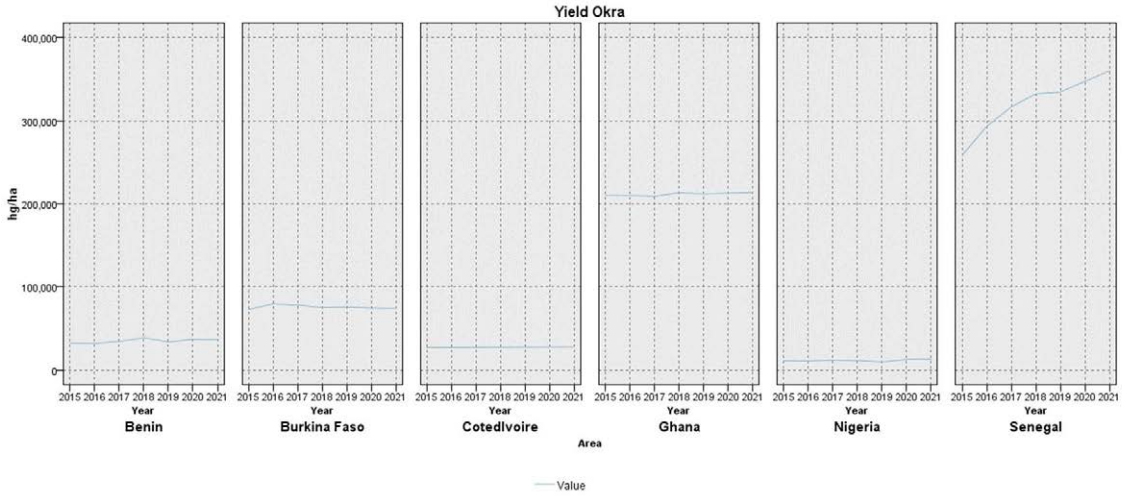
Figure 59 Distribution of Okra (Other vegetables)

- Production of Okra[72]

The production of okra is 1,803 thousand tons (2021, APS data), accounting for nearly 20% of the production of other vegetables.

It is necessary to carry out a soil test to check fertility of the soil and the pH, nutrients and microbial count of your soil. If necessary, farmers can add manure, microbial inoculants and fertilizers to the soil to make it fertile. Farmland preparation involves felling of trees, de-stumping, ploughing, harrowing and ridging etc. Mechanized farmland preparation is faster and much more efficient than the use of manual labor especially if the farmland is big.

Although a lot of okra seeds sold in Nigeria are expired and not fit for farming. It is important to get seeds from accredited seeds dealers. For okra production, the land is prepared in March-May, planted in May-July, and harvested in October-January (in Adamawa, Borno and Yobe states)[73]. The yield of Okra production in Nigeria is quite low as compared to neighboring countries. Distribution of good seeds, the promotion of proper work procedures, and active marketing would increase yield and reduce waste.



Source: Made by the study team based on FAO STAT

Figure 60 Yield of Okra in comparison with the neighboring countries

The following description is about vegetables in general.

- Distribution and Consumer markets (vegetables in general)

The distribution of vegetables is mostly traditional, and the wholesaling process involves various traders including middlemen, resulting in a multilayered and inefficient distribution structure. There are few modern supermarkets and hypermarkets, except in large metropolitan areas like Lagos. As

[72] Source: https://veggiegrow.ng/okra-farming-in-nigeria
[73] Source: https://fscluster.org/sites/default/files/fss_seasonal_calendar_agric_kitsfao.pdf

logistics operators are not well developed, many companies need to have their own logistics functions. Without development of cold chain, it is possible to transport on normal temperature or frozen food, but refrigerated transportation means and storage facilities are not in place. Due to the above problems, the distribution of fresh vegetables and packaged foods faces many challenges, resulting in a large amount of waste. .

Most of the fresh fruits and vegetables are supplied to the domestic market through wholesalers, because they have the means of transportation to carry them in long distances, typically from production area in the north to remote consumer markets in the south.

In the consumer market, modern distribution and retail such as supermarkets are estimated to have a share of about 1% to 5%, targeting high-income consumers in urban areas, while the majority is traditional distribution.

An informal market still somehow dominates, where exploitation and cartels are said to exist. Also, many traders lack business skills and do not keep daily accounting records. All of this hinders market efficiency. In addition, there is great uncertainty about availability and costs of transportation, due to fuel shortages, inadequate road networks connecting long distances, and aging roads. Therefore the traders have no choice but to set prices to reflect these risks into consideration.

- Trade of “other vegetables”

As for other vegetables as a whole, fresh and chilled vegetables are both imported and exported. Considering the relative price being about 0.5, there might be an opportunity to develop export market.

- Opportunities and challenges for vegetables in general

FMARD points out in APS that the majority of states are unable to distribute and promote the use of pesticides, and the price of agricultural materials too high for small-scale farmers to use them.

If the yield is raised to the level of neighboring countries through subsidies for agricultural materials, and waste is reduced by improving distribution including post-harvest processing and cold chains, it is expected that the domestic supply volume and farmers' income will increased.

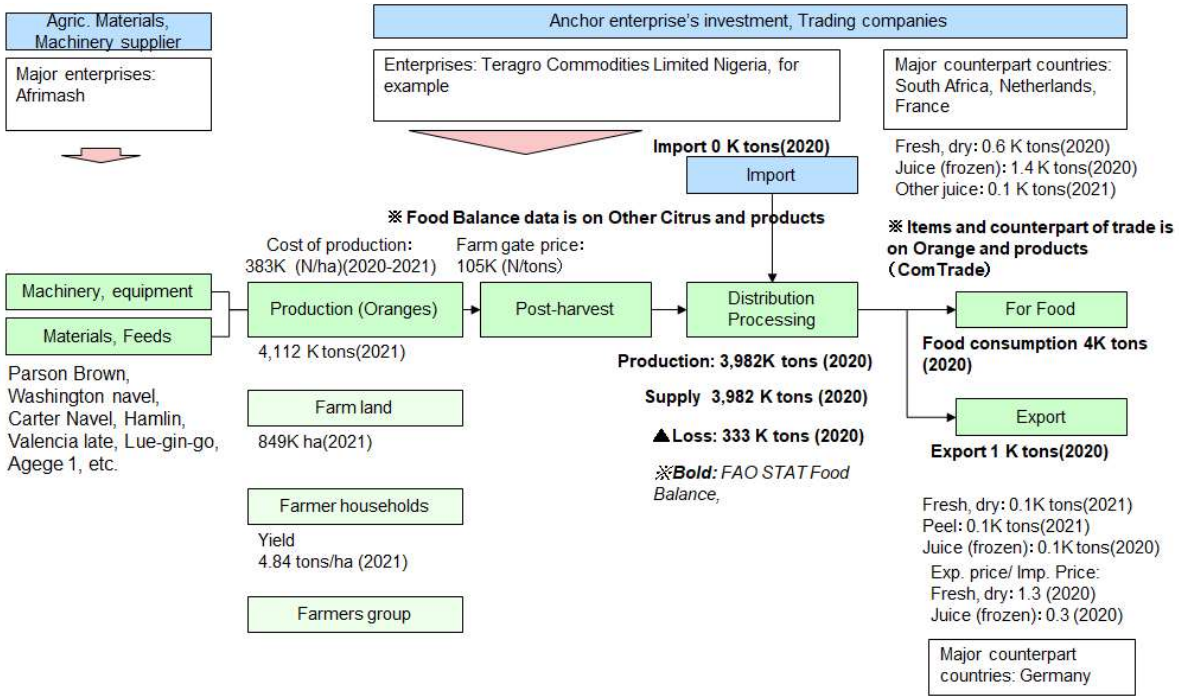
(15) Oranges and the products

- Overview

In addition of fresh oranges, oranges are processed, distributed and consumed as intermediate processed products such as peel and final consumer products such as jam, jelly, and orange juice.

Nigeria's orange production is classified as Other Citrus fruits in the FAO STAT Food Balance statistics. The production in the Food Balance was 3,982 thousand tons, Food consumption was 3,684

thousand tons, and waste was 333 thousand tons in 2020[74].



Source: Made by the study team based on FMARD APS, FAO STAT, ComTrade, data from FMARD, etc.

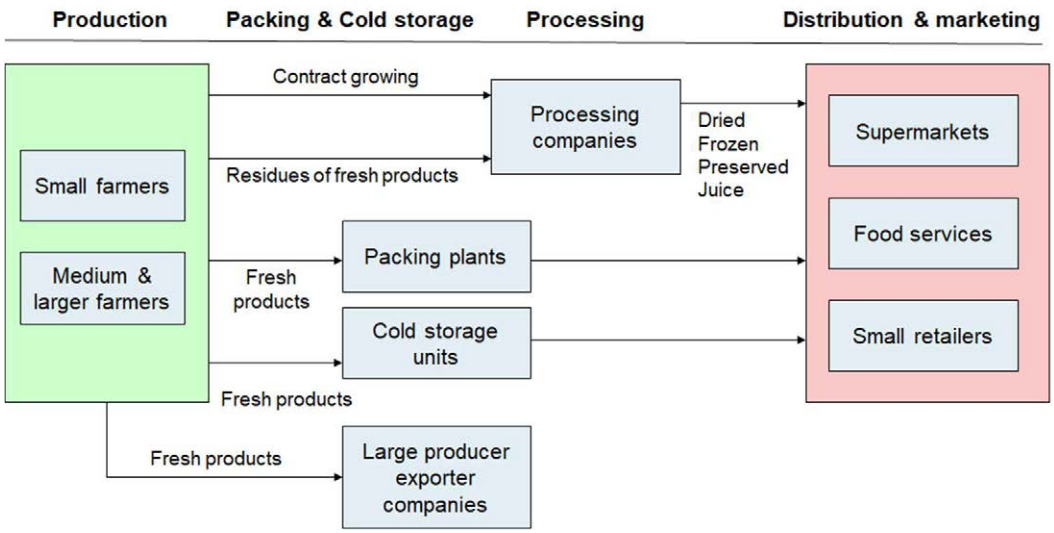
Figure 61 Food Balance of Other Citrus fruit

- Production

According to interviews with FMARD, the production of oranges was 4,112 thousand tons, the farm land area was 849 thousand ha, and the yield was 4.84 tons/ha in 2021.

It takes more than three years from planting seedlings to harvesting, but high interest rates make it difficult to implement large investments. There are many small-scale producers and yields are low compared to neighboring countries.

[74] Food Balance defines the following items: Other citrus fruit, n.e.c., Juice of citrus fruit n.e.c., Citrus juice, concentrated n.e.c.

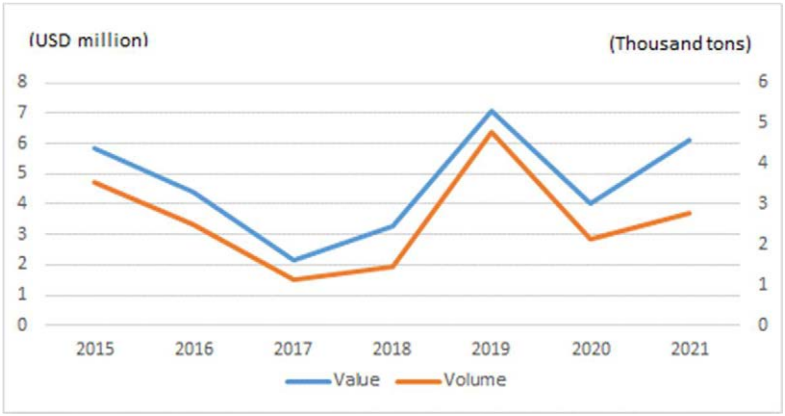


Source: Made by the Study Team based on interviews

Figure 62 Distribution of oranges and citrus fruit

- Trade

Imports of oranges and processed products, mainly frozen/concentrated orange juice, fluctuate around USD 4-7 million per year. On the other hand, exports are negligible.



Source: Made by the Study Team based on UN ComTrade data

Figure 63 Import of oranges and the products

- Opportunities and challenges

The yield is about half that of neighboring countries, and the potential for yield improvement is large. But according to Food Balance statistics, domestic demand has flattened out over the past five years. In addition to low yields due to limited production linked to VC, losses are large due to lack of storage facilities and primary processing facilities in rural areas. R&D and access to good seedlings

are also challenges.

In order to take advantage of opportunities, it is necessary to implement policy to promote whole VC and to strengthen access to finance.

3. Processing Crops

(16) Sesame[75]

- Value Chain Structure

Figure 64 Dried sesame (from footnote 75)

Most of Nigeria's sesame is exported unprocessed to Turkey, Japan, and other countries. The figure below shows an overview of Nigeria's sesame VC. Most sesame producers are small and medium scale farmers. Harvested sesame is collected at collection points via agricultural cooperatives or traders, and shipped by wholesalers according to orders. Most of the shipped sesame is exported through exporters after being fined and packed. Domestic sesame consumption, including food processing, is limited.

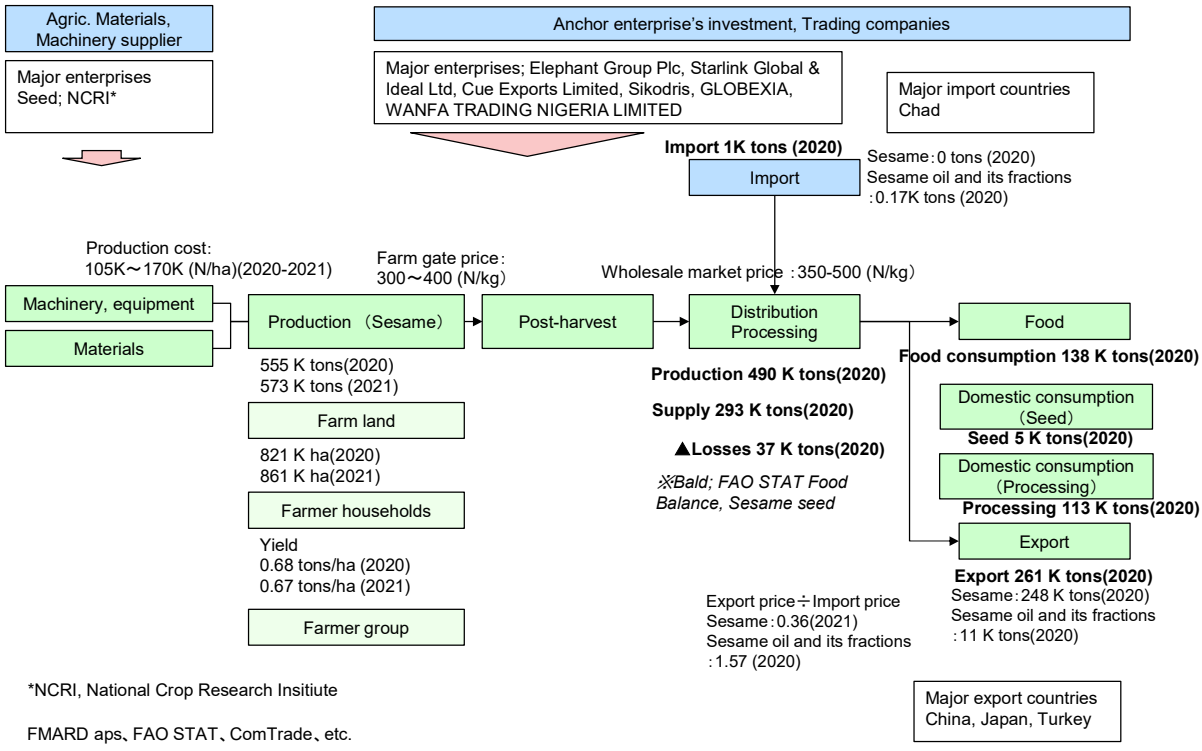


Figure 65 Sesame Value Chain

[75] Unless otherwise noted, the source is "The Data collection survey on food value chain development for food security and nutrition improvement in Sub-Saharan Africa", JICA, 2020.

- Details of Value Chain

The figure below shows an image of the sesame value chain of Nigeria.

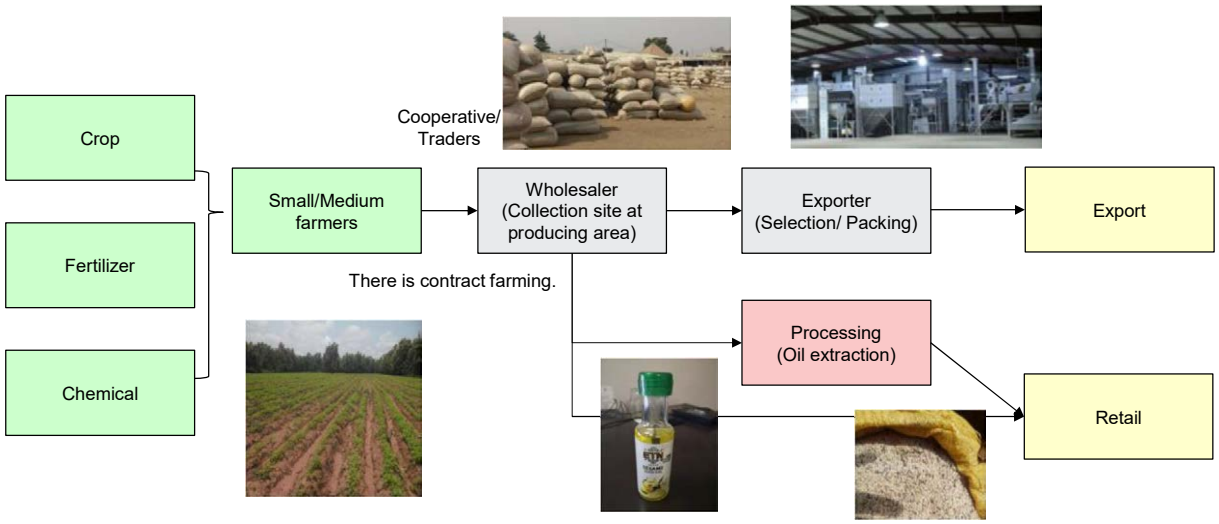


Figure 66 Diagram of Sesame Value Chain (photos from the footnote 75)

Source; Made by Study Team based on The Data collection survey on food value chain development for food security and nutrition improvement in Sub-Saharan Africa

- Production

Areas and quantity of production[76]

It is widely produced mainly in the northern and central regions of the country. The production quantity is shown in the table below, with production of approximately 560,000 tons in 2020 and 570,000 tons in 2021, making it the fourth or fifth largest producer in the world.

76 National Report of Wet Season Agricultural Performance in Nigeria (APS) 2021

Table 10 Area and Quantity of Sesame Production and Yield of Each State

State	Land Area ('000) Ha			Production ('000) MT			Yield (Ton/Ha)	
	2020	2021	% Change	2020	2021	% Change	2020	2021
Adamawa	16.91	17.08	1.00	17.97	18.05	0.47	1.06	1.06
Bauchi	22.48	21.81	-3.00	10.65	10.48	-1.55	0.47	0.48
Benue	114.73	119.38	4.05	93.24	96.58	3.58	0.81	0.81
Borno	17.57	18.02	2.56	8.48	8.62	1.65	0.48	0.48
FCT	86.52	89.19	3.09	57.78	58.94	2.00	0.67	0.66
Gombe	37.82	38.01	0.50	10.72	10.75	0.27	0.28	0.28
Jigawa	16.78	18.88	12.50	20.69	22.76	10.00	1.23	1.21
Kano	21.36	22.42	4.95	21.87	22.59	3.29	1.02	1.01
Katsina	54.11	52.76	-2.50	17.84	17.57	-1.50	0.33	0.33
Kebbi	10.35	10.69	3.30	7.39	7.54	2.06	0.71	0.71
Kogi	91.44	96.47	5.50	71.08	73.57	3.50	0.78	0.76
Kwara	34.23	36.27	5.95	15.51	16.14	4.07	0.45	0.45
Nasarawa	58.61	62.26	6.23	59.40	62.38	5.01	1.01	1.00
Niger	68.47	80.08	16.96	25.94	28.90	11.40	0.38	0.36
Plateau	60.65	65.08	7.31	37.33	39.25	5.15	0.62	0.60
Sokoto	29.15	29.96	2.77	15.75	15.94	1.21	0.54	0.53
Taraba	59.74	60.93	1.99	50.39	51.10	1.41	0.84	0.84
Yobe	14.12	16.79	18.90	3.20	3.50	9.40	0.23	0.21
Zamfara	5.58	4.46	-20.07	9.93	8.05	-18.98	1.78	1.80
National	**820.63**	**860.53**	**4.86**	**555.16**	**572.71**	**3.16**	**0.68**	**0.67**

Source; APS 2021

Cropping Season

In the northern fringes, seeding is generally done in late June or early July. In the north, due to low rainfall, sowing begins as soon as the rainy season starts (around May). Harvest time is around 90-120 days after sowing, depending on the variety, and in the central region, harvesting takes place between November and December.

Input

The main inputs are seeds, fertilizers, and pesticides. Fertilizers and pesticides can be purchased at agricultural supply stores, but seeds are rarely distributed. The National Cereal Research Institute (NCRI) is responsible for the development and dissemination of sesame seed varieties. Seven varieties are supplied, of which NCRIBEN 04E is the most widespread due to its high yield and oil content. The majority of Nigerian sesame is pressed for oil, but the oil content is low (less than 50%), so variety development is important to strengthen international competitiveness. Fertilization is recommended for land with low soil fertility, but many farmers have difficulty applying fertilizer due to lack of funds.

Production Cost

The table below shows the income and expenditure for sesame of small farmers (2 ha) in Gwagwalada, about 60 km from the center of Abuja in the FCT. The production cost is 90,000 N/ha if sowing, weeding threshing and sorting are not included in the cost as family labor, and 114,000 N/ha if they are included as a cost. The final revenue is 32,250 N/ha (8,500 N/ha if family labor is also included as a cost), resulting in a profit, but the management is under pressure if yields fall. The decline in yield is largely due to the inability to cultivate at the right time due to difficulties in accessing funds and waiting for the right turn for wage cultivation services.

Table 11 Income and Expenditure for Sesame

1. Income				
Category	Item	Yield (kg/ha)	Unit price (NGN/kg)	Income (NGN)
Sales	Sesame	350	350	122,500
Total income (NGN/ha)				122,500
2. Cost				
Category	Item	Quantity/ha	Unit price (NGN)	Cost (NGN)
Inputs	Seeds (procured from the market)	25 kg	400	10,000
	Fertilizer	5 bag (50 kg)	6,500	32,500
	Insecticide	1 bottle	2,500	2,500
Production	Land preparation (tractor rental)	1	20,000	20,000
	Seeding	0 (4 person-day)	1,000	0(4,000)
	Weeding ×2 times	0 (12 person-day)	1,000	0 (12,000)
	Harvesting, Drying	25 person-day	1,000	25,000
Post-harvest	Threshing, Sorting	0 (8 person-day)	1,000	0 (8,000)
Total cost (NGN/ha)				90,000 (114,000)
3. Revenue (NGN/ha)				32,250 (8,500)

- Processing

There are a number of exporters in the country that perform pre-export sesame screening and packing, using rotary sifters, stoners, gravity sorters, color sorters, and other equipment to meet the needs of their customers. Some sesame exporters have their own laboratories to analyze sesame for pesticide residues and conduct the necessary tests on samples prior to sorting, while others send samples to other countries in Europe to conduct the same tests and collect accurate data.

In addition, sesame oil is produced and sold in small quantities by sesame oil millers, although on a limited scale. In rural areas, sesame-based confectionery and other products are produced and sold. Officials from FMARD and NCRI pointed out the need to develop a sesame processing industry to stimulate domestic demand for sesame. Local extension workers also pointed out the need for extension and awareness-raising on sesame utilization in rural areas.

- Distribution/Marketing

After drying and sorting, harvested sesame is mostly collected at sesame collection points (located in the production area) via agricultural cooperatives or traders. From the collection points, wholesalers ship sesame to meet the orders of sesame users (mainly sesame exporters). Others use storage facilities to coordinate shipments and sell around May-July, when market prices are higher. Some exporters provide farmers with inputs and purchase sesame under contract.

Delays, not limited to sesame, in unloading from the Apapa port in Lagos (Nigeria's largest export port) have become the norm due to heavy traffic congestion in the area and insufficient loading capacity (only three container cranes), resulting in late deliveries and consequent higher costs.

Annual exports have ranged from 143,000 to 173,000 tons in 2014-2017, with the largest export destination being Turkey, followed by Japan, with the two countries accounting for 64-75% of exports.

- Challenge

Nigeria is a major sesame exporter worldwide, and from the perspective of maintaining and strengthening its competitiveness as a raw material supplier, challenges regarding sesame VC are summarized below.

Propagation and dissemination of improved seed: Sesame varieties developed and supplied in Nigeria are inferior to those of other countries (e.g. Tanzania) in terms of yield and oil content. In addition, activities related to the multiplication and dissemination of improved seeds are limited, making access difficult for many farmers.

Low yield and difficulty in accessing finance: Sesame yields in Nigeria are low. There are various factors, but there are some cases where small-scale farmers are unable to procure inputs and utilize wage cultivation services due to financial inaccessibility, and thus miss the appropriate cropping season.

Delayed delivery during export: Traffic congestion, especially around ports, is the main factors that put pressure on sesame exporters' business, resulting in significant economic losses.

- Opportunity

Vast flat land: In addition to the large area of land available for sesame production, there is also a large amount of flat land suitable for mechanized operations.

Established supply chain: Nigeria has been a major sesame supplier to Japan since 1990s, and a sesame supply chain has already been established by exporters.

Trend of increasing demand: The fact that international demand for sesame is expected to continue to increase has high potential for industries related to sesame VC (e.g., agricultural machinery sales).

(17) Cocoa[75]

- Value Chain Structure

Most of Nigeria's cocoa is exported unprocessed to the EU, Southeast Asia, and other countries. The figure below shows an overview of Nigeria's cocoa VC. Cocoa is cultivated mainly by small-scale farmers for export. Most of the harvested cocoa is exported by exporters through cooperatives and registered Licensed Buying Agents (LBAs), but some is processed domestically.

Figure 67 Cocoa and products (https://www.meiji.co.jp/hello-chocolate/basic/20.html)

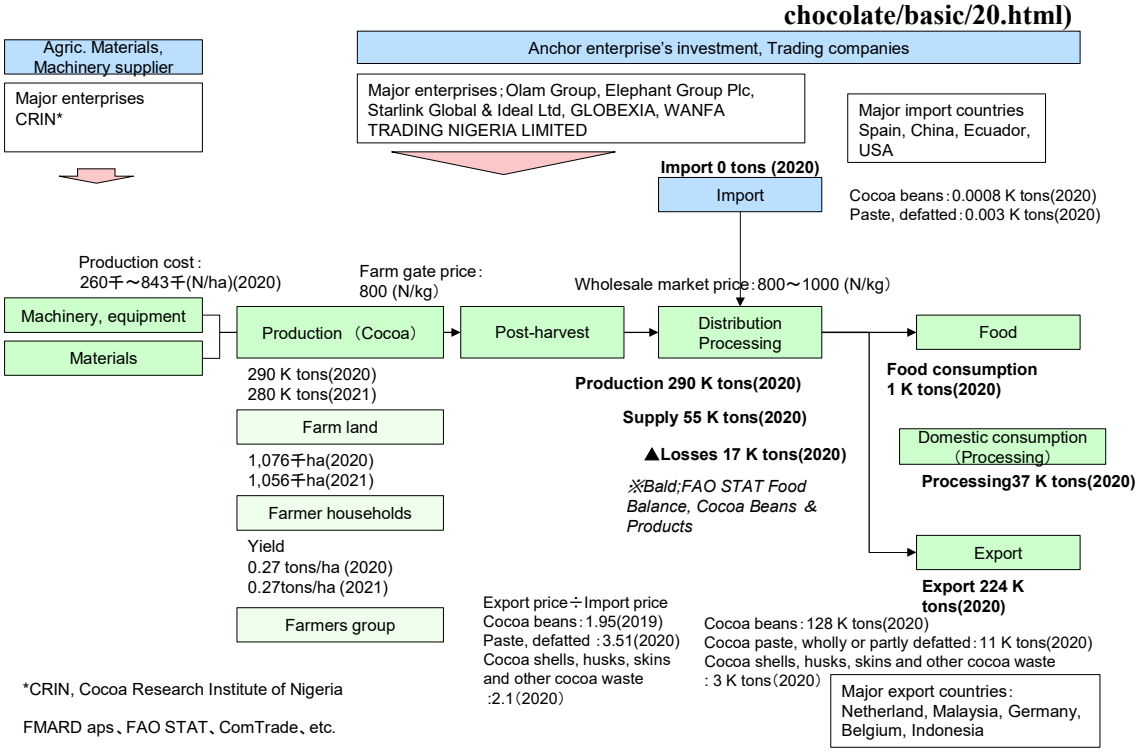


Figure 68 Cocoa Value Chain

- Details of Value Chain

The figure below shows an image of the cocoa value chain of Nigeria.

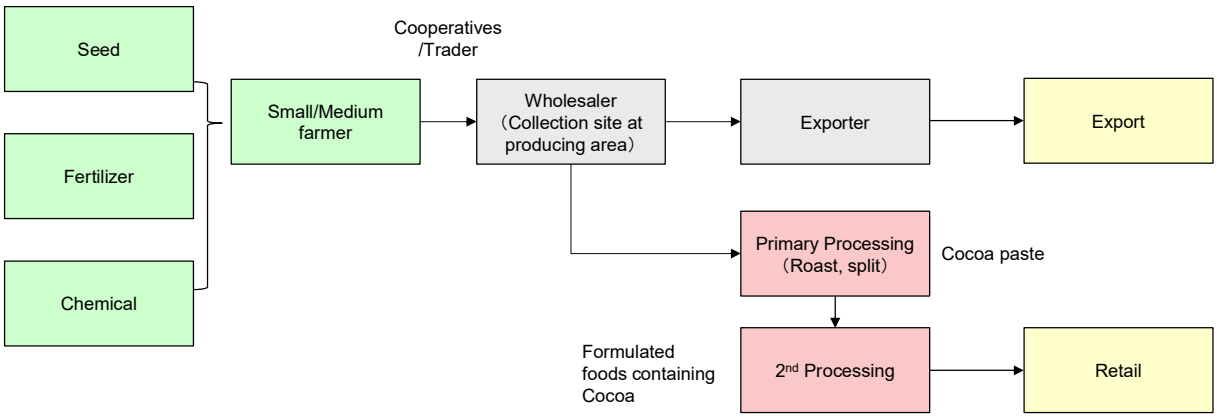


Figure 69 Diagram of Cocoa Value Chain

Source; Made by Study Team based on The Data collection survey on food value chain development for food security and nutrition improvement in Sub-Saharan Africa

- Production

Areas and quantity of production[77]

It is widely produced in the southern part of the country. The table below shows production by state. In 2010/11 and 2011/12, the country produced about 370,000 tons, but production has been declining since then, and in recent years it has been around 280,000-290,000 tons, making it the fourth largest producer in the world.

Table 12 Area and Quantity of Cocoa Production by State (unit; '000 ha, '000 tons)

		2011/12		2010/11	
S/N	State	Area	Production	Area	Production
1	Ondo	321.97	92.22	320.19	91.99
2	Cross River	327.91	69.42	310.99	71.45
3	Osun	251.3	74.1	237.06	71.1
4	Ekiti	98.15	36.46	97.07	37.97
5	Oyo	109.03	36.06	107.75	33.57
6	Edo	104.77	23.68	105.28	27.36
7	Ogun	92.76	19.9	89.84	19.88
8	Taraba	10.53	4.89	9.78	4.32
9	Delta	11.52	3.93	10.69	3.81
10	Abia	14.49	3.34	13.46	3.3
11	Akwa-Ibom	5.35	1.25	6.82	2.25
12	Adamawa	5.34	1.65	5.33	1.66
13	Kwara	5.14	1.43	4.77	1.41
14	Kogi	3.84	1.06	3.56	1.05
15	Lagos	0.97	0.2	0.9	0.2
16	Bayelsa	0.32	0.09	0.3	0.09
17	Rivers	0.18	0.3	0.16	0.05
18	Imo	0.04	0.01	0.04	0.01
	National	1,363.60	370.01	1,324.00	371.47

77 Cocoa Production Pattern in Nigeria: The Missing Link in Regional Agro-Economic Development, 2020

Source; Cocoa Production Pattern in Nigeria: The Missing Link in Regional Agro-Economic Development, 2020

Cropping Season

Cocoa can be harvested almost year-round (main season is September-March, light season is June-August), although production fluctuates with the seasons. Ripe cocoa is harvested promptly to prevent theft and to allow for fermentation. In the main season, cocoa is harvested every 15 days. Disease control and harvesting are the main activities on the plantation.

Input

Seedlings and seeds are produced by the Cocoa Research Institute of Nigeria (CRIN) or self-seeded by farmers. CRIN sells cocoa pods (cocoa nuts, containing around 40 seeds) at N200-300/piece and seedlings at N150-200/seedling. CRIN has developed eight hybrid varieties, but their productivity is not stable because they are individually genetically distinct. Generally, no fertilizer is used and fungicides are sprayed for diseases. Cocoa is insect-pollinated and blooms and pollinates year-round, so basically no insecticides are sprayed.

Production Cost

Limited information on production costs is organized in the table below.

Table 13 Production Cost of Cocoa (Unit N/ha)

State	2020	2021
Cross Rivers	429,510	NA
Edo	843,330	NA
Ekiti	260,000	265,000

Source; APS 2021

- Processing

The harvested cocoa is fermented and dried. In Nigeria, wooden fermentation boxes, which are the global standard, are not used. Instead, cocoa beans are fermented by wrapping them in banana leaves laid on the ground, which results in a wide range of unevenness in the finished product. Because the fermentation process is carried out after a certain amount of beans are collected, the cocoa beans collected first naturally begin fermenting, and the progress of fermentation differs from that of the beans collected later. After fermentation, the beans are dried in the sun, but due to insufficient cleaning, the percentage of foreign matter is 5%, which is higher than in Ghana (0-1%) and Cote d'Ivoire (3%).

Cocoa butter and cocoa powder are produced from cocoa, and these are the main ingredients of

chocolate, but in Nigeria, unlike in Cote d'Ivoire, Indonesia, and Ghana, little processing is done into these products and the beans are exported. Processing into beverages and chocolate is also done, but in very small quantities.

- Distribution/Marketing

Roads from farms to farmers' homes, where cocoa is fermented and dried, are undeveloped and difficult for vehicles to pass, which has hindered the expansion of cultivated area. It has also been pointed out that the long loading and export procedures in Lagos drive up costs and may be a factor in smuggling to neighboring countries.

Cocoa beverages (powder) and chocolate are also produced and sold in small quantities. Chocolate bars are sold at 500-600 yen per bar, but the quality is not commensurate with the price, as Nigerian cocoa is not a superior flavor variety. On the other hand, cocoa beverages (powder) are cheaper than competing products such as Nestle, and there is a certain demand for them, with several manufacturers producing them. However, production is low and does not meet demand. Considering the market for cocoa-like products, there is potential to increase sales if attractive products are developed.

- Challenge

Hybrid varieties have been developed, but the seedlings are genetically ununiform because they are bred from seeds, and the original performance of the variety has not been achieved. The simultaneous aging of old trees and aging farmers, as well as young people leaving farming, prevent the renewal of old trees, leading to a decrease in cultivated area and production. The equipment and procedures for fermentation and drying are also inadequate, resulting in lower quality and adulteration, which is one of the reasons why export prices cannot be raised. In addition, share croppers are responsible for a certain part of the cultivation, fermentation, and drying processes, but they are rarely engaged in these processes for a long time, which is one of the reasons for the lack of accumulation of technology and investment in cocoa production. The fact that farm gate price is not influenced by quality is a background that makes it difficult to motivate them to improve quality. Cocoa beverages distributed domestically are relatively inexpensive, but their nutritional value is not well known. Threats to VC are the high requirements of international markets, such as the ratio of adulterants, and the fierce competition in international markets.

- Opportunity

Potential for production expansion: There are vast areas suitable for cocoa cultivation and a large rural population. CRIN has also improved its varieties and accumulated technical expertise in renewal of old trees and control of pests and diseases, so it is expected to increase production volume by improving both inputs and cultivation techniques.

Already established supply chain: Cocoa production and exports have a long history, and the export supply chain has already been established. Quality control has been properly implemented, and there have been almost no returns due to exceedances of pesticide residue standards.
Increased competitiveness: The need for cocoa in emerging markets, a promising market for Nigerian cocoa, which is inferior in quality from Ghana and Cote d'Ivoire, is growing. Both countries' export tax-like regimes drives up export prices, so Nigerian cocoa is more price competitive. Import bans on cocoa products provide a market for domestic cocoa products (e.g., beverages).

(18) Ginger[78]

- Value Chain Structure

The majority of Nigerian ginger is split, dried, and exported to Germany, Netherlands and UAE. Nigeria is the world third largest producer after India and China. The figure below shows an overview of ginger VC in Nigeria. Most ginger producers are small and medium scale farmers. Harvested ginger is collected by primary processors through agricultural cooperatives or traders, dried and split, and mostly exported through exporters.

Figure 70 Ginger dry split (footnote 78)

78 Unless otherwise noted, the source is "Value Chain Analysis Nigeria Ginger, Centre for the Promotion of Imports from developing countries (CBI)", Ministry of Foreign Affairs of Netherland, 2020

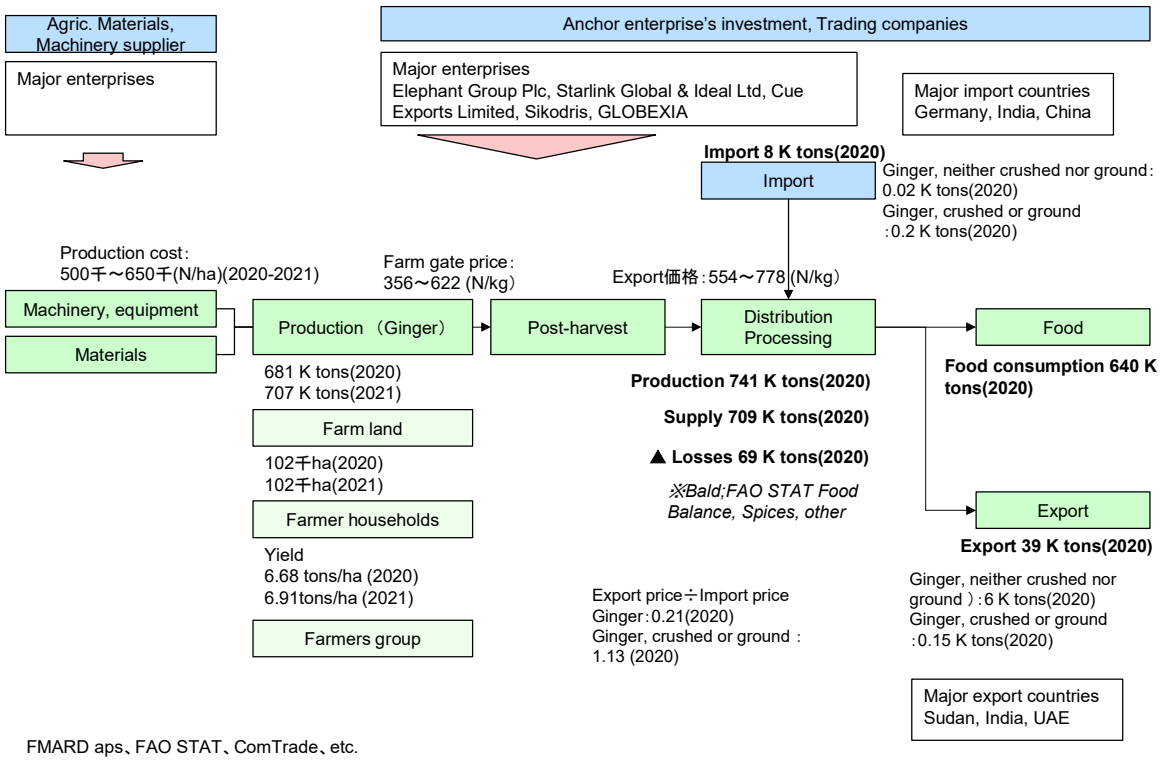


Figure 71 Ginger Value Chain

- Details of Value Chain

The figure below shows an image of the ginger value chain of Nigeria.

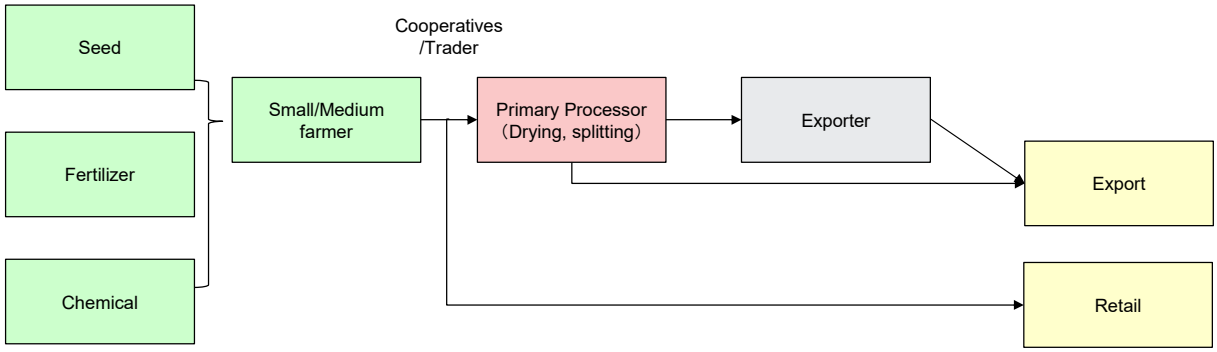


Figure 72 Diagram of Ginger Value Chain

Source; Made by Study Team based on Value Chain Analysis Nigeria Ginger, 2020

- Production

Areas and quantity of production [76]

Ginger is mainly produced in limited areas in the northern and central regions of the country. The status of each state is shown in the table below and the total production is about 681,000 tons in 2020 and 707,000 tons in 2021.

Table 14 Area and Quantity of Ginger Production and Yield of Each State

State	Land Area ('000) Ha			Production ('000) MT			Yield (Ton/Ha)	
	2020	2021	% Change	2020	2021	% Change	2019	2020
Bauchi	10.46	10.46	0	32.94	32.94	0	3.15	3.15
Benue	10.47	10.47	0	65.95	65.95	0	6.3	6.30
Kaduna	51.48	51.74	0.5	514.25	539.96	5	9.99	10.44
Nasarawa	29.65	29.65	0	68.25	68.25	0	2.3	2.30
National	**102.06**	102.32	0.25	**681.39**	**707.10**	**3.75**	**6.68**	6.91

Source; APS 2021

Cropping Season[79]

Planting begins in March/April and harvest begins in October/November. It takes 9 months from planting to maturity; harvest at 6 months for fresh, or 9 months for mature.

Input

Two main varieties are grown: Yellow Ginger (locally known as Tafin Giwa) and Black Ginger (locally known as Yatsun Biri), the former being higher yielding, spicier, and more popular in the market. Fertilizer and seed ginger are the main inputs, available from local dealers.

Production Cost

According to APS 2021, in Kaduna, the largest production state, the production is 500,000 N/ha in 2020 and 650,000 N/ha in 2021.

- Processing

The majority of ginger produced in Nigeria is exported outside the country, with only 6% of farmers producing ginger for the domestic market. After harvesting, farmers wash, cut, and dry ginger before shipping. Ginger is mostly dried in the sun, which is prone to contamination by foreign matter and quality deterioration. Cutting and drying machines are rarely used. 90-95% of Nigerian ginger is distributed in dry split form.

- Distribution/Marketing

Most of the dried ginger shipped by farmers is purchased by Lagos-based distributor agents and exported. About 90% of Nigerian ginger is exported as dried ginger. It is then processed into powder, ginger oil, oleoresin (which kills germs and promotes blood circulation), and other products at the importing country.

[79] The Ginger Value Chain; Investment Opportunities Along the Value Chain, Agra Innovate West Africa, 2018

- Challenge

In "Value Chain Analysis Nigeria Ginger," the challenges of ginger VC in Nigeria are summarized from three aspects: human resources, natural environment, and management.

Human Resources: In terms of gender equality, there are risks of gender inequality within Nigeria in general, lack of youth employment, lack of resources for small farmers, and child labor.

Natural Environmental: Ginger yields in Nigeria are low. Mainly due to improper input use, farming practices, and weather fluctuations. Untreated washing water is also an issue.

Management: Lack of formal agreements between small farmers and buyers, high price volatility, opaque distribution mechanisms, and widespread corruption are cited.

- Opportunity

Production Capacity: The production area has a favorable climate and high production potential, and production continues to increase. Primary processing at farmers' level is also well established, and the NRCRI is expected to extend its research results.

Already established supply chain: There are traders at each level of the supply chain, and the ginger supply chain has already been established through previous exports.

Trend of increasing demand: Nigerian ginger's reputation is high and demand is firm. European companies are also interested, as the demand for ginger is growing due to health consciousness. Many ways of applications are expected in the domestic market also, so there is potential for growth.

Policy support: Ginger has been identified as a priority crop, and Agricultural Development Programme (ADP) under the state ministry of agriculture has also assigned staff in charge and is working with state governments. The Federal Ministry of Trade and Industry (FMTI) has also established a ginger VC unit.

(19) Groundnuts

- Value Chain Structure

Nigeria is the world's third largest producer of groundnuts, but most of it is consumed domestically, and about half is processed and marketed. The figure below shows an image of Nigeria's groundnuts VC. Most of the groundnuts producers are small and medium scale farmers. Harvested groundnuts is sold to retailers and processors via traders.

Figure 73 Harvested groundnuts (footnote 81)

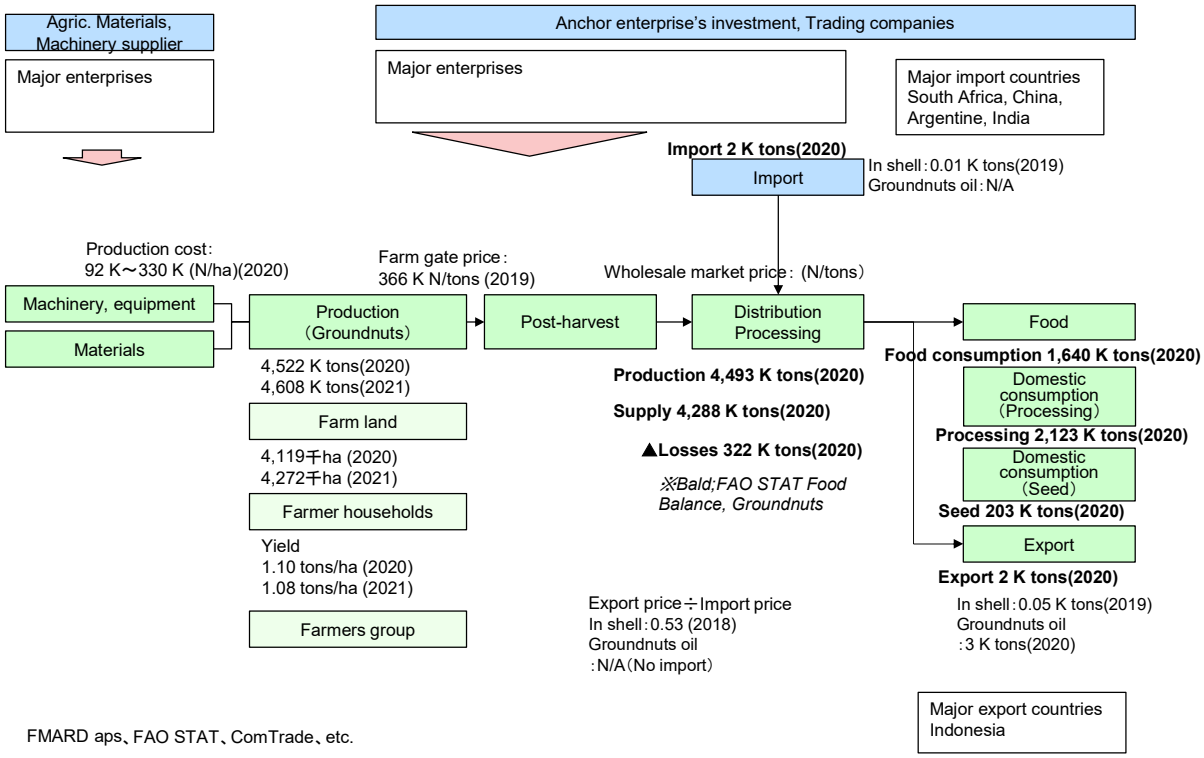


Figure 74 Groundnuts Value Chain

- Details of Value Chain

The figure below shows an image of the groundnuts value chain of Nigeria.

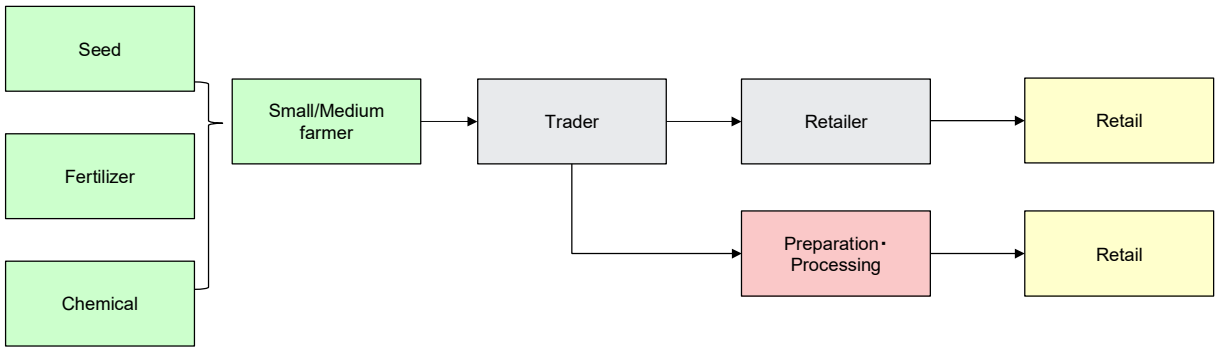


Figure 75 Diagram of Groundnuts Value Chain

Source; Made by Study Team based on Marketing chain for groundnuts in North Central Nigeria

- Production

Areas and quantity of production [76]

Groundnuts is widely produced mainly in the northern and central regions of the country. The production status is shown in the table below, with the total production of approximately 4.23 million tons in both 2020 and 2021, making it the third largest producer in the world.

Table 15 Area and Quantity of Groundnuts Production and Yield of Each State

State	Land Area ('000) Ha			Production ('000) MT			Yield (Ton/Ha)	
	2020	2021	% Change	2020	2021	% Change	2020	2021
Adamawa	57.49	58.67	2.05	129.70	131.17	1.13	2.26	2.24
Bauchi	400.30	412.24	2.98	518.47	533.97	2.99	1.30	1.30
Bayelsa	23.80	25.17	5.76	25.17	25.17	0.00	1.06	1.00
Benue	261.65	270.73	3.47	307.80	277.60	-9.81	1.18	1.03
Borno	161.41	161.41	0.00	190.24	197.47	3.80	1.18	1.22
C/Rivers	13.46	14.48	7.60	18.38	19.77	7.55	1.37	1.37
Ebonyi	5.03	5.28	4.88	5.21	5.55	6.50	1.04	1.05
Edo	10.89	10.51	-3.50	6.74	7.12	5.70	0.62	0.68
Enugu	5.29	5.46	3.16	6.50	7.11	9.40	1.23	1.30
FCT	180.59	186.30	3.16	0.23	0.24	1.09	0.00	0.00
Gombe	124.13	124.70	0.46	136.72	138.83	1.55	1.10	1.11
Imo	9.13	9.31	2.00	7.70	7.98	3.69	0.84	0.86
Jigawa	152.30	152.84	0.35	240.16	242.43	0.95	1.58	1.59
Kaduna	204.59	209.91	2.60	280.53	288.95	3.00	1.37	1.38
Kano	216.30	220.19	1.80	150.32	153.33	2.00	0.70	0.70
Katsina	148.30	141.29	-4.73	141.93	137.63	-3.03	0.96	0.97
Kebbi	149.36	146.37	-2.00	189.99	182.39	-4.00	1.27	1.25
Kogi	126.36	137.19	8.57	170.93	173.78	1.67	1.35	1.27
Kwara	188.63	194.43	3.07	252.76	260.28	2.97	1.34	1.34
Nasarawa	91.49	93.32	2.00	210.18	208.75	-0.68	2.30	2.24
Niger	213.47	228.87	7.21	295.92	284.99	-3.70	1.39	1.25
Ogun	19.32	19.41	0.45	42.18	41.82	-0.86	2.18	2.16
Osun	38.03	40.51	6.53	56.70	57.84	2.01	1.49	1.43
Oyo	47.80	49.17	2.87	59.16	61.52	3.99	1.24	1.25
Plateau	146.87	146.87	0.00	209.07	209.55	0.23	1.42	1.43
Sokoto	197.84	197.84	0.00	100.38	100.36	-0.02	0.51	0.51
Taraba	219.87	224.37	2.05	239.14	241.85	1.13	1.09	1.08
Yobe	47.06	45.98	-2.29	61.21	61.24	0.05	1.30	1.33
Zamfara	159.43	169.39	6.24	177.14	168.83	-4.69	1.11	1.00
National	3620.19	3702.21	2.27	4230.60	4227.50	-0.07	1.17	1.14

Source; APS 2021

Production Cost

In the APS 2020 and 2021, the production costs of groundnuts for 2020 and 2021 are listed, in which the average of the states with data for both years is calculated to be 130,328 N/ha in 2020 and 161,620 N/ha in 2021, 24% cost increase reflecting price hike. In addition, the average annual farm gate price of Nigerian groundnuts according to FAOSTAT (2019) is 175,791 N/tons.

- Processing

Most of groundnuts produced in Nigeria is consumed domestically. As shown in the VC diagram of groundnuts above, half of the total domestic supply goes to processing and producing products such as peanut oil and peanut butter.

- Distribution/Marketing

Most groundnuts is produced by small-scale farmers and is used in a variety of ways, including as seed, for self-consumption, for emergency cash, and for selling surplus products. Generally, the products are distributed to markets and processors through small or large traders, but the flow is complex and inefficient due to the large number of people involved. [80]

- Challenge

Production: Challenges in production include unstable rainfall in recent years, low soil fertility, groundnuts rosette disease (it once gave devastating damages throughout the country), and lack of quality inputs.[81]

Market and distribution: Currently, traders provide inputs to farmers, and then purchase the harvest. Farmers and small traders in rural areas are illiterate, so obtaining loans from financial institutions is difficult, interest is high, and procedures are cumbersome. Many stakeholders rely on their personal networks to gather information via phone calls or SMS by cell phones, and there is a need for more efficient and transparent information sharing. Road conditions in rural areas are poor, leading to higher transportation costs.[80]

Trade: The European market is a promising export destination due to the expected stable demand growth. However, this requires appropriate quality control, selection of trade partners, and completion of necessary procedures. [82]

- Opportunity

Policy support: Groundnuts is considered a priority crop and is expected to take advantage of various FMARD support measures, and support from the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT, headquartered in India but with a branch office in Kano).[81]

Production capacity: Productivity is expected to increase due to the spread of improved varieties. Confectionery varieties have potential for niche demands.[81]

Trend of increasing demand: Strong demand growth is expected worldwide, especially in Europe, which is a potential destination market for exports due to its high demand.[82]

80 Marketing chain for groundnuts in North Central Nigeria, Benue State University, 2015
81 A Farmer's Guide to Profitable Groundnut Production in Nigeria, ICRISAT, 2014
82 Product Profile: Groundnut, Nigerian Export Promotion Council, 2021

(20) Oil Palm[84]

- Value Chain Structure

Nigeria was once the world's largest oil palm producer, but is now a net importer. The figure below shows an overview of oil palm VC in Nigeria. The production patterns are diverse: harvesting by small-scale farmers from wild groves, cultivation by small and medium-scale farmers, and cultivation by large-scale farmers and enterprises. The harvested oil palm is immediately brought to processing plants where they are pressed and distributed to markets as palm oil.

Figure 76 Oil Palm Plantation (footnote [83])

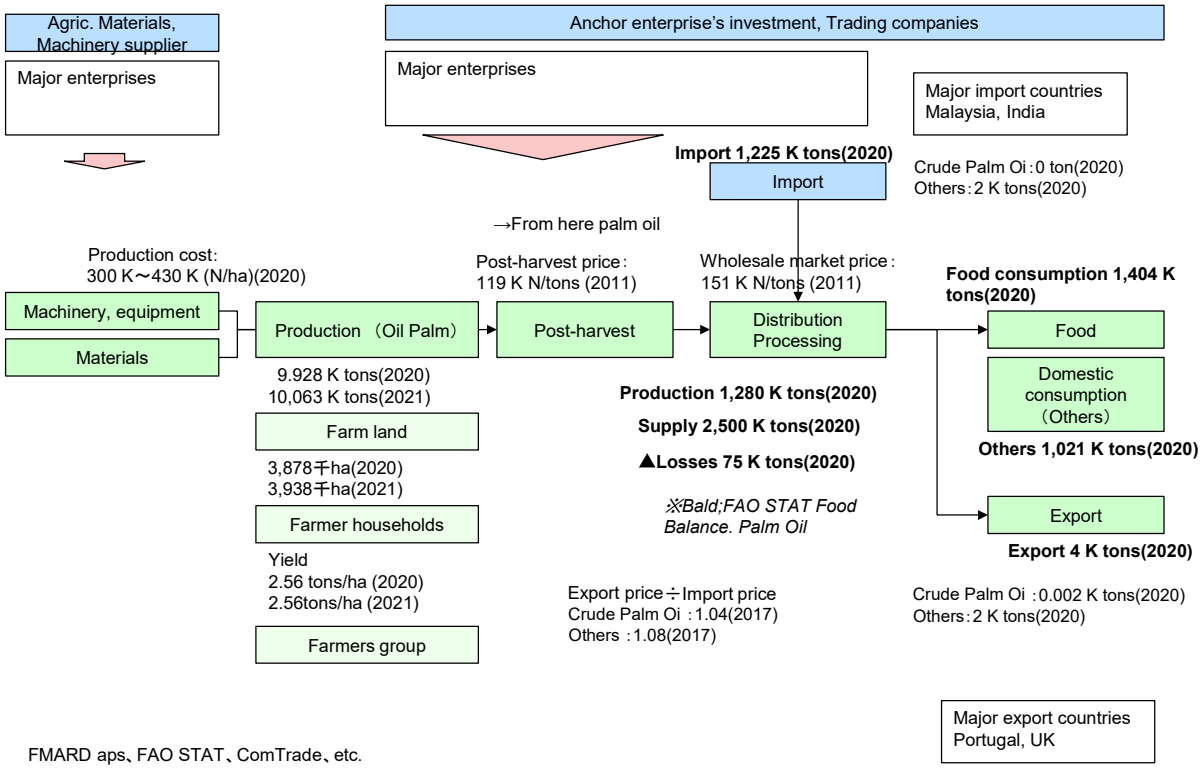


Figure 77 Oil Palm Value Chain

Oil palm is used for various ways as shown in the figure below. The main use of oil palm is for food, where it is consumed as cooking oil in the flow of Fruit > Crude palm oil > Food or Nut > Kernel > Oil.

83 https://www.vanguardngr.com/2018/04/edo-plans-biggest-oil-palm-plantation-nigeria/
84 Unless otherwise noted, the source is "A report on Palm Oil Value Chain Analysis in the Niger Delta", PIND, 2011

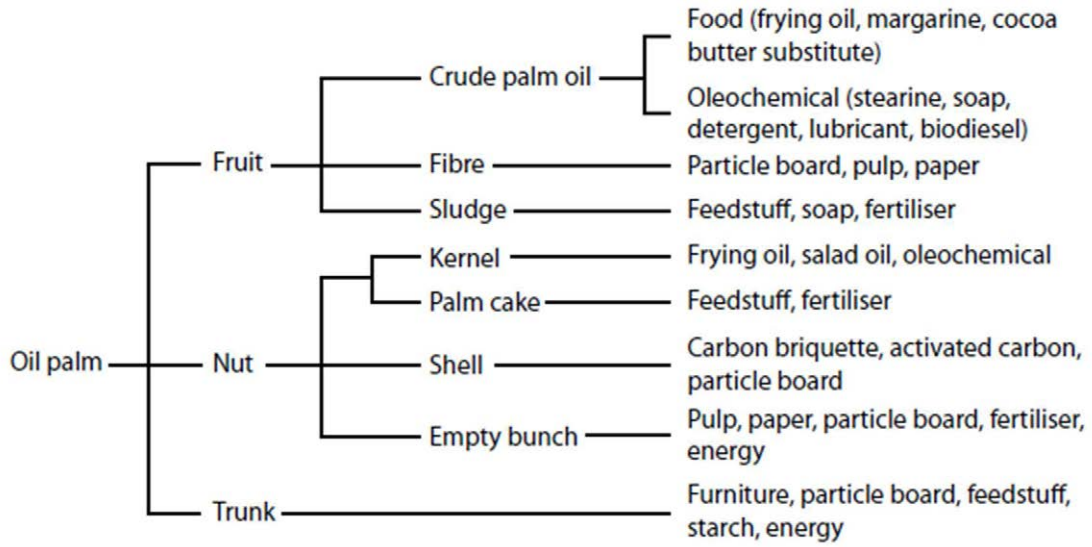


Figure 78 Products Made from Oil Palm

Source; A Report on Palm Oil Value Chain Analysis in the Niger Delta

- Details of Value Chain

The figure below shows the details of the oil palm value chain of Nigeria.

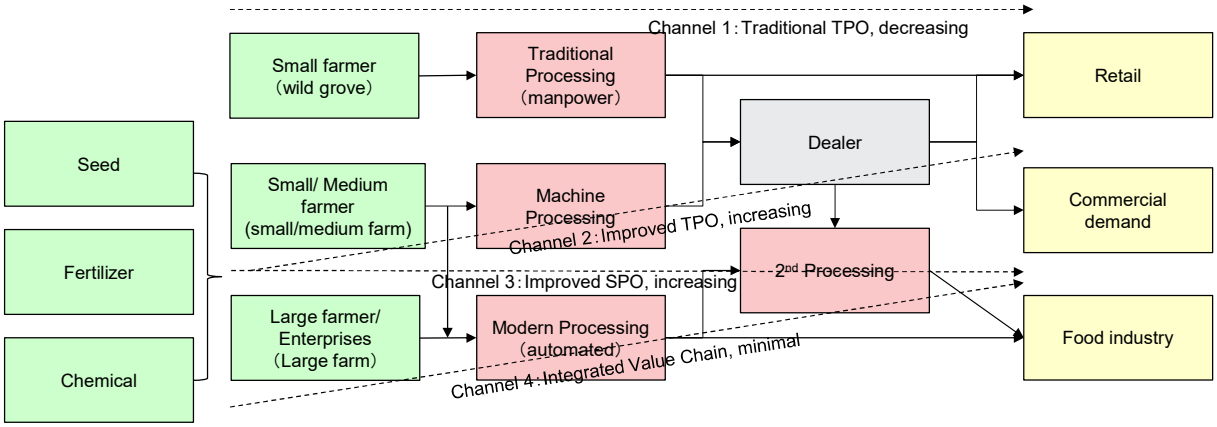


Figure 79 Diagram of Oil Palm Value Chain

Source; Made by Study Team based on A Report on Palm Oil Value Chain Analysis in the Niger Delta

- Production

Areas and quantity of production[76]

Oil palm is widely produced in the South. The production situation is shown in the table below. 832,000 tons were produced on 1.09 million ha in 2010, and 919,000 tons were produced on 1.18 million ha in 2011. The large production states are Akwa-Ibom, Imo, Delta, Cross River, and Ondo.

Table 16 Area and Quantity of Oil Palm Production of Each State ('000 ha, '000 tons)

State	2010/2011		2011/2012	
	Area	Production	Area	Production
Abia	53.51	46.53	53.03	49.23
Akwa-Ibom	162.25	133.78	172.82	135.82
Anambra	64.62	45.61	74.26	53.46
Bayelsa	NA	NA	36.07	15.37
Cross River	111.90	86.95	121.59	101.74
Delta	126.16	101.49	130.21	104.73
Ebonyi	113.48	83.63	111.07	89.72
Edo	93.13	66.98	102.66	70.88
Enugu	66.28	53.25	72.19	56.30
Imo	161.93	109.48	164.28	124.44
Ondo	115.86	89.36	120.47	101.09
Rivers State	21.02	13.81	22.10	16.42
Total	1090.14	831.87	1180.75	919.2

Source; Appraising the Changing Trends in Oil Palm Farming in Nigeria's Lower South Region 2020

Production Cost

In APS 2020 and 2021, costs of oil palm production in 2020 and 2021 are listed, and the average for states with data is calculated. The cost is 359,857 N/ha in 2020 and 475,000 N/ha in 2021, 32% increase reflecting the price hike. In addition, according to FAO (2013), the farm gate price of Nigerian palm oil is 119,438 N/tons and the wholesale market price is 151,288 N/tons.

- Processing

Most of palm oil produced in Nigeria is consumed domestically. Once harvested, oil palm is immediately taken to a processing plant. In small-scale processing plants, oil is pressed manually, which is inefficient. Advanced small farmers use small-scale oil mills with small engines. Processors use larger mills, and large operators have fully-automated lines. There are three main products from oil palm: Technical Palm Oil (TPO), which is not high quality and is commonly used in the public diet; Special Palm Oil (SPO), which is high quality and used in the food industry; and Palm Kernel Oil (PKO), which is also high quality and used in the food industry. TPO accounts for 80% of palm oil.

- Distribution/Marketing

So far, most of palm oil harvested extensively and pressed manually by small-scale farmers, and many stakeholders are involved in the distribution process. In the case of small and medium scale operations by advanced farmers, after oil is pressed, it is sold to dealers. The dealers sell to actual users

and retailers. In the case of large-scale operations, the enterprises carry out higher-level processing at their own plants, producing a variety of products for sale.

- Challenge

Production: Challenges in production are difficulties obtaining inputs like high quality seedlings, fertilizers, and other inputs, and rising labor and transportation costs. Many production trees are old and need to be renewed. The area of harvested forests is decreasing due to development projects, etc. Expansion of farmland is difficult due to the socioeconomic conditions in the region, so productivity per unit area needs to be increased. In addition, most of the large public farms are not well managed and need to be improved.

Processing: Current manual oil presses and small-scale oil presses are inefficient, and more efficient equipment is required. In many cases, spare parts for processing equipment are not available, making it difficult to maintain and repair. Capital investment requires adequate funds, but they are difficult to prepare. In some cases, large facilities are used only a part of their capacity due to the limited amount of oil palm available.

Distribution: The government ban on vegetable oil imports led to a temporary increase in domestic palm oil prices, but prices have been declining since the ban was lifted in 2008. Some distributors are unable to trade in sufficient quantities due to lack of funds. Poor road conditions make transportation costs high, but it is difficult to pass all the costs onto the selling price.

- Opportunity

Improvement of oil press technology: Introduction of more efficient small-scale oil presses, together with financing schemes, will improve the oil extraction rate and reduce the amount of waste.

Increased production: Production is expected to increase through rehabilitation of existing plantations, revival of closed large public plantations, and increased yields through improved varieties. In addition, the Nigerian Institute for Oil Palm Research (NIFOR) is conducting specialized research, so production increase is expected through improvement and dissemination of production technologies.

(21) Cashewnuts[86]

- Value Chain Structure

Although the history of cashewnuts production in Nigeria is relatively new, it is now the sixth largest producer in the world and the third largest in Africa. It is mainly exported in shell. The figure below shows an overview of cashew VC in Nigeria. The production ranges from small-scale to commercial farmers.

Figure 80 Fruits of cashew (footnote[85])

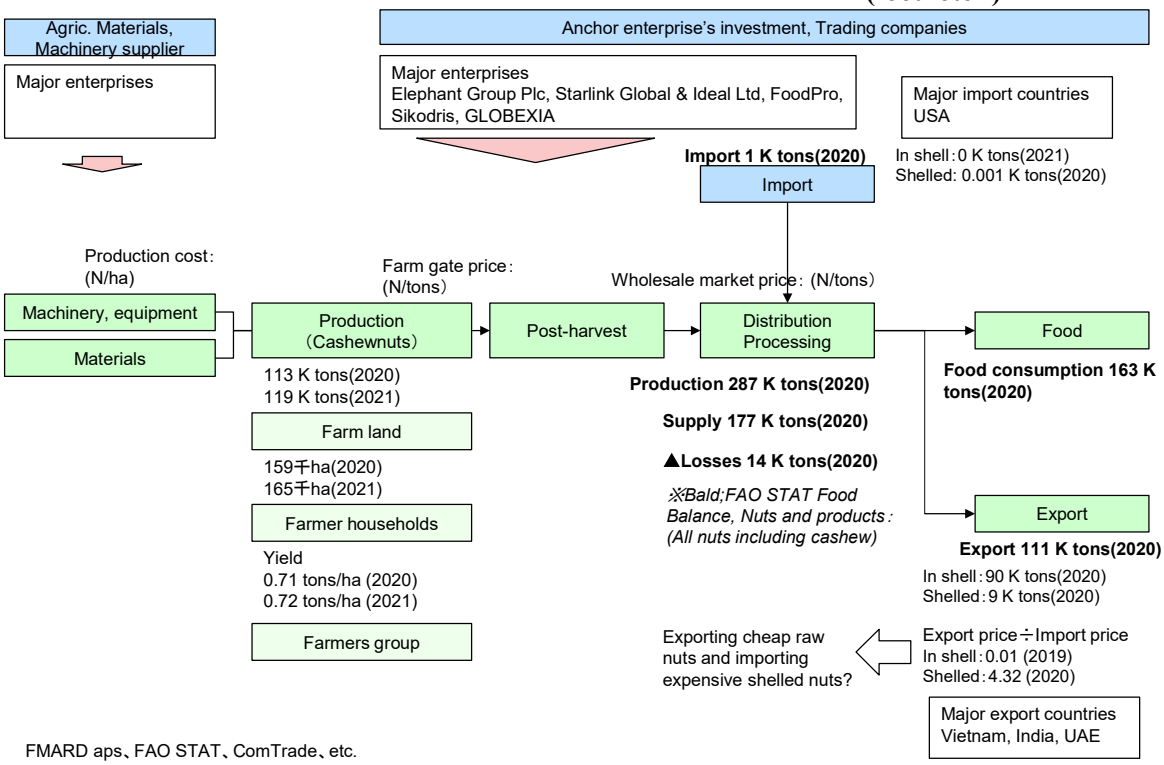


Figure 81 Cashewnuts Value Chain

- Details of Value Chain

The figure below shows an image of the cashewnuts value chain of Nigeria.

85 https://medium.com/vox-nigeria/nigerian-cashew-farmers-are-going-nuts-f34a4e6ae938
86 Unless otherwise noted, the source is "Product Profile: Cashew Nut Kernels", Nigerian Export Promotion Council

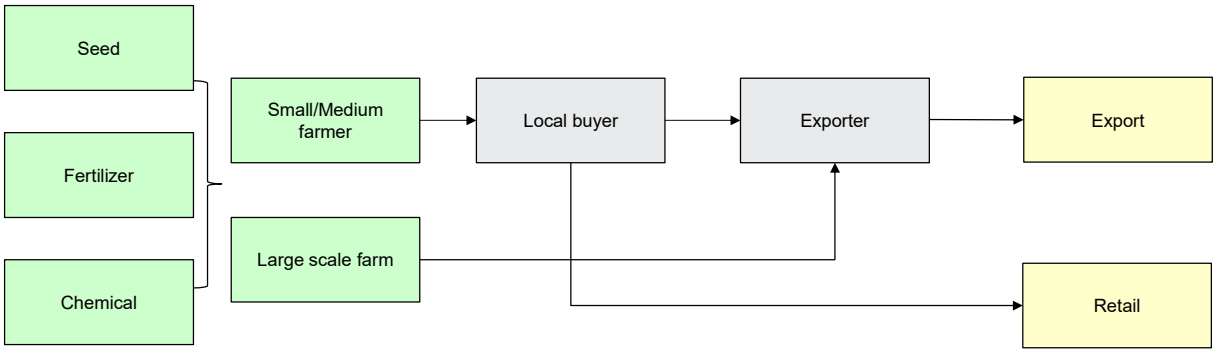


Figure 82 Diagram of Cashewnuts Value Chain

Source; Made by Study Team based on "Product Profile: Cashew Nut Kernels", "Cashew Farmers, Stakeholders in Kogi Want More from Government" and others

- Production

Areas and quantity of production

Production situation is shown below and it is increasing.

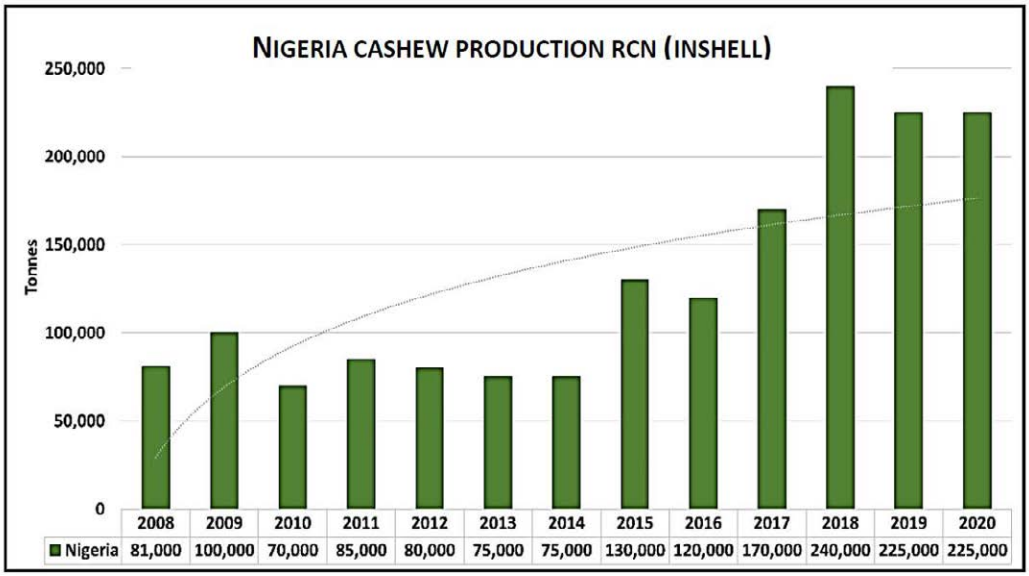


Figure 83 Cashewnuts Production Quantity in Nigeria

Source; Product Profile: Cashew Nut Kernels

It is widely produced in 22 states, mainly in the southern part of the country, with Kogi State in particular producing 60% of the country's total.[87]。

[87] National Cashew Association of Nigeria, NCAN to sign N3.6bn MoU to improve cashew production, https://ncan.ng/2022/07/09/e-pub-details/ncan-to-sign-n36bn-mou-to-improve-cashew-production/?tid=5&tg_id=2&pid=83&cid=1

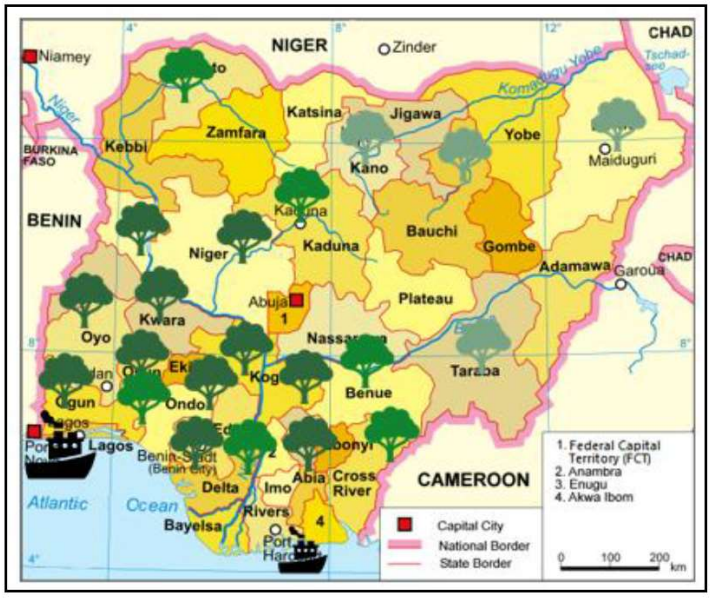


Figure 84 Area of Cashewnuts Production

Source; Product Profile: Cashew Nut Kernels, the color thickness of green trees shows production quantity.

- Processing

The most of Nigerian cashewnuts is exported to Vietnam in shell form and re-exported from Vietnam after processing.

Vietnam is one of the major exporters of cashewnuts, but it depends on imports of raw materials. Vietnam produces 350,000-400,000 tons on a production area of 300,000 ha, which is only 30% of the processing industry's demand. Therefore, the country imports more than 1 million tons of raw cashewnuts from all over the world, especially from Africa. Vietnam's cashew industry has invested to 500,000 ha in Cambodia to procure cashewnuts nearby. India, the world's largest exporter of processed cashews, also imports about 60% of raw cashews from Africa and Asia. [88]

The removal of cashew shells is done in processing plants because it requires a special process, but this is rarely done in Nigeria, and processing has potential for value-adding.

- Distribution/Marketing

Eighty five (85) % of cashewnuts produced in Nigeria is exported in shell. Of that, 81% is exported to Vietnam and re-exported from Vietnam after processing.

Although Nigerian cashewnuts is highly evaluated and in great demand, export contracts have been cancelled in some cases due to traffic congestion at loading ports and complicated export procedures

[88] Cashing In On The Cashew Nuts Boom, NATIONAL CASHEW ASSOCIATION OF NIGERIA, https://ncan.ng/2022/07/09/e-pub-details/cashing-in-on-the-cashew-nuts-boom/?tid=1&tg_id=4&pid=81&cid=1

with long time. [89]

- Challenge

Production: Eighty (80) % of existing cashew trees are considered old, and there is a need to renew them from seed to improved varieties.[89]

Processing: It is said that less than 7% of the products are processed domestically, and an increase of domestic processing amount is required to improve value-added.[88]

Distribution: Traffic congestion and delays in administrative procedures at major loading ports such as Apapa have become bottlenecks in increasing export volumes, and improvements are required. International prices fluctuate widely, and appropriate measures are required.

- Opportunity

Production: CRIN is offering a large Brazilian variety that is more expensive than the existing cashews. It is expected to promote improved varieties in conjunction with the renewal of old trees. National Cashew Association of Nigeria (NCAN) targets to increase annual cashew production from N 50 billion to 220 billion by 2020 and has signed a N 3.6 billion MoU with a foreign investor in 2019, which is expected to expand production.

Processing: Current domestic processing volume is small, but some companies are constructing processing plants, and domestic processing volume is expected to increase.14

Marketing: The global market for cashews is expanding at 5-6% per year and is expected to grow. Nigeria's domestic cashew market is the largest in West Africa and is expected to grow with economic development.

(22) Sugarcane[91]

- Value Chain Structure

Nigeria relies on imports for 95 % of raw sugar and needs to improve domestic production. Therefore, production increase of sugarcane, the raw material, is targeted. On the other hand, imported raw sugar is refined and exported to neighboring countries. The figure below shows an overview of sugarcane VC in Nigeria. Sugarcane is produced as a raw material for

Figure 85 Sugarcane plantation (footnote[90])

89 Cashew farmers see higher output, better pricing ahead of 2020 season, NATIONAL CASHEW ASSOCIATION OF NIGERIA, https://ncan.ng/2022/07/09/e-pub-details/cashew-farmers-see-higher-output-better-pricing-ahead-of-2020-season/?tid=1&tg_id=4&pid=86&cid=1

90 https://www.foodbusinessafrica.com/nigeria-to-still-depend-on-sugar-imports-as-cane-sugar-production-is-projected-to-decline-by-7/

91 Unless otherwise noted, the source is “Sugar Annual”, USDA, 2021

sugar production in factories, either on company-owned farms or through contract farming.

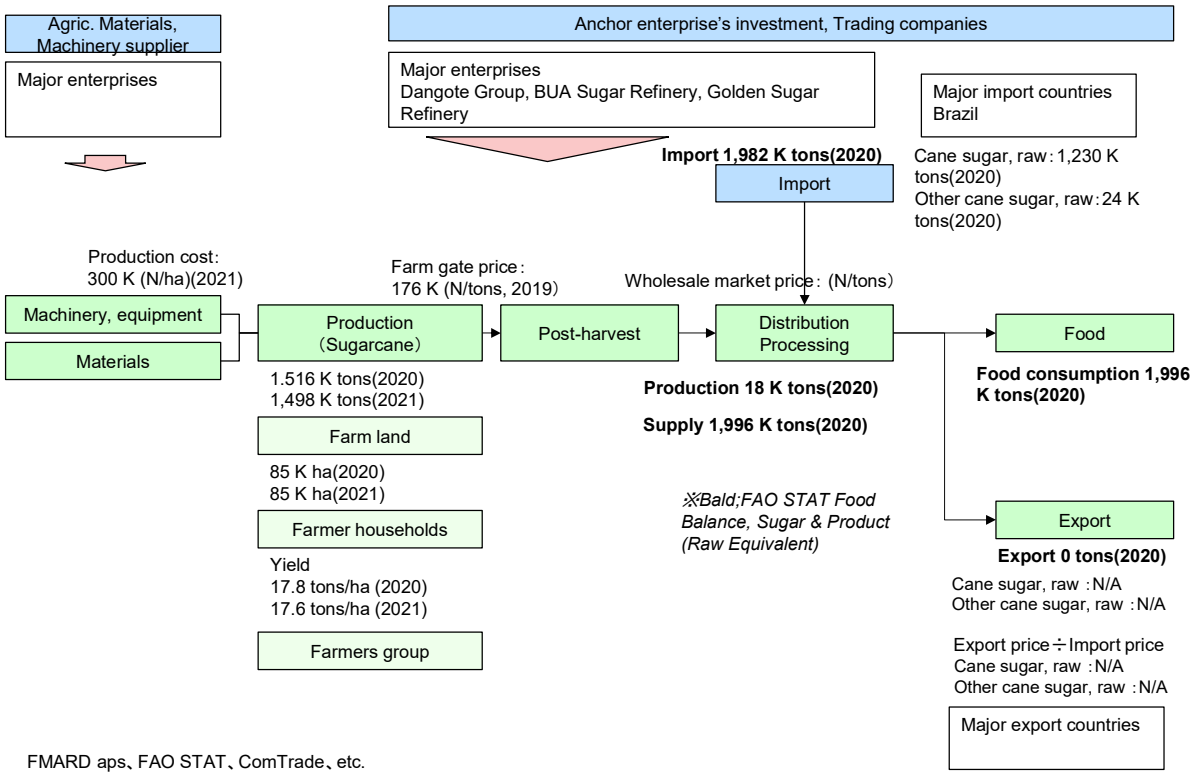


Figure 86 Sugarcane Value Chain

- Details of Value Chain

The figure below shows an image of the sugarcane value chain of Nigeria.

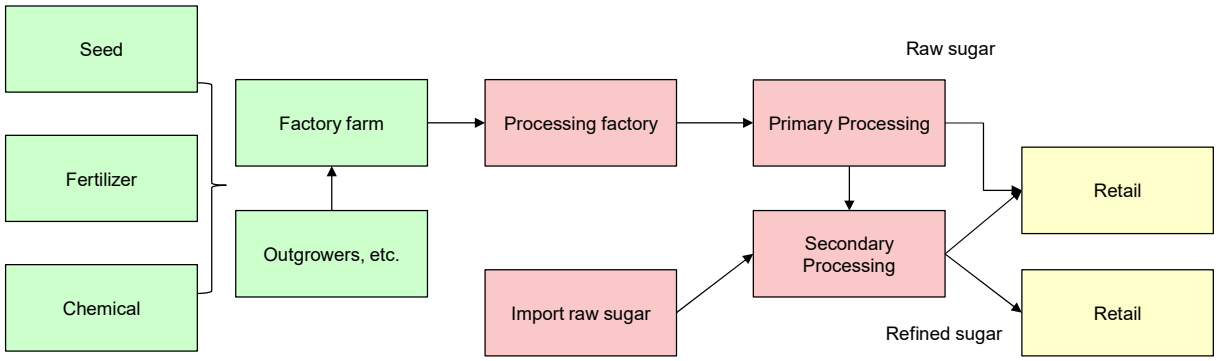


Figure 87 Diagram of Sugarcane Value Chain

Source; Made by Study Team based on Sugar Annual, USDA, 2021, etc.

- Production

Sugarcane is widely produced mainly in the northern part of the country. The main producing states

are Kwara, Adamawa, Niger, Kebbi, Jigawa, Sokoto, Oyo, and Taraba. Although the production volume for each state is unknown, according to FAOSTAT, the country as a whole produces 1.52 million tons in 2020 and 1.50 million tons in 2021, as shown in the figure above. The cost of production was 300,000 N/ha (APS 2021), and the farm gate price was 176,000 N/tons (FAOSTAT 2019).

- Processing

Sugar production companies have increased their sugar refining capacity from 2.75 million tons in 2019 to 3.4 million tons in 2020, but due to slow production growth, only 70% of the capacity has been utilized. Dangote Sugar Refinery, BUA Sugar Refinery, and Golden Sugar Company Limited are actively investing in this sector. On the other hand, there are plants refining imported raw sugar in Lagos, Port Harcourt, and other locations.

- Distribution/Marketing

As previously mentioned, Nigeria relies on imports for 95% of raw sugar, most of which comes from Brazil. To overcome this situation, the government launched the National Sugar Master Plan (NSMP) in 2012, aiming to expand domestic sugarcane production, and has been working to establish a financing system, promote investment, and impose import tariffs on sugar. However, development has not progressed as planned.

- Challenge

Self-sufficiency: Domestic production of raw sugar is only a few percent of demand and relies almost entirely on imports, so from both food security and economic perspectives, there is a need to expand raw sugar production through increased sugarcane production.

Production: Challenges in production are lack of good varieties, reliance on rainfed production, expensive inputs, lack of appropriate technology, minimal use of good agricultural practices, and lack of access to credit. In the past, there have been bankruptcies of government-owned factories. Private companies have also not been able to expand sugarcane production.

- Opportunity

Policy: Although not necessarily on track, the government has formulated an NSMP and aims to expand sugarcane production, so positive results are expected.

Production: The government is trying to utilize 800,000 ha along the Benue and Niger rivers to expand sugarcane production. There is also a move to strengthen contract farming through long-term support to recipient communities.

Distribution: With the devaluation of Naira, Nigerian refined sugar has become more price competitive, making it favorable for export of refined sugar to neighboring West and Central African countries.

(23) Cotton

Figure 88 Cotton field (footnote[92])

- Value Chain Structure

Nigeria's cotton products were once one of the most exported products, accounting for 25% of GDP in 1980, and the country was one of the largest cotton producers in the world, with over 200 cotton product manufacturing companies. Today, however, only eight mills are in operation. Although cotton production has been increasing in recent years, the industry has not been able to revive, and raw cotton exports have been increasing. Production, domestic consumption, imports and exports are shown in the table below. [93]

Table 17 Production, Trade and Consumption of Cotton in Nigeria

Year	Area 000 ha	Production 000 ton	Imports 000 ton	Consumption 000 ton	Exports 000 ton
2017/18	261	51	1	28	20
2018/19	250	51	1	28	29
2019/20	130	44	1	25	23
2020/21	264	90	1	30	36
2021/22	272	93	1	30	64

Source; Made by Study Team based on the footnote 93.

- Production

The table below shows the production area, quantity, and yield for each cotton-producing state in 2020 and 2021. The total production was 237,000 tons in 2020 and 243,000 tons in 2021. The largest production states are Kano, Katsina, Bauchi, Sokoto, and Kaduna, which are located in the northern part of the country. It should be noted, however, that there is a large discrepancy between the figures in the table above and those in the table below.

92 https://guardian.ng/opinion/cotton-production-in-nigeria-the-ogun-example/
93 Here is Why Nigeria is missing out on global $38bn cotton market, https://www.dataphyte.com/latest-reports/economy/here-is-why-nigeria-is-missing-out-on-global-38bn-cotton-market/

Table 18 Area and Quantity of Cotton Production and Yield of Each State

State	Land Area ('000) Ha			Production ('000) MT			Yield (Ton/Ha)	
	2020	2021	% Change	2020	2021	% Change	2020	2021
Adamawa	23.86	24.57	2.97	11.37	11.82	3.93	0.48	0.48
Bauchi	96.98	97.32	0.35	29.29	29.57	0.95	0.30	0.30
Borno	45.74	45.98	0.52	13.67	13.96	2.09	0.30	0.30
Gombe	32.82	33.07	0.75	11.52	11.59	0.57	0.35	0.35
Jigawa	35.50	36.00	1.40	7.84	7.96	1.58	0.22	0.22
Kaduna	8.45	8.32	-1.58	26.50	26.61	0.42	3.14	3.20
Kano	47.51	48.85	2.83	32.76	35.73	9.07	0.69	0.73
Katsina	62.88	63.36	0.76	29.72	30.91	4.02	0.47	0.49
Kebbi	39.17	39.13	-0.11	14.93	15.13	1.36	0.38	0.39
Oyo	2.67	2.88	7.80	2.40	2.69	11.94	0.90	0.93
Plateau	9.60	9.70	1.01	6.46	6.52	0.97	0.67	0.67
Sokoto	38.08	38.08	-0.01	27.11	27.21	0.38	0.71	0.71
Taraba	22.14	22.73	2.67	4.23	4.58	8.32	0.19	0.20
Yobe	32.86	32.98	0.37	12.68	13.20	4.12	0.39	0.40
Zamfara	12.11	7.92	-34.64	6.36	5.26	-17.31	0.53	0.66
National	**510.37**	**510.86**	**0.10**	**236.83**	**242.75**	**2.50**	**0.46**	**0.48**

Source; APS 2021

According to "Yield estimation and profitability of cotton production in Northern Nigeria (Scienceweb Publishing, 2020)", the cost of cotton production is 178,000 N/ha, and the unit selling price for farmers is 160,000 N/t. Note that the yield in this paper is 1.263 t/ha, which is a general figure, but the table above shows a very small yield of 0.48 t/ha, which may be the weight of cotton only excluding seeds, so confirmation is required (generally, the weight of seed is 65% while weight of fiber is 35% of cotton[94]).

- Processing

After harvesting in the farm, cotton undergoes a ginning process to separate the fibres from the seeds, and is then exported or advanced to the next process in the form of compressed raw cotton (also known as lint). Various processes are then followed before the cotton is turned into cotton products. The seeds are mainly used to make edible cottonseed oil.

- Distribution/Marketing[95]

94 https://noc-cotton.org/overseas/%e4%b8%96%e7%95%8c%e3%81%ae%e7%b6%bf%e8%8a%b1%e3%81%ae%e7%94%9f%e7%94%a3

95 CBN invests over N120bn on cotton value chain, Vanguard, 2020, https://www.vanguardngr.com/2020/10/cbn-invests-over-n120bn-on-cotton-value-chain/

As previously mentioned, Nigeria's cotton industry was once thriving, but subsequently declined due to the decline in agriculture caused by the development and production of crude oil and the dismantling of the Cotton Marketing Board in 1986. However, in recent years, the federal government and the Central Bank of Nigeria have been promoting investment with the aim of revitalising the industry, and it is beginning to regain its vitality: by 2019, 19 cotton mills would be back in operation, with more to follow by 2020. Smuggling and dumping of cotton products is also a major problem, but has been significantly curbed by freezing the accounts of illegal traders.

- Challenge

Production: Producers cited lack of finance, unstable selling prices, poor quality but expensive inputs, policy changes, lack of links with buyers and pests.
Distribution: As already mentioned, the industry is re-emerging as an industry, but production and sales capacity is still low compared to the past and the infrastructure needs to be strengthened.

- Opportunity

Policy support: The government is investing in the cotton and cotton industry to expand production, which is expected to be utilized.
Distribution: Cotton production is increasing and investment in the industry is progressing, which will lead to increased added value and more employment if final products are completed within the country.

(24) Hibiscus

- Value Chain Structure

Hibiscus is mainly used as an ingredient in herbal teas and global demand has been growing over the past decades. China is the largest producer, but the quality is low, followed by Thailand, which has invested in hibiscus production and boasts high quality. They are followed by Mexico and Egypt. Sudanese hibiscus is considered the highest quality, but supplies are low. [97]

Figure 89 Dried hibiscus (footnote[96])

Hibiscus is mainly produced in the north of Nigeria, and although it is consumed domestically as an ingredient in beverages, most of its production is exported. Of these, 80% were exported to Mexico, but exports have stalled since the refusal to land in 2018 due to contamination. However, the Mexican embargo

96 http://globexia.com/dried-hibiscus-flower-exporters-in-nigeria-zobo-leaves-suppliers/
97 HIBISCUS Post-harvest Operations, FAO, 2004

was lifted in 2021 and exports have resumed.[98]

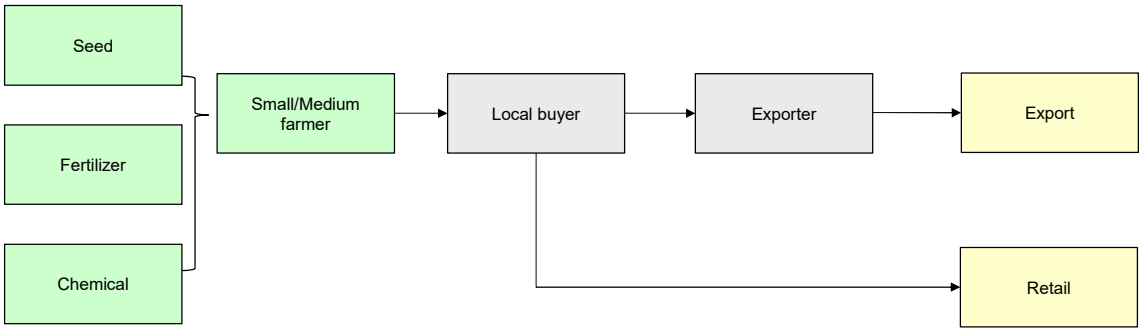


Figure 90 Diagram of Hibiscus Value Chain

Source; Made by Study Team based on "Tackling Hibiscus export ban to Mexico" The Nation Newspaper, 2019.9.27, "HIBISCUS Post-harvest Operations", etc

- Information of Value Chain

There is no coherent information on hibiscus VC in Nigeria, but the information collected is organized below.

- Production

The main production areas are the northern states of Kano, Katsina, Jigawa, Bauchi, Gombe and Borno. According to AgroEknor, which specializes in hibiscus exports, current national production is around 16,000 tons, while demand for Nigerian hibiscus from the international market is expected to be over 24,000 tons and the company has performed well over the past five years.[98]

- Processing

Harvesting is done by hand and care must be taken to ensure that no foreign matters are included. It is then promptly dried to about 11% by weight.[97]

- Distribution/Marketing[99]

In 2017, before the embargo, 1,983 containers of hibiscus were exported from Nigeria to Mexico, generating USD 35 million in nine months. The Hibiscus Farmers Association in Jigawa sold N 3.6 billion (about USD 10 million) in hibiscus exports in 2018. In Jigawa State, 15,000 farmers produced 15,000 tons of hibiscus and they sold to over 30 Kano-based companies at 240,000 N/tons. The companies buy through agents, stockpile in the surrounding markets and export 98% of the product. AgroEknor, already mentioned, has also started exporting from Port Harcourt airport, where export

98 Nigeria's $100m Hibiscus export market opens opportunity for farmers, investors – Businessamlive, 2022, https://www.businessamlive.com/nigerias-100m-hibiscus-export-market-opens-opportunity-for-farmers-investors/
99 Tackling Hibiscus export ban to Mexico, The Nation Newspaper, 2019, https://thenationonlineng.net/tackling-hibiscus-export-ban-to-mexico/

procedures are quicker, despite high costs, security and other risks.

- Challenge

Production: Production is low against demand from export markets, so there is a need to expand production.

Quality: Thorough quality control is required to prevent a recurrence of the case in Mexico, where imports were banned due to contamination.

- Opportunity

Policy: There is a call for hibiscus to be included in cluster programmes to provide input support, which, if realized, could lead to hibiscus production increase.

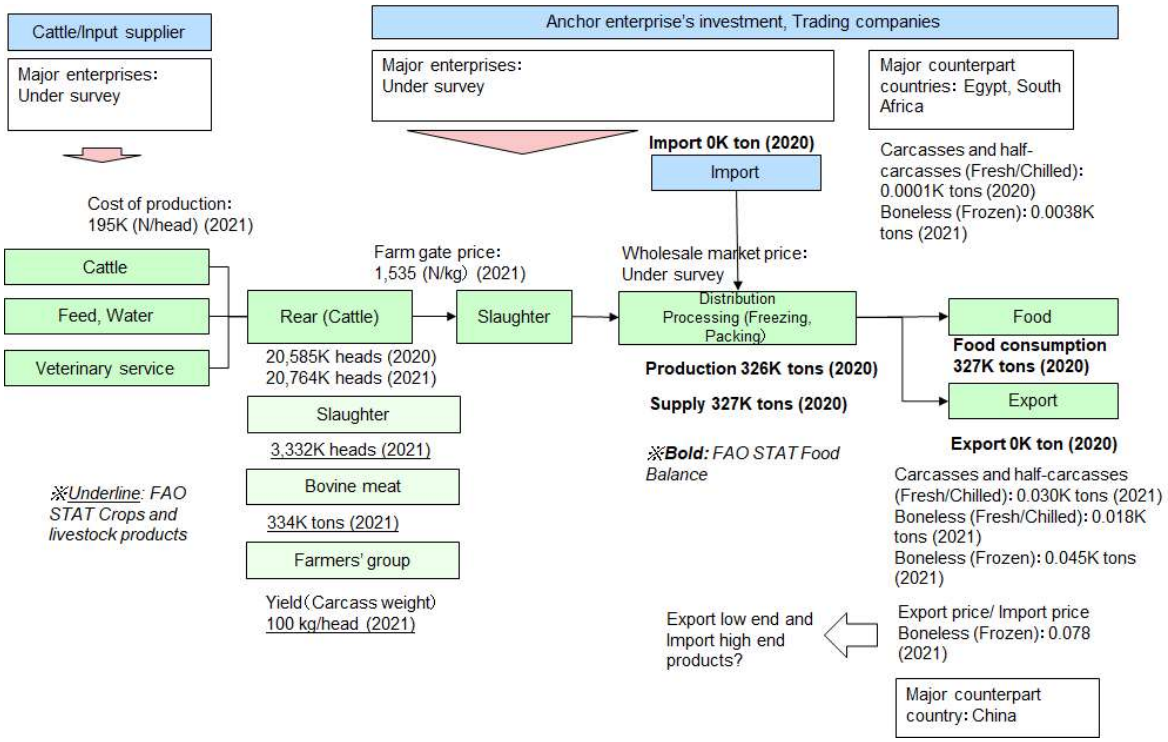
Distribution: Global market demand for Nigerian hibiscus is significant and expected to grow.

4. Livestock

(25) Cattle (Beef)

- Overview

Cattle (beef) is mainly consumed as food as carcasses and boneless meat, and the number of reared cattle is 20,585 thousand heads in 2020 and 20,764 thousand heads in 2021. FAO's Food Balance statistics indicates figures that include processed foods such as sausages in addition to meat products, the total supply of beef-related products, including imports and domestic production, is 327 thousand tons in 2020. In addition, most of them are consumed domestically as food, and are hardly exported.



Source: Made by the study team based on FMARD APS, FAO STAT, ComTrade, etc.

Figure 91 Food balance of Cattle (Beef)

- Production

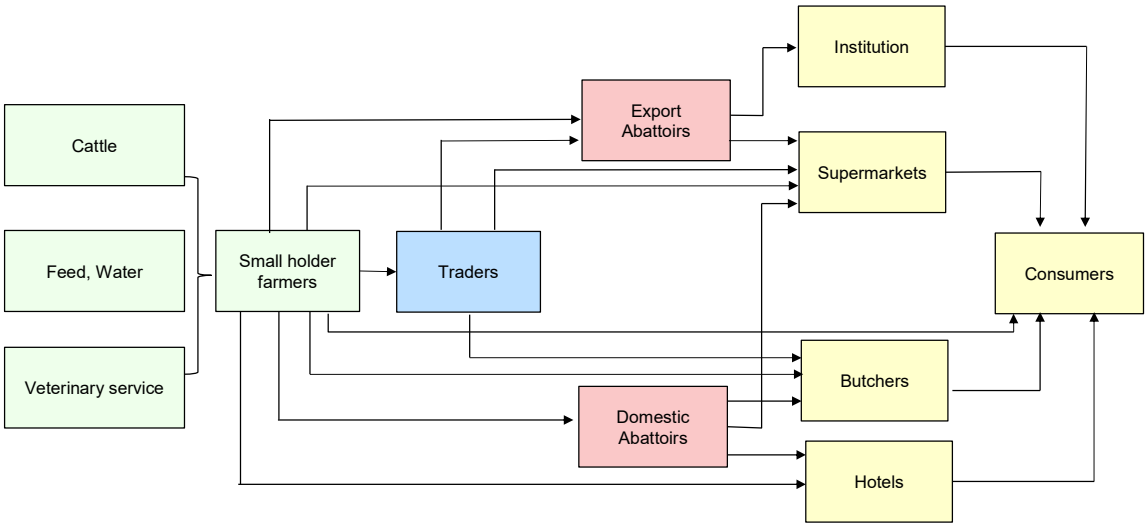
There are three production methods: (1) sedentary pastoralism, (2) non-sedentary pastoralism, and (3) large-scale farms. (1) Settled pastoralists engage in grazing at post-harvest lands and fallow lands, and in cultivating agricultural crops. (2) Non-sedentary pastoralists do not engage in agriculture and move their cattle across states and national borders, grazing on fallow lands, post-harvest fields, and river plains. (3) Large-scale farms are characterized by a high degree of mechanization, possession of processing facilities, and non-grazing.

All production methods face challenges. About (1) sedentary pastoralists and (2) non-sedentary pastoralists, the challenges are inadequate animal nutrition and infestation of tsetse fly and disease such as foot-and-mouth disease, and about (3) large-scale farms, the high cost of inputs including feed troughs is a challenge.

- Distribution

In the domestic market, the private sector is primarily responsible for distribution, while the public sector contributes to the provision and management of slaughterhouses and livestock markets, as well as meat inspection. In recent years, the Federal Capital Territory Administration has set the conditions for the transport of meat around the Federal Capital City. Under the conditions, the use of motorcycles

for transporting meat in Abuja was banned, and a new method was introduced whereby meat must not be transported in a messy manner. It also stipulated that three-wheeled meat trucks must be used for distances up to 3 km from the slaughterhouse, and four-wheeled meat trucks must be used for longer distances.



Source: Made by the study team based on "Review of the livestock/meat and milk value chains and policy influencing them in Nigeria"

Figure 92 Cattle (Beef) value chain

- Processing

Value-added products, i.e., processed and packaged beef, are rarely produced in Nigeria.

- Consumption Market

Key factors in the growing demand for quality meat products in many developing countries are population growth, rising incomes, and changing consumer preferences, and in Nigeria, the growing demand for high-quality meat products provides an opportunity for livestock producers to market value-added meat products. However, inadequate policies and regulations have not allowed small-scale meat producers and retailers to fully benefit from this opportunity.

In addition, high-income consumers prefer to purchase meat from upscale markets such as specialty stores and supermarkets. High-income consumers perceive cleanly packaged meat, meat produced under clean facilities, and veterinarian-approved meat as high-quality, safe food, and are actually willing to pay a premium for these products. Low-income consumers, on the other hand, purchase meat products primarily from local butchers.

- Trade

Imports of beef-related products are less than 1,000 tons in 2020, but the major import companies are Egypt and South Africa. Exports, on the other hand, are less than 1,000 tons, mainly of carcasses and boneless meat, and the major export country is China. The relative price of trade (unit price of exports divided by import price) is 0.078 for boneless meat (frozen), indicating the possibility of competitiveness in low-priced products.

- Opportunities

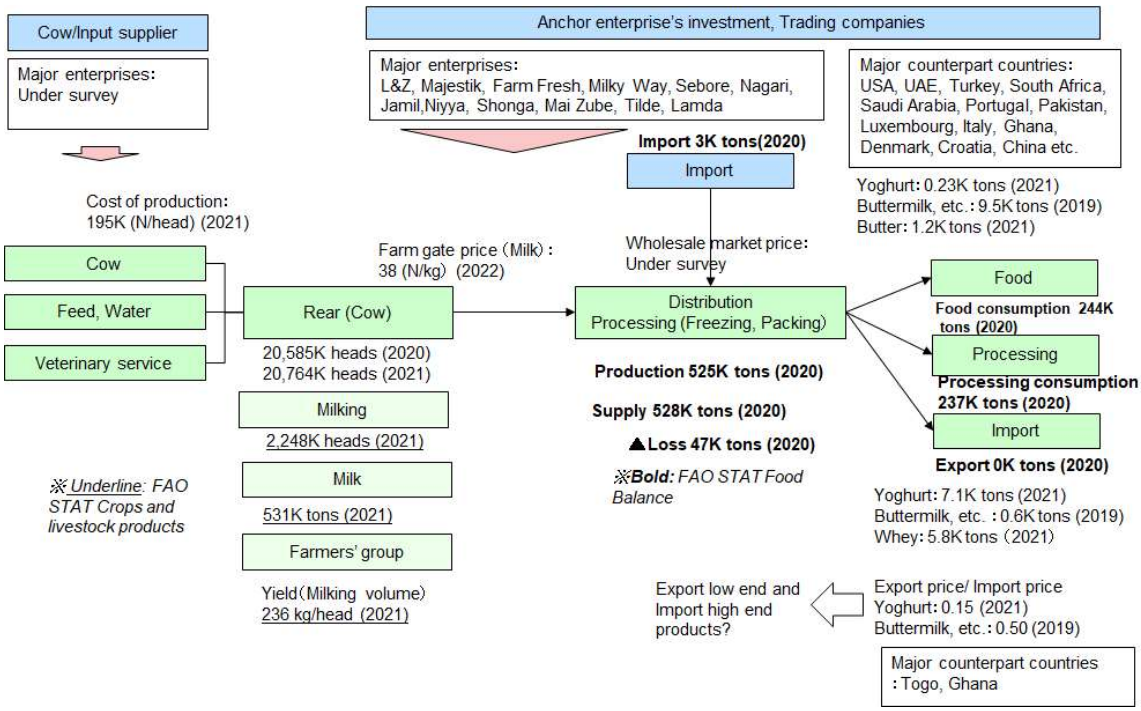
Because pastoralists are widely distributed, it is difficult for official agencies and traders to reach producers, which imposes additional costs in ensuring input supply, market access, etc. This could be addressed by improving logistics efficiency through the promotion of digitalization and the development of roads and other infrastructure.

Commercialization of the livestock industry is also an issue, and although transition from the current subsistence pastoralism to business-oriented livestock production is difficult, this will require training on production so that pastoralists can meet market demand and on records of proper income and expenditure to distinguish between revenue and profit.

(26) Cattle (Dairy Products)

- Overview

Dairy products are processed into yogurt and other products as food. In FAO's Food Balance statistics, dairy products include yoghurt etc. in addition to milk and the total supply of dairy products, including imports and domestic production, is 528 thousand tons in 2020, of which 244 thousand tons are consumed as food in 2020.



Source: Made by the study team based on FMARD APS, FAO STAT, ComTrade, etc.

Figure 93 Food Balance of Cattle (Dairy product)

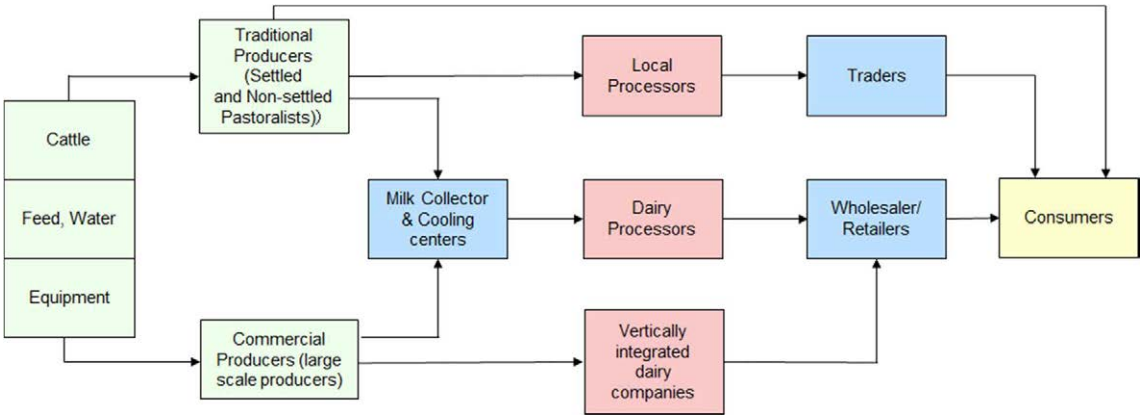
- Production

Nigeria has 20 million heads of cattle, of which 2.3 million are dairy cows. Most dairy cows are reared in northern Nigeria, including Kano, Kaduna, Nasarawa, and Niger states, and 99% of them are local breeds such as Baundji, Rahaji, and Sokoto Gudali.

Milk production is also low compared to the world average: 0.7 liters per cow per day (world average - 6.6 liters) about (1) sedentary pastoralists and (2) non-sedentary pastoralists, and 8 liters per cow per day (world average - 30 liters) about (3) large farms.

- Distribution

Milk collection centers are established to collect milk from pastoralists. At the collection centers, milk is tested for quality by the use of a milk fat meter and an alcohol test, pasteurized in a sterilizer, and then transported to a processing plant. In addition, milk collection centers provide training in hygiene, animal health, and feeding to dairy producers.



Source: Made by the study team based on "Transforming Nigeria's Agricultural Value Chain"

Figure 94 Value chain of Cattle (Dairy product)

- Processing

In northern Nigeria, most local milk processing companies operate on a small scale, with a production capacity of about 50 liters per day. Local processors produce traditional dairy products such as sour milk, sour yogurt, locally produced butter, and cheese, but lack of advanced technology and inadequate dairy infrastructure result in dairy products that are not up to standard. In addition, several commercial processors use local and imported milk for the production of milk derivatives such as pasteurized milk, ultra-high temperature heat-treated milk, unsweetened condensed milk, yogurt, and ice cream.

Imported milk accounts for 75% of milk processing inputs, and most dairy processors import powdered milk, which is then converted back into liquid milk and other dairy products such as yogurt, ice cream, and confectionery. Imported milk powder is supplied mainly from New Zealand, Australia, South America, EU, India, Ukraine, and Poland, and multinational companies such as PZ Cussons (UK) and Promasidor have partnered with or acquired Nigerian dairy companies to produce milk products from imported milk powder.

Challenges faced by dairy processors include a lack of cold chain infrastructure, fluctuations of exchange rate, and poor logistics.

- Consumption Market

In Nigeria, local processors use traders and vendors to informally sell milk within their communities. Large-scale processors, on the other hand, have established a more robust distribution model through grocery retailers and supermarkets. In addition, because of the growing number of modern malls across the country, many processors have partnered with supermarkets to supply dairy products on a regular basis.

Three main types of dairy products are sold: powdered milk, unsweetened condensed milk, and

condensed milk in metal cans or sachets of different weights. Milk in sachets is sold in the range of N25 to N50, targeting consumers who prefer a lower price range. Other packages are sold in medium and large sizes ranging from N150 to N6,500. Although milk consumption per capita in Nigeria is low at 10 liters, the increase in shopping malls, increasing urbanization, and rising per capita income are expected to support demand for dairy products.

- Trade

Imports of dairy products amounted to 3,000 tons in 2020, accounting for about 0.6% of the domestic supply, and major import countries are the United States, the United Arab Emirates, Turkey, South Africa, Saudi Arabia, Portugal, Pakistan, Luxembourg, Italy, Ghana, Denmark, Croatia, and China. On the other hand, exports are mainly processed products such as yogurt, buttermilk, whey, and adjusted whey, and major export countries are Togo and Ghana. The relative prices of trade (unit price of exports divided by import price) are 0.15 for yogurt and 0.50 for buttermilk and other products, indicating the possibility of competitiveness in low-priced products.

- Opportunities

Opportunities in production include: 1) improving milk yield through improved cow breeds; 2) improving milk quality by providing extension services to pastoralists, including training on cow health and hygiene; and 3) improving access of processors to pastoralists through the formation of producer groups/cooperatives of pastoralists.

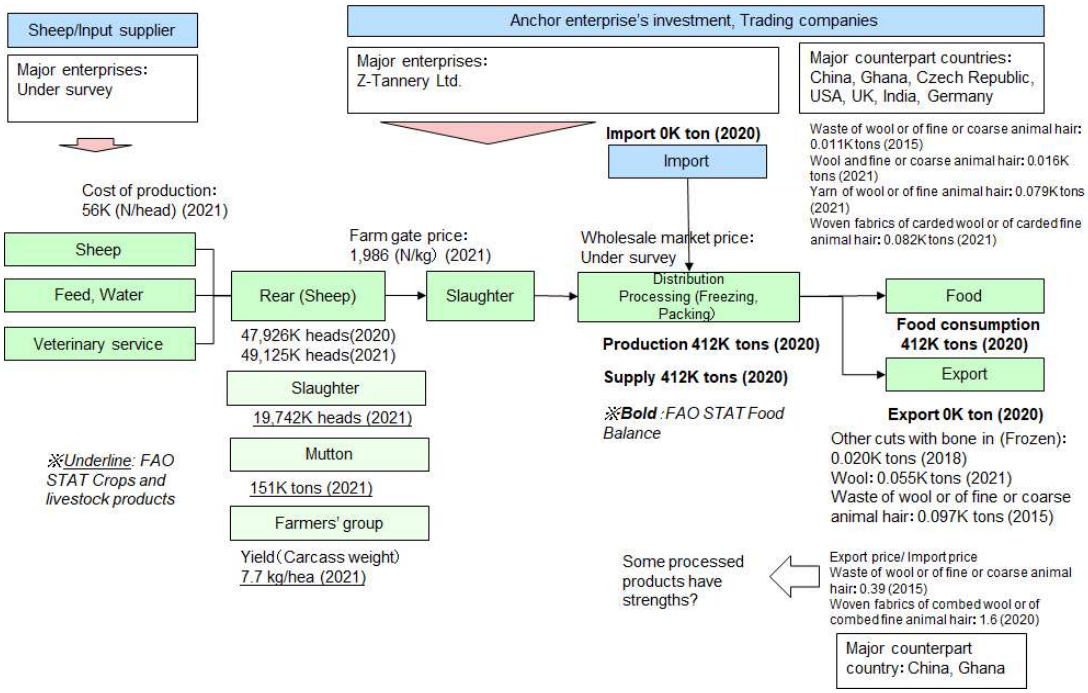
Opportunities in processing include: 1) increasing milk supply by encouraging processors to produce their own milk or work closely with pastoralists; 2) providing local processors with equipment such as homogenizers, pasteurizers, and mixers to improve processing capacity and milk quality.

Opportunities in distribution include the introduction of cold chain technology into the planned construction of a railroad linking northern and southern Nigeria, aimed at facilitating the transport and distribution of dairy products across the country.

(27) Sheep

- Overview

Sheep are consumed as meat and processed into wool for other uses. The number of sheep is 47,926 thousand heads in 2020 and 49,125 thousand heads in 2021. About FAO's Food Balance statistics, the total amount of sheep and goat meat is indicated, and non-food items such as wool are not included, the total supply, including imports and domestic production, is 412,000 tons in 2020, and all are consumed as food.



Source: Made by the study team based on FMARD APS, FAO STAT, ComTrade, etc.

Figure 95 Food Balance of sheep

Since VC in Nigeria has been difficult to identify, "Production", "Distribution", "Processing", and "Consumption markets" and "Opportunities" described in the following sections will describe VC in Ethiopia as a similar case (Concerning "Trade", VC in Nigeria will be described based on the figure above).

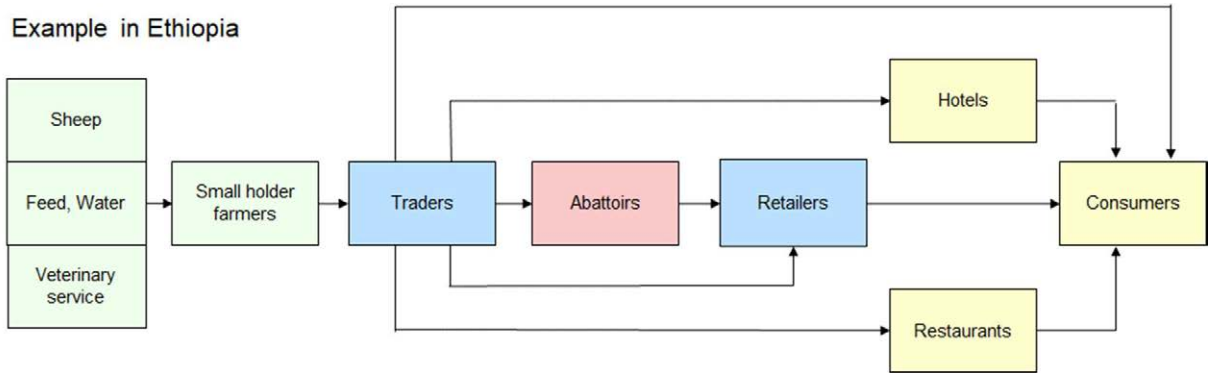
- Production (VC in Ethiopia)

Sheep are reared parallel to crop production, and sheep are a direct source of income when problems arise regarding crop yields. The average number of sheep kept by farmers is 5, with a minimum of 1 and a maximum of 15. Sheep are kept mainly in sheds, with few farmers keeping them inside their dwellings.

- Distribution (VC in Ethiopia)

Sheep are purchased by traders from farmers and then transported to slaughterhouses. Since slaughterhouses need young growing male sheep, traders buy ones weighing more than 20 kg from farmers and transport them to the slaughterhouses. Sheep may also be sold live to retailers or consumers.

The selling price depends primarily on supply and demand, which are heavily influenced by the season and the occurrence of religious and cultural festivals.



Source: Made by the study team based on "Analysis of Sheep Value Chain : The Case of Adama District, East Shoa Zone of Oromia Regional State, Ethiopia"

Figure 96 Value chain of sheep

- Processing (VC in Ethiopia)

Sheep are processed mainly in hotels and restaurants, but also in slaughterhouses. Hotels and restaurants purchase young, non-pregnant female sheep and process them into roast or boiled meat. At the slaughterhouse, the skin is removed, the entire carcass is cooled, and the carcass is wrapped in a white cotton cloth.

- Consumption Market (VC in Ethiopia)

Consumers can buy processed meat at supermarkets and butchers, or eat a variety of lamb-based dishes at hotels. Some farmers also buy live sheep to slaughter at home or to rear and fatten.

- Trade (VC in Nigeria)

Imports of sheep-related products are less than 1,000 tons in 2020 and major import countries are China, Ghana, the Czech Republic, the United States, the United Kingdom, India, and Germany. On the other hand, exports are also less than 1,000 tons, mainly of processed products such as meat on the bone and wool, and main export countries are China and Ghana. The relative prices of trade (unit export price divided by import price) are 0.7 about wool, fine, or coarse animal hair scraps and 1.6 about combed fabrics, suggesting that there may be differences in competitiveness depending on the processed product.

- Opportunities (VC in Ethiopia)

Sheep help stabilize farmers' livelihoods by serving as a source of income during crop failures. It

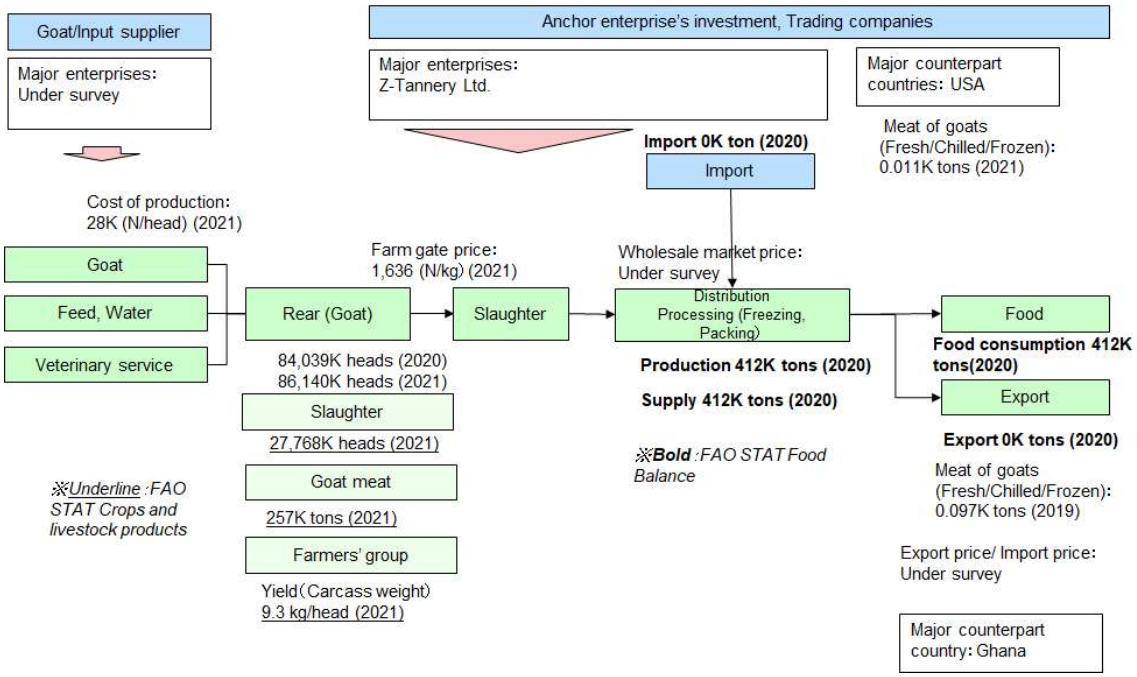
has advantages with regard to integrating crop production and rearing of sheep because they produce lambs in a gestation period of about 150 days, which allows for fast turnover, and it is easy for children and women to rear them.

In addition, the high demand for sheep in the market as a result of population growth, urbanization, and increased income creates opportunities for producers to sell sheep at better prices.

(28) Goat

- Overview

Goats are consumed as meat and few processed products are distributed. The number of reared goats is 84,039 thousand heads in 2020 and 86,140 thousand heads in 2021. FAO's Food Balance statistics indicates the total amount of sheep and goat meat, and the total supply, including imports and domestic production, is 412 thousand tons in 2020, and its consumption as food is also 412 thousand tons in 2020.



Source: Made by the study team based on FMARD APS, FAO STAT, ComTrade, etc.

Figure 97 Food Balance of goat

Since VC in Nigeria has been difficult to identify, “Production”, “Distribution”, “Processing”, and “Consumption markets” and “Opportunities” described in the following sections will describe VC in Australia as a similar case (Concerning “Trade”, VC in Nigeria will be described based on the figure above).

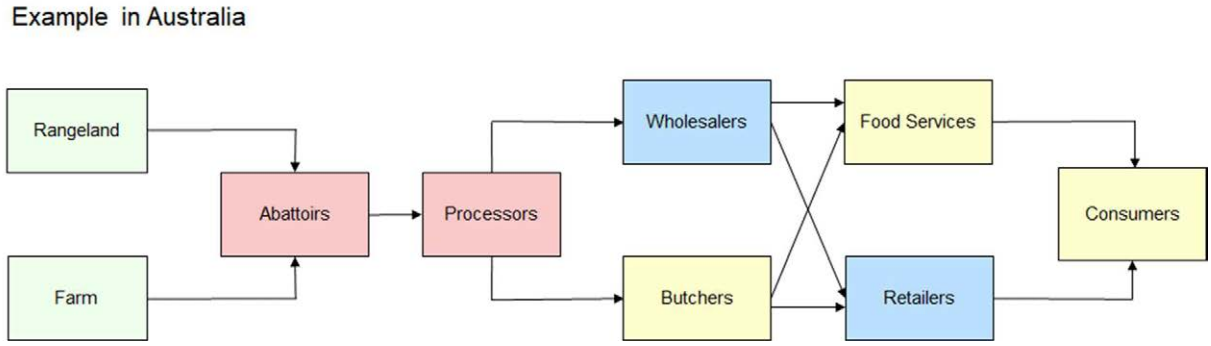
- Production (VC in Australia)

The majority of goats processed for meat are reared at pasture or are wild. There are also goats reared for fiber and dairy products, but their numbers are much smaller than those for meat production.

- Distribution (VC in Australia)

More than 90% of goat meat produced in Australia is exported, mainly because export demand far exceeds domestic retail demand, which is due to the availability of other types of meat in Australia.

The domestic supply of goat meat is not stable, leading to fluctuations of price. In addition, the capture of goats on pasture is dependent on environmental outcomes, including the occurrence of drought and predators such as wild dogs. Weather conditions can also cause problems with respect to transport of goats.



Source: Made by the study team based on "A Value Chain Analysis of Australian Goat Meat Markets"

Figure 98 Value chain of goat

- Processing (Australia VC)

While some goats are processed for domestic consumption, many are processed for export within Australia. Others also are exported as live animals and processed overseas. When processed at abattoirs, the majority are processed into frozen conditions for export, although there is some demand for chilled meat.

- Consumption Market (VC in Australia)

Domestically, there is a limited market and little information on the amount of meat sent directly to retailers from butchers or wholesalers, and that which parts of the goat are consumed in restaurants and other food services.

- Trade (VC in Nigeria)

Imports of goat meat are less than 1,000 tons in 2020, and the main import country is the United States. On the other hand, exports are also only goat meat and an amount is less than 1,000 tons, and the main export country is Ghana. The relative price of trade (unit export price divided by import price) should be confirmed in field survey.

- Opportunities (VC in Australia)

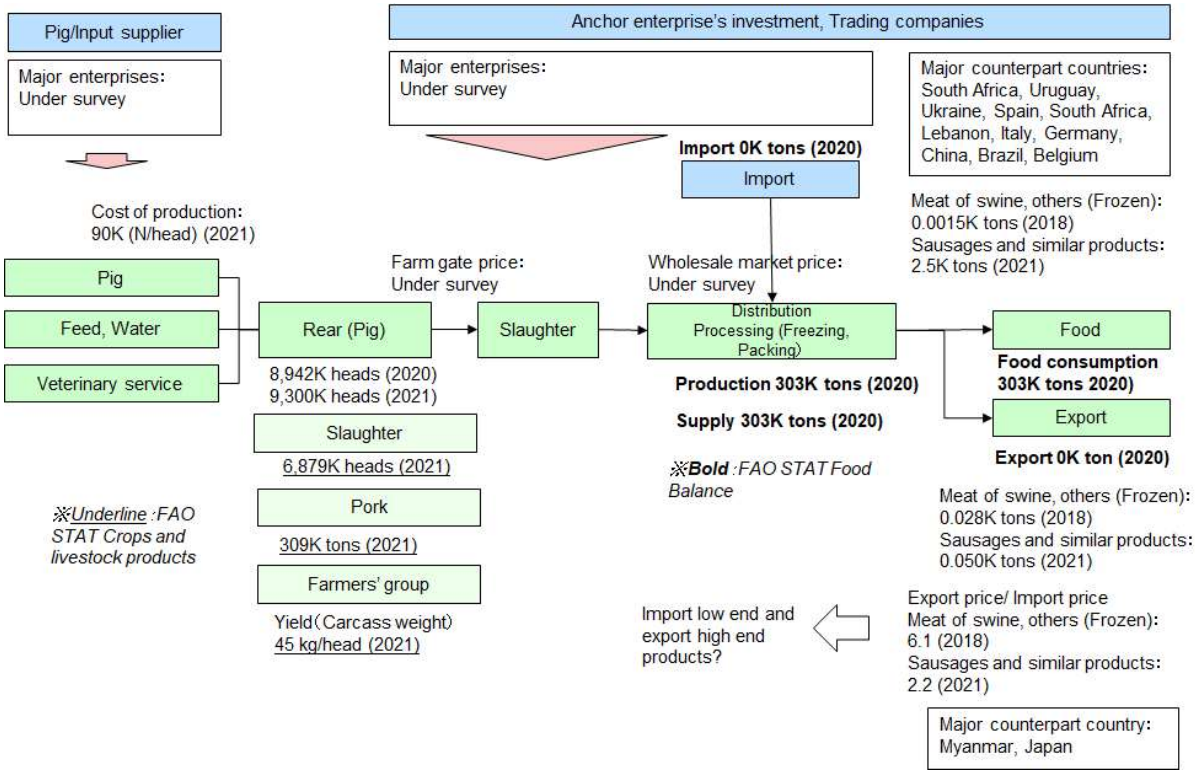
While much attention has been paid to the traceability of agricultural products, detailed information on the origin of goat meat has not been provided. However, this means that there is opportunity for meat of farm-raised goat to be branded and value-added.

Another opportunity is that the supply is unstable because the majority of the supply consists of pasture-raised goats. An unstable supply makes it difficult to grow the market domestically and increase opportunities in export markets, and can lead to wholesalers and importers storing large volumes of meat, which can affect the price of year-round supply. The way to avoid this is to manage the farming operation and create a stable supply.

(29) Pig

- Overview

Pigs are eaten as meat and processed into sausages and other products for use as food. The number of reared pigs is 8,942 thousand heads in 2020 and 9,300 thousand heads in 2021. FAO's Food Balance statistics indicates figures of pork, including processed products such as sausages, etc., and the total supply, including imports and domestic production, is 303 thousand tons in 2020, and the amount consumed as food is also 303 thousand tons in 2020.



Source: Made by the study team based on FMARD APS, FAO STAT, ComTrade, etc.

Figure 99 Food Balance of pig

Since VC in Nigeria has been difficult to identify,, "Production", "Distribution", "Processing", and "Consumption markets" and "Opportunities" described in the following sections will describe VC in South Africa as a similar case (Concerning "Trade", VC in Nigeria will be described based on the figure above).

- Production (VC in South Africa)

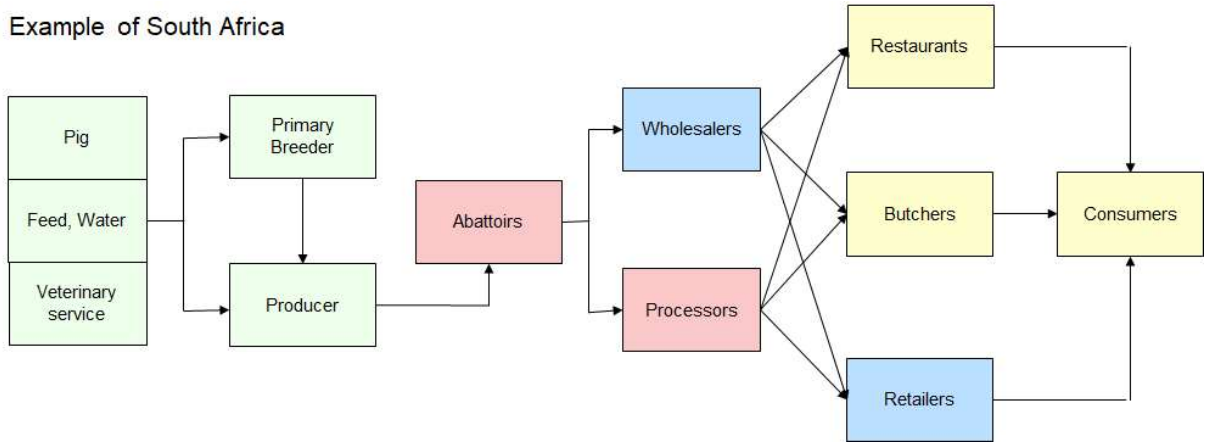
As an international trend, the increase in production of pork is largely due to an increase in carcass weight rather than an increase in the number of slaughtered pigs. However, since it is impossible to increase carcass weight indefinitely, further increases in production over the next decade will come from an increase in the number of sows and further improvements in production efficiency. In addition, sufficient planning and investment to increase the number of sows will be required to meet the projected increase in consumption with increased domestic production rather than increased imports.

- Distribution (VC in South Africa)

Most producers do all the breeding, weaning, and finishing work themselves and operate the process from calving to finishing. This is in contrast to producers in the EU, where production of piglet and finishing are not typically performed by the same producer. In addition, although the number of

commercial producers is small, the number of primary producers far exceeds the number of slaughterhouses, so farmers are not free to set their own prices and sell pigs in response to prices determined by supply and demand in the market.

In addition, due to transportation costs and the impact of long distances on the health and weight of adult pigs, many producers are limited in the number of slaughterhouses to which they can realistically deliver. Shifting the sales period is not possible due to the extra cost of feeding the pigs, and producers have no choice but to accept the price offered by the slaughterhouses.



Source: Made by the study team based on "Evaluating the South African pork value chain"

Figure 100 Value chain of pig

- Processing (VC in South Africa)

The pork industry is divided into two segments, with approximately 45% of the pork produced going to the fresh meat market and 55% to the processing market. When considering the further processing stage of the value chain, a clear distinction needs to be made between processors, who add considerable value to the product before selling it to the retail stage, and wholesalers, who are primarily distributors. In the chain of fresh meat, wholesalers may perform some cutting and packaging operations, but only a limited number of them, and in many cases cutting and packaging is also performed at the abattoir level.

- Consumption Market (VC in South Africa)

All major retail chains sell pork, but the strategies used in the procurement and distribution process are very different. One major retailer outsources the procurement, processing, packaging, and distribution of its pork products to a single service provider, which places the pork on store shelves in pre-packaged form. On the other hand, some retailers procure whole carcasses that are processed and packaged by in-store butchers. Both systems have distinct advantages, and using an in-store butcher

store provides a freshness to the consumer. Alternatively, a centralized packing and distribution system allows for the strategic distribution of key products to areas where demand for specific products is high.

Market prices follow a cyclical pattern, usually higher later in the year as a result of increased demand in the summer months, with demand and associated prices peaking around Christmas time. After the Christmas vacations, demand typically declines significantly and prices follow suit.

- Trade (VC in Nigeria)

Imports of pork-related products are less than 1 thousand tons in 2020, and the main import countries are South Africa, Uruguay, Ukraine, Spain, South Africa, Lebanon, Italy, Germany, China, Brazil, and Belgium. On the other hand, exports are also less than 1 thousand tons, mainly sausages, and the main export countries are Myanmar and Japan. The relative price of trade (unit export price divided by import price) is 2.2 about sausages, indicating the possibility of competitiveness in high-priced products.

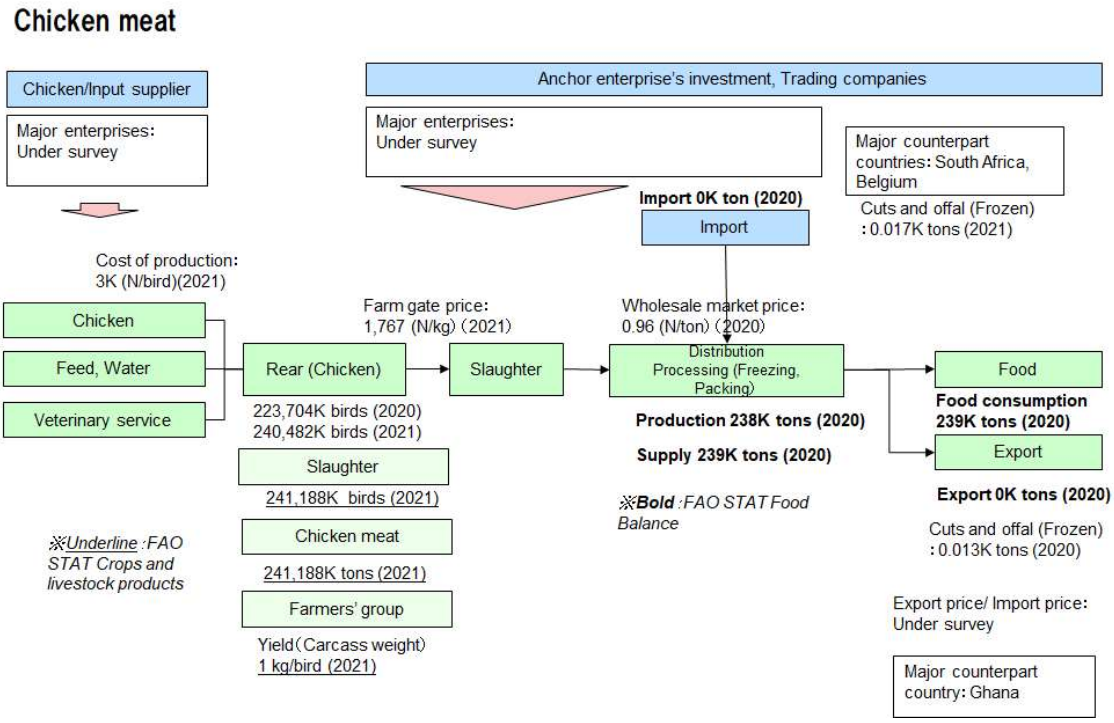
- Opportunities (VC in South Africa)

Factors that constrain VC promotion include underdeveloped infrastructure, political situation, costs and regulations related to labor, labor productivity, and administrative prices for fuel, electricity, etc. The cost of labor and its availability as a constraint means that more extensive mechanization is needed. In the long run, there is no doubt that investments are needed to increase productivity and improve efficiency of value chain, and this is more likely to be achieved through investments in the macro environment that support efficiency of pork value chain.

(30) Chicken

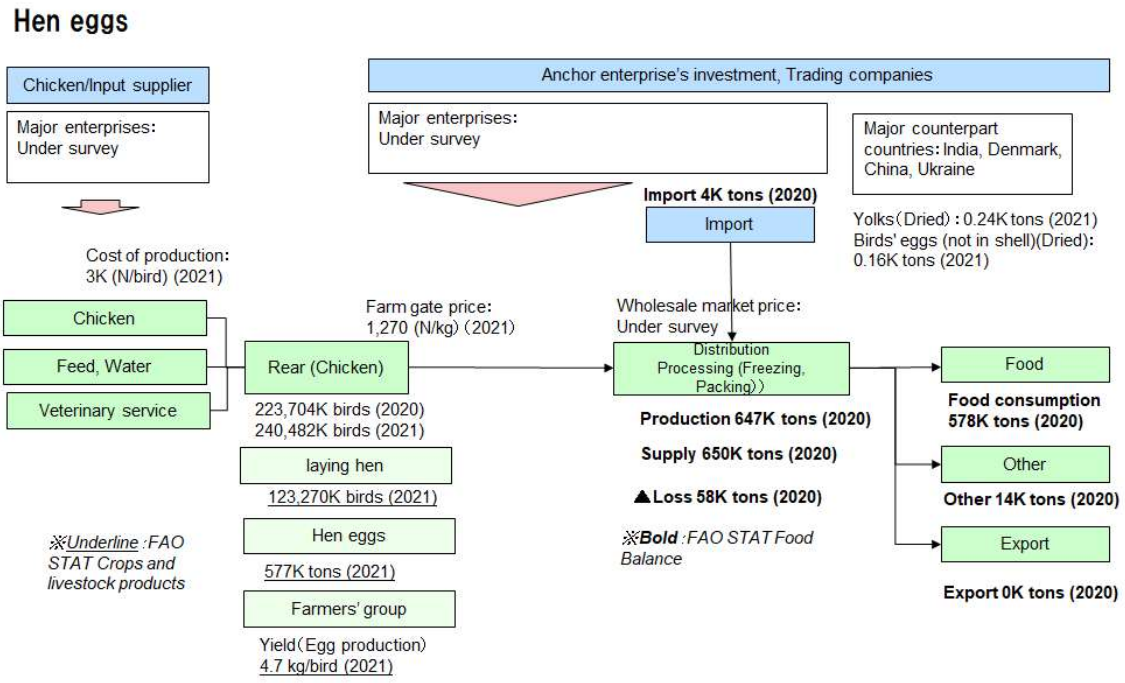
- Overview

Chickens are consumed as meat, and eggs and egg yolks are also used as food. The number of reared chickens is 223,704 thousand birds in 2020 and 240,482 thousand birds in 2021. FAO's Food Balance statistics indicates total amount of meat about chicken, turkey, duck, etc., and it shows that the supply, including imports and domestic production, is 239 thousand tons in 2020.Consumption as food is also 239 thousand tons in 2020. Regarding the supply of eggs, including imports and domestic production, is 650 thousand tons in 2020, and consumption as food is 578 thousand tons in 2020.



Source: Made by the study team based on FMARD APS, FAO STAT, ComTrade, etc.

Figure 101 Food Balance of chicken meat



Source: Made by the study team based on FMARD APS, FAO STAT, ComTrade, etc.

Figure 102 Food Balance of egg

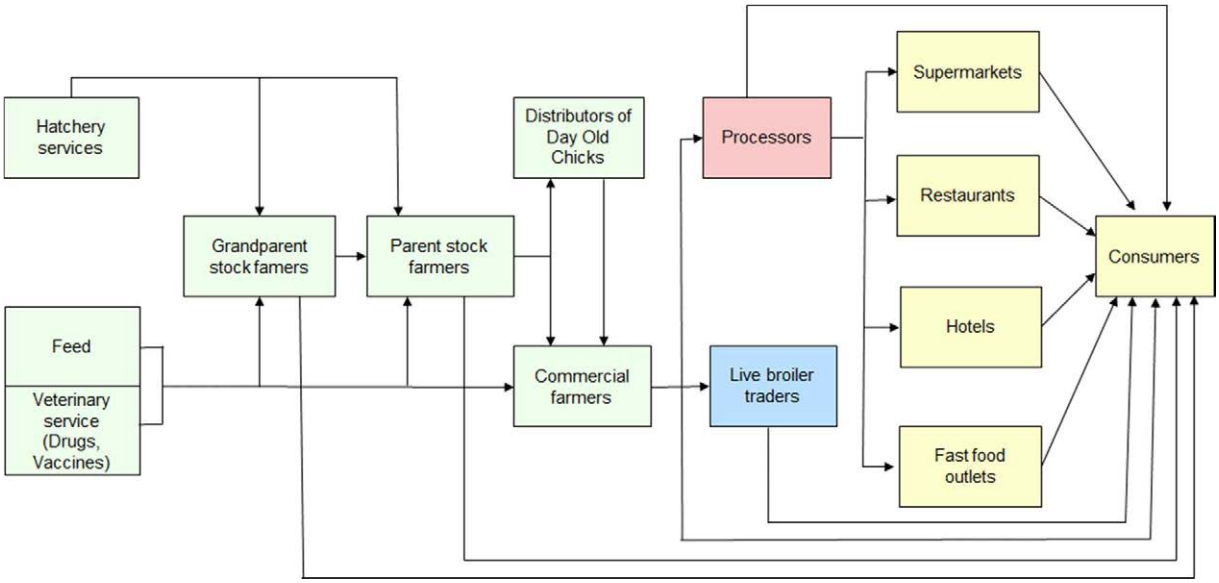
- Production

About one-third of the chickens reared in Nigeria are kept in semi-intensive management systems, while 22% are kept under intensive management systems. Although semi-intensive management systems are popular, they are characterized by low productivity. On the other hand, intensive management systems are underdeveloped. Productivity of poultry in Nigeria is low and it is unable to meet domestic demand. In addition, the gap between domestic demand and supply is expected to widen in the future. The reasons for low productivity of poultry include the lack of local breeds that produce high yields, the high cost of feed and feed products, poor road networks, unreliable markets, and disease outbreaks.

- Distribution

Chickens raised by commercial farmers are sold live to processors and live broiler traders. The processors process the chickens and sell them to supermarkets and other retailers. Live broiler traders sell live chickens directly to consumers. Grandparent stock farmers, parent stock farmers, and commercial farmers may also sell live chickens directly to consumers, bypassing processors and live broiler traders.

Challenges in distribution include the seasonality of supply and demand for live chickens and the difficulty of live broiler dealers to reach farms in remote areas due to poor road networks.



Source: Made by the study team based on “An assessment of broiler value chain in Nigeria”

Figure 103 Value chain of Chicken

- Processing

Chickens are processed and packaged by processors and sold as whole chickens, chicken meat cut

into parts, gizzards, heads, legs, etc. There are three main challenges in the processing sector: high cost of mature broilers, fragile infrastructure (electricity and roads), and high cost of storage facilities.

- Consumption Market

Chicken meat processed by processors is sold to consumers, supermarkets, restaurants, hotels, and fast food outlets.

- Trade

Less than 1,000 tons of poultry-related meats are imported in 2020, and the main import countries are South Africa and Belgium. On the other hand, exports are also less than 1,000 tons, mainly of cut chicken meat, and the main export county is Ghana. The relative price of trade (unit export price divided by import price) will be investigated in the field survey. In addition, the Nigerian government has banned the import of frozen chicken meat since 2002 to reduce competition with producers in foreign countries.

- Opportunities

Stakeholders in the feed industry need to work on producing high quality and inexpensive feed to lower costs of broiler production. The National Animal Production Institute and the National Veterinary Research Institute, in cooperation with other relevant research institutions, could develop improved disease-resistant broiler breeds that would help solve the problems of disease outbreaks and high cost of Day Old Chicks. In addition, the Nigerian government should continue the import ban on frozen chicken meat that has been in place since 2002 to promote local production and ensure quality control of processed chicken meat by the relevant authorities.

5. Aquaculture

(31) Catfish and Tilapia

- Overview

In Nigeria, catfish (mainly Clarias sp.) and tilapia (mainly Tilapia sp.) are widely produced, distributed and consumed. Catfish and tilapia are consumed as being fresh, dried, smoked, at home, in restaurants or in hotels.

The domestic production of farmed catfish and tilapia in Nigeria is 372,000 tons (catfish: 276,000 tons, tilapia: 96,000 tons), mainly in Bauchi, Oyo, Lagos, Imo, Osun states. Iceland, Cameroon and Norway are the main import counterpart of catfish and tilapia, but the amount of import is limited compared to amount of domestic production. There is almost no export, and domestic production is

mostly consumed domestically.

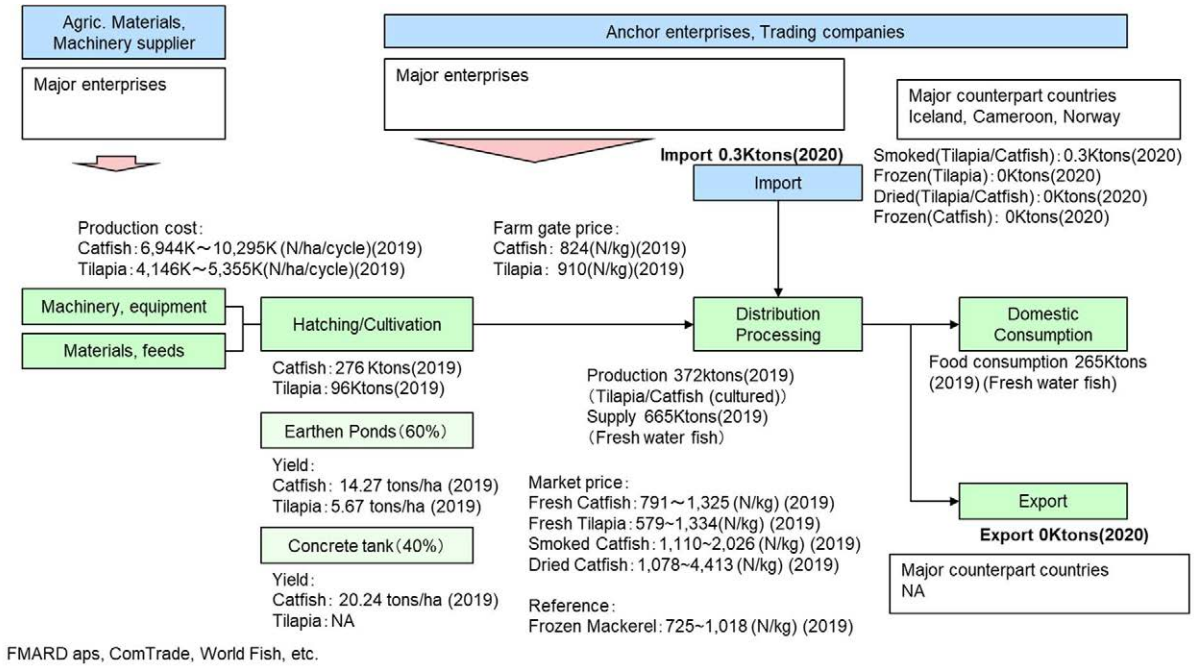


Figure 104 Food Balance of Catfish and Tilapia

- Production

In the production of catfish and tilapia, a hatchery company purchases parent fish (Sometimes excellent parent fish are purchased from other country. The excellent parent fish of tilapia is mainly imported from Bangladesh[100]), hatches the eggs, and then farms the fish until it becomes an adult fish. In general, fish with a size of 1 kg or more per individual are preferred, and it is said that it takes about 133 to 162 days to grow to a size that can be shipped.

There are two types of farming methods. One is aquaculture using earthen ponds, which accounts for about 60% of the total, and the other is aquaculture using concrete tanks, which accounts for 40%. Concrete tanks are generally said to produce more per hectare, but require more investment.

Small-scale hatchery operators and aquaculture operators sometimes form groups in order to facilitate financing under the ABP (Anchor Borrowers' Programme) and make a bulk to ship to better markets[101].

- Distribution

As for the distribution of catfish and tilapia, fishes are often transported to nearby markets or processors by car, truck, motorcycle and wheelbarrow. Regarding domestically farmed catfish and tilapia, cold chain development has not developed, and refrigeration facilities are limited only to

[100] Interview in the 1st survey of the team.
[101] Increasing Income Diversifying Diets and Empowering Women, Report of the scoping study (WorldFish, 2021)

transportation of imported fishes such as mackerel. It is said that many products are wasted due to the undeveloped cold chain, which is one of the major challenges for aquaculture VCs[102].

In case of market in the following pictures, catfishes are put in the red buckets and transported from farm to the market by van. After being brought to the market, catfishes are stored in the tub and then may be sold within a week. The longer they are stored, the lower their quality.

Source: Taken by survey team on 6th June 2023

Figure 105 Van for transportation (left), Bucket for transportation (center), Tub for storage (right)

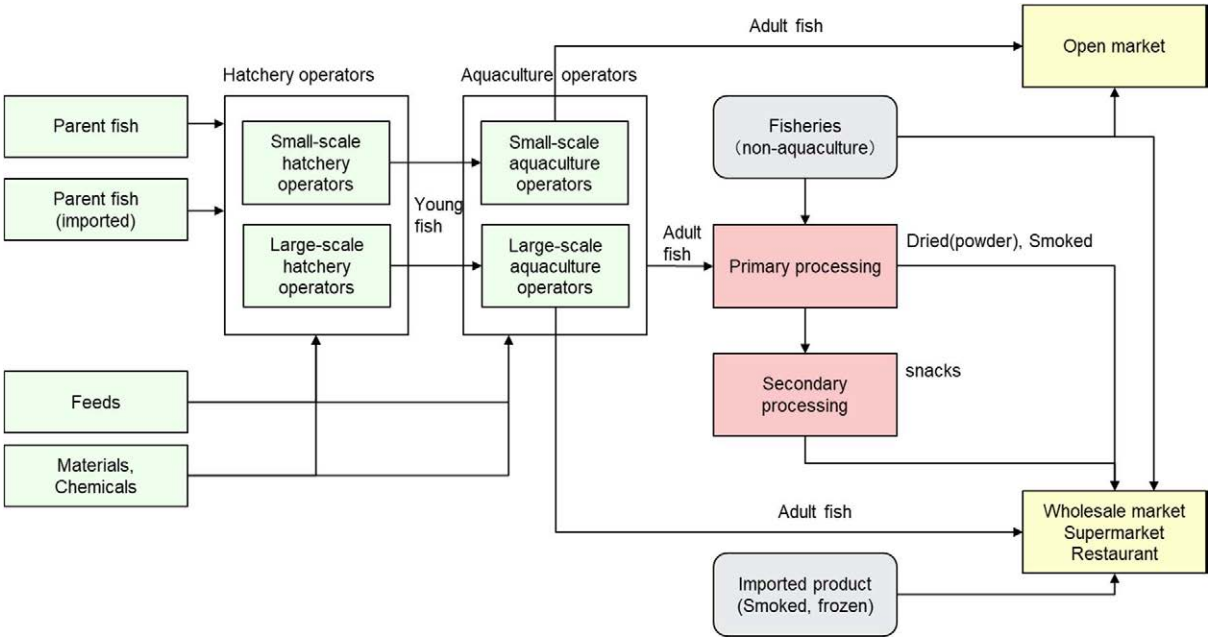


Figure 106 Value chain of Catfish and Tilapia

- Processing

In many cases, aquaculture operators process the fish by themselves. Most of the processing is just simple, such as drying and smoking, but due to undeveloped processing facilities and immature processing technology, the quality of processed products is low and the selling price is low[103]. In case of market in the following pictures, catfishes are smoked in simple facility and it takes 2 or 3 days.

[102] Increasing Income Diversifying Diets and Empowering Women, Report of the scoping study (WorldFish, 2021)
[103] Increasing Income Diversifying Diets and Empowering Women, Report of the scoping study (WorldFish, 2021)

And also they are fried for processing.


Source: Taken by survey team on 6th June 2023

Figure 107 Simple facility for smoking (left), Fried for processing (right)

- Market

Catfish and tilapia are purchased and consumed in supermarkets and restaurants, which are shipped through nearby markets and wholesale markets.

In Nigeria, more than 50% of the population is Muslim[104], catfish and tilapia are considered to be more important sources of protein. The demand of farmed fish is expected to increase steadily in line with future population growth in Nigeria[105].

- Trade

Catfish and tilapia are not much imported or exported into/from Nigeria. However, it can be said that catfish and tilapia have great potential if they can become substitutes for mackerel, etc., which are currently dependent on imports.

In the "Fisheries and Aquaculture, Marine and Inland Fisheries Development", one of the 10 intervention pillars of NATIP, it is indicated that the government intends to increase the domestic production and the opportunity of employment for more than 500 thousands people in fishery industry. It may imply that the government highly expects as a role of substitute of imported fish such as mackerels.

- Challenges
  - **Cold Chain Development**: The post-harvest loss and low selling price due to the undevelopment of cold chain is one of the challenges. In addition to that, in Nigeria, consumers prefer to fresh fish to processed fish. It may contribute to reduce post-harvest losses and to increase selling price if the clod chain is well developed and producers can supply fish products which fit the demand of consumers.
  - **Financial Access**: The financial access of the actors in VC (e.g. producers, processors, traders,

[104] Estimate of Muslim Population in the World and Japan, 2019/2020 (Tanada, 2021)
[105] Increasing Income Diversifying Diets and Empowering Women, Report of the scoping study (WorldFish, 2021)

aggregators, transporters etc.) is one of the challenges. To maximize the potential of the VC, it may be important to increase investments for the better quality and more quantity of the product by enhancing financial access of the VC actors.

- **Transportation**: The transportation of the products is one of the challenges. To develop roads for product transportation and install transportation facilities (e.g. trucks and cars), it may contribute to reduce transportation period and better product quality.
- **Processing Techniques and Facilities**: The low processing techniques of producer and processor is one of the challenges. By improving the technique for the processing and installing the processing facilities to the producer, the products can be sold in higher price and producers and processors may get more profit.
- **Improvement of Variety**: The low quality of the variety of catfish and tilapia is one of the challenge. By developing the high quality variety, it may reduce the farming period and production cost, and contribute selling price increasing.
- **Value Chain Linkage**: The poor value chain linkage is one of the challenges. Sometimes producers miss the best timing for selling because producers cannot access a timely information on buyers. It is very important that producers produce when buyers want to buy, and producers may get more profit by optimizing the timing for production

- Opportunity

The catfish and tilapia aquaculture industry is expected to grow steadily as the population increases in Nigeria.

Due to the lack of cold chain, undevelopment of transportation road, poor processing techniques, undevelopment of value chain, the quality of products is not higher grade, and it results in lower sales prices, and profits of producers, processors, and distributors are not growing. And also, due to the poor varieties, it is occurring the higher production cost and low yield.

There is room for intervention in improving the ability of each actors' financial accesses in order to resolve the challenges above mentioned. The competitiveness and added value of aquaculture VCs will be strengthened if the intervention have accomplished.

Annex 2

Analysis of Rural Socio-Economic Survey

1. Crop farmer

1.1 Basic information of farmers

1.1.1 Household

Number of respondents by farm area class and farm income class (N=70)

(Unit: Number of respondents)

Farm area class (ha)	Farm income class (N million)					
	<0.3	0.3≤ 0.5	0.5≤ < 1.5	≤1.5 < 3	3≤	Total
<2	1	3	1	1	2	8
2≤ <3	1	6	4	2	1	14
3≤ <4	1	1	5	2	2	11
4≤ <8	5	3	5	7	1	21
8≤	3	1	2	2	8	16
Total	11	14	17	14	14	70

Women's household: Number of respondents by farm area class and farm income class (N=12)

(Unit: Number of respondents)

Farm area class (ha)	Farm income class (N million)					
	<0.3	0.3≤ 0.5	0.5≤ < 1.5	≤1.5 < 3	3≤	Total
<2	1	3	0	0	1	5
2≤ <3	0	0	1	0	0	1
3≤ <4	0	0	1	1	0	2
4≤ <8	0	0	2	1	0	3
8≤	0	0	0	1	0	1
Total	1	3	4	3	1	12

Average number of family members by farm area class and farm income class (N=70)

(Unit: persons)

Farm area class (ha)	Farm income class (N million)					
	<0.3	0.3≤ 0.5	0.5≤ < 1.5	≤1.5 < 3	3≤	Total
<2	1.0	3.3	2.0	2.0	2.0	2.4
2≤ <3	2.0	4.3	5.0	2.0	2.0	3.9
3≤ <4	1.0	4.0	4.4	2.5	3.5	3.5
4≤ <8	3.8	6.7	3.6	2.9	3.0	3.8
8≤	3.0	4.0	8.0	3.0	4.4	4.4
Total	2.9	4.6	4.6	2.6	3.6	3.7

Women's household: Average number of family members by farm area class and farm income class (N=12)

(Unit: persons)

Farm area class (ha)	Farm income class (N million)					
	<0.3	0.3≤ <0.5	0.5≤ <1.5	≤1.5 < 3	3≤	Total
<2	1.0	3.3	0.0	0.0	2.0	2.6
2≤ <3	0.0	0.0	5.0	0.0	0.0	5.0
3≤ <4	0.0	0.0	2.0	3.0	0.0	2.5
4≤ <8	0.0	0.0	3.5	4.0	0.0	3.7

8≤	0.0	0.0	0.0	3.0	0.0	3.0
Total	1.0	3.3	3.5	3.3	2.0	3.1

Average age of household head by farm area class and farm income class (N=70)

(Unit: years old)

Farm area class (ha)	Farm income class (N million)					
	<0.3	0.3≤ <0.5	0.5≤ <1.5	≤1.5 < 3	3≤	Total
<2	60	33	36	27	36	37
2≤ <3	42	38	42	29	32	38
3≤ <4	35	52	42	47	52	45
4≤ <8	54	36	40	39	38	42
8≤	70	32	58	49	42	50
Total	56	37	43	39	42	43

Women's household: Average age of household head by farm area class and farm income class (N=12)

(Unit: years old)

Farm area class (ha)	Farm income class (N million)					
	<0.3	0.3≤ <0.5	0.5≤ <1.5	≤1.5 < 3	3≤	Total
<2	60	33	0	0	35	39
2≤ <3	0	0	45	0	0	45
3≤ <4	0	0	58	35	0	47
4≤ <8	0	0	45	40	0	43
8≤	0	0	0	36	0	36
Total	60	33	48	37	35	42

1.1.2 Revenue

Month of receiving agricultural income (Multiple answer: MA), and annual gross profit (agricultural revenue - agricultural expenditure) divided to each month（N=70）

(Unit: Number of responses, Naira)

	January	February	March	April	May	June
Response (MA)	14	2	11	4	11	1
Composition	9%	1%	7%	2%	7%	1%
Average gross profit	224,410	32,059	176,322	64,117	176,322	16,029

	July	August	September	October	November	December	合計
Response (MA)	5	12	14	21	27	42	164
Composition	3%	7%	9%	13%	16%	26%	100%
Average gross profit	80,146	192,351	224,410	336,615	432,791	673,230	2,628,802

Average non-agricultural revenue by farm area class and farm income class (N=70)

(Unit: Naira)

Farm area class (ha)	Farm income class (N million)					
	<0.3	0.3≤ <0.5	0.5≤ <1.5	≤1.5 < 3	3≤	Total
<2	0	100,000	0	0	900,000	262,500
2≤ <3	0	50,000	50,000	60,000	0	44,286
3≤ <4	0	20,000	0	0	0	1,818
4≤ <8	100,000	150,000	0	0	0	45,238
8≤	0	0	475,000	0	501,250	310,000
Total	45,455	76,429	67,647	8,571	415,000	123,571

Average number of household members who earn non-agricultural revenue by farm area class and farm income class (N=70)

(Unit: Persons)

Farm area class (ha)	Farm income class (N million)					
	<0.3	0.3≤ <0.5	0.5≤ <1.5	≤1.5 < 3	3≤	Total
<2	0.00	0.67	0.00	0.00	0.50	0.38
2≤ <3	0.00	0.17	0.25	0.50	0.00	0.21
3≤ <4	0.00	1.00	0.00	0.00	0.00	0.09
4≤ <8	0.40	0.67	0.00	0.00	0.00	0.19
8≤	0.00	0.00	1.00	0.00	0.50	0.38
Total	0.18	0.43	0.18	0.07	0.36	0.24

1.1.3 Borrowing from financial institutions

Profile of farmers who have borrowing experience

Profile					Borrowing experience						
Farmer	Product	Farm size (ha)	Agric. revenue (N)	Non-agric income (N)	Lender	Purpose	Time of borrowing	Amount (N)	Tenor (months)	Interest rate	Collateral
Farmer A	Cocoa, Oil palm	8	NA	NA	Spring bank	machinery and equipment	2003	500,000	NA	NA	None
Farmer B	Cocoa	4	100,000	300,000	First Bank	machinery and equipment	2022	250,000	6	NA	None

1.1.4 Farm land

Ownership of farm land by farm area class (N=70)

(Unit: number of respondents)

Ownership	Farm area class (ha)					
	<2	2≤ <3	3≤ <4	4≤ <8	8≤	Total
Owned	6	11	10	17	13	57
Rented	2	2	1	1	1	7

Both		1		3	2	6
Total	8	14	11	21	16	70

Ownership and title of farmland (N=70)

(Unit: number of respondents)

Ownership	Do you have title/deed?			Total	Ratio of holding title/ deed
	Yes	No	Unknown		
Owned	12	44	1	57	21%
Rented	0	0	7	7	NA
Both	0	6	0	6	0%
Total	12	50	8	70	17%

Lessor of farm land and written agreement (N=13)

(Unit: number of respondents)

Lessor	Is there written agreement?		Total	Ratio of holding written agreement
	Yes	No		
Family	0	1	1	0%
Large land owner	0	12	12	0%
Total	0	13	13	0%

Term of land rental agreement (N=13)

(Unit: months)

Lessor	How long is rental agreement (months)?		
	Longest	Shortest	Average
Family	12	12	12
Large land owner	12	12	12

1.2 Cultivation of farmers

1.2.1 Cultivation crops

Crops and farm area of farmers who cultivate those crops (MA) (N=70)

Crops cultivated	Farm area of farmers who cultivate the crops (ha)			Number of farmers
	average	minimum	maximum	
Rice	4.4	2	10	26
Maize	6.1	1	20	21
Sorghum	8.0	3	20	12
Yam	7.8	2	20	18
Cassava	5.0	1	8	13
Millet				
Cocoyam				
Plantain	16.5	5	41	4
Wheat				
Potatoes				
Soybeans	3.5	2	8	13
Tomatoes	3.4	1	10	10

Crops cultivated	Farm area of farmers who cultivate the crops (ha)			Number of farmers
	average	minimum	maximum	
Cowpea	4.0	4	4	1
Okra	2.3	1	4	19
Orange				
Sesame	3.6	2	9	14
Cocoa	9.0	1	41	10
Ginger				
Groundnut	1.0	1	1	1
Oil palm	16.0	5	41	4
Cashew				
Sugarcane				
Cotton				
Hibiscus				
Leafy vegetables	2.2	1	4	12

Note: Highlight average farm area for top 3 and last 3 items. Highlight number of farmers for top 3 items.

1.2.2 Agricultural machinery and equipment

Machinery and equipment owned by farmers, and farmland of the owner farmer (M=70) (44 farmers are the owners among 70)

Farmer ID	Type of machinery	Count	Brand	Purchased price (N)	Maintenance cost (N)	Year of purchase	Status	Brand you wish to purchase	Price of Brand you wish to purchase (N)	Farm area (ha)	Farm land ownership
2	02_Manual sprayer (shouldering type)	1	Jector	25,000	0	2021	In Good Condition	nil	0	1	Owned
3	02_Manual sprayer (shouldering type)	1	jector	25,000	0	2020	In Good Condition	nil	0	1	Owned
6	02_Manual sprayer (shouldering type)	9	AGRIPAK (Pakistan)	7,000	1,500	2010	In Good Condition	Agricpak	25,000	10	Owned
8	02_Manual sprayer (shouldering type)	6	AGRIPAK (Pakistan)	20,000	10,000	2020	In Good Condition	Solo pump	10,000	8	Owned
10	07_Manual spreader (shouldering type)	3	Jacktor	26,000	5,000	2018	In Good Condition	Jacktor	65,000	9	Both
11	02_Manual sprayer (shouldering type)	1	AGRIPAK (Pakistan)	20,000	3,000	2019	In Bad condition	Jacktor	65,000	2	Owned
14	02_Manual sprayer (shouldering type)	1	Jacktor	18,000	1,500	2019	In Bad condition	Jacktor	60,000	2	Owned

Farmer ID	Type of machinery	Count	Brand	Purchased price (N)	Maintenance cost (N)	Year of purchase	Status	Brand you wish to purchase	Price of Brand you wish to purchase (N)	Farm area (ha)	Farm land ownership
25	02_Manual sprayer (shouldering type)	3	jacto	25,000	3,000	2015	In Good Condition	jacto	60,000	5	Both
27	02_Manual sprayer (shouldering type)	2	AGRIPAK (Pakistan)	7,700	0	2020	In Bad condition	none	14,000	4	Owned
28	02_Manual sprayer (shouldering type)	1	AGRIPAK (Pakistan)	7,700	1,500	2020	In Bad condition	agricpick	14,000	1	Owned
30	02_Manual sprayer (shouldering type)	5	AGRIPAK (Pakistan)	12,000	2,000	2013	In Good Condition	agripak	12,000	3	Owned
34	02_Manual sprayer (shouldering type)	1	AGRIPAK (Pakistan)	9,000	4,000	2018	In Good Condition	agripak	12,000	4	Owned
35	02_Manual sprayer (shouldering type)	1	AGRIPAK (Pakistan)	4,500	0	2018	In Good Condition	agrikpak	12,000	4	Owned
37	02_Manual sprayer (shouldering type)	1	jector	65,000	0	2019	In Good Condition	jector	65,000	2	Rented
39	02_Manual sprayer (shouldering type)	1	Jector	30,000	0	2022	In Good Condition	nil	0	4	Owned

Farmer ID	Type of machinery	Count	Brand	Purchased price (N)	Maintenance cost (N)	Year of purchase	Status	Brand you wish to purchase	Price of Brand you wish to purchase (N)	Farm area (ha)	Farm land ownership
40	02_Manual sprayer (shouldering type)	3	tector and jector	30,000	0	2019	In Good Condition	nil	0	10	Owned
40	28_Irrigation pumping machine	1	pmt	60,000	3,000	2020	In Good Condition	nil	0	10	Owned
41	02_Manual sprayer (shouldering type)	1	jector	25,000	0	2017	In Good Condition	nil	0	2	Owned
41	28_Irrigation pumping machine	1	pmt	80,000	3,000	2022	In Good Condition	koshin	200,000	2	Owned
42	02_Manual sprayer (shouldering type)	1	jector	30,000	0	2022	In Good Condition	nil	0	4	Owned
47	02_Manual sprayer (shouldering type)	2	Jacto	25,000	1,000	2015	In Good Condition	Jacto	50,000	4	Owned
57	03_Electric powered sprayer (shouldering type)	5	AGRIPAK (Pakistan)	500,000	0	2021	In Good Condition	none	0	41	Owned
57	26_Harvester	1	AGRIPAK (Pakistan)	350,000	5,000	2021	In Good Condition	none	0	41	Owned
58	02_Manual sprayer (shouldering type)	2	AGRIPAK (Pakistan)	10,000	5,000	2021	In Bad condition	Nafac	16,000	5	Owned
59	02_Manual sprayer	6	AGRIPAK (Pakistan)	6,500	4,000	2021	In Good Condition	Agrcipax	14,000	10	Owned

Farmer ID	Type of machinery	Count	Brand	Purchased price (N)	Maintenance cost (N)	Year of purchase	Status	Brand you wish to purchase	Price of Brand you wish to purchase (N)	Farm area (ha)	Farm land ownership
	(shouldering type)										
60	07_Manual spreader (shouldering type)	1	jacktor	65,000	5,000	2014	In Good Condition	jacktor	78,000	3	Owned
62	02_Manual sprayer (shouldering type)	1	jackor	45,000	4,000	2023	In Good Condition	jackor	45,000	4	Owned
63	02_Manual sprayer (shouldering type)	1	jackor	45,000	4,000	2022	In Good Condition	jactor	45,000	2	Owned
64	02_Manual sprayer (shouldering type)	1	techtor	16,000	2,000	2023	In Good Condition	jackor	45,000	3	Owned
70	02_Manual sprayer (shouldering type)	1	jecto	60,000	0	2019	In Good Condition	jecto	70,000	1	Rented
75	02_Manual sprayer (shouldering type)	1	jacktor	38,000	5,000	2022	In Good Condition	jacktor	450,000	2	Owned
77	02_Manual sprayer (shouldering type)	1	mercury	8,000	3,500	2023	In Good Condition	jackor	51,000	3	Owned
78	02_Manual sprayer	1	Jacto	19,000	500	2019	In Good Condition	Jacto	50,000	3	Owned

Farmer ID	Type of machinery	Count	Brand	Purchased price (N)	Maintenance cost (N)	Year of purchase	Status	Brand you wish to purchase	Price of Brand you wish to purchase (N)	Farm area (ha)	Farm land ownership
	(shouldering type)										
79	02_Manual sprayer (shouldering type)	1	Jacto	25,000	3,000	2019	In Good Condition	Jacto	50,000	5	Owned
82	02_Manual sprayer (shouldering type)	1	Jacto	25,000	10,000	2019	In Good Condition	jacto 20	51,000	4	Owned
85	02_Manual sprayer (shouldering type)	1	Jackto	16,000	2,000	2017	In Bad condition	Jackto	61,000	8	Owned
86	02_Manual sprayer (shouldering type)	1	Jacto	19,000	5,000	2016	In Good Condition	Jacto	61,000	8	Owned
88	02_Manual sprayer (shouldering type)	1	jector	60,000	3,000	2018	In Good Condition	jector	60,000	2	Rented
91	02_Manual sprayer (shouldering type)	1	jackor	35,000	30,000	2019	In Bad condition	jackor	56,000	2	Owned
92	02_Manual sprayer (shouldering type)	1	jecta	60,000	3,000	2018	In Good Condition	jecta	60,000	4	Rented
93	02_Manual sprayer	1	jecta	60,000	3,000	2018	In Good Condition	jecta	60,000	3	Rented

Farmer ID	Type of machinery	Count	Brand	Purchased price (N)	Maintenance cost (N)	Year of purchase	Status	Brand you wish to purchase	Price of Brand you wish to purchase (N)	Farm area (ha)	Farm land ownership
	(shouldering type)										
94	02_Manual sprayer (shouldering type)	1	jacto	60,000	3,000	2018	In Good Condition	jacto	60,000	1	Owned
101	02_Manual sprayer (shouldering type)	1	jacto	60,000	3,000	2018	In Good Condition	jacto	60,000	1	Owned
105	02_Manual sprayer (shouldering type)	1	Jecto	32,000	3,000	2020	In Bad condition	Jecto	60,000	3	Owned
106	02_Manual sprayer (shouldering type)	1	jacto	60,000	3,500	2017	In Good Condition	jacto	60,000	4	Owned
107	02_Manual sprayer (shouldering type)	1	jacto	60,000	3,500	2018	In Good Condition	jacto	60,000	3	Owned
108	02_Manual sprayer (shouldering type)	1	AGRIPAK (Pakistan)	58,000	3,500	2017	In Good Condition	jacto	60,000	1	Owned

1.3 Management of farm

Yield and unit yield by crops (MA) (N=70)

Crops	Average cultivation area (ha)	Average yield (tons)				Average unit yield (tons/ha)			
		Last season	Previous season	Third last season	Fourth last season	Last season	Previous season	Third last season	Fourth last season
Rice	3.12	2.88	2.27	2.08	2.42	0.93	0.73	0.67	0.78
Maize	3.33	4.76	4.19	4.90	4.00	1.43	1.26	1.47	1.20
Sorghum	2.58	2.17	1.92	3.58	2.00	0.84	0.74	1.39	0.77
Yam	4.39	3.72	3.56	3.06	3.50	0.85	0.81	0.70	0.80
Cassava	3.85	6.00	3.54	4.15	3.77	1.56	0.92	1.08	0.98
Millet									
Cocoyam									
Plantain	7.00	36.25	38.25	30.00	25.75	5.18	5.46	4.29	3.68
Wheat									
Potatoes									
Soybeans	1.54	1.69	1.15	1.00	1.62	1.10	0.75	0.65	1.05
Tomatoes	1.40	6.20	5.80	6.00	6.00	4.43	4.14	4.29	4.29
Cowpea	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Okra	1.16	4.16	5.11	4.11	5.37	3.59	4.41	3.55	4.64
Orange									
Sesame	2.71	1.57	1.43	1.21	1.71	0.58	0.53	0.45	0.63
Cocoa	7.70	9.00	7.10	8.70	8.90	1.17	0.92	1.13	1.16
Ginger									
Groundnut	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Oil palm	9.50	27.50	20.75	20.50	21.00	2.89	2.18	2.16	2.21
Cashew									
Sugarcane									
Cotton									
Hibiscus									
Leafy vegetables	1.00	2.17	1.58	1.58	1.50	2.17	1.58	1.58	1.50

Seed price, wage of labor, water supply cost, fuel cost by crops (MA) (N=70)

Crops	Average seed price (N/KG)	Wage (N/day)	Average days of hired worker (days/season)	Average wages (N/season)	Water supply cost (N/ha/season)	Fuel cost (N/ha/season)
Rice	1,589	3,077	3	8,284	550	4,367
Maize	14,556	2,075	24	50,689	0	2,714
Sorghum	14,350	1,667	35	58,889	0	
Yam	28,122	2,500	24	59,722	429	14,333
Cassava	258	3,769	3	12,757	1,000	8,617
Millet				0		

Crops	Average seed price (N/KG)	Wage (N/day)	Average days of hired worker (days/season)	Average wages (N/season)	Water supply cost (N/ha/season)	Fuel cost (N/ha/season)
Cocoyam				0		
Plantain	9,800	2,675	7	18,056	0	5,000
Wheat				0		
Potatoes				0		
Soybeans	3,103	3,192	2	4,911	300	3,500
Tomatoes	2,950	2,000	12	23,400	0	2,250
Cowpea	1,000	2,000	14	28,000	0	
Okra	3,958	2,355	46	109,458	132	219,000
Orange				0		
Sesame	9,523	2,964	2	5,929	750	
Cocoa	1,700			0	150	
Ginger				0		
Groundnut	1,200			0	0	
Oil palm	18,125	2,875	7	18,688	0	
Cashew						
Sugarcane						
Cotton						
Hibiscus						
Leafy vegetables	4,990	2,500	66	163,958	0	165,600

Sales price and cost of transportation to market by crops (MA) (N=70)

Crops	Average sales price (N/kg)	Cost of transportation to market (N/kg)
Rice	696	23
Maize	332	31
Sorghum	434	44
Yam	441	25
Cassava	46	12
Millet		
Cocoyam		
Plantain	400	23
Wheat		
Potatoes		
Soybeans	588	19
Tomatoes	310	20
Cowpea	500	20
Okra	244	13
Orange		

Crops	Average sales price (N/kg)	Cost of transportation to market (N/kg)
Sesame	1,467	16
Cocoa	2,260	178
Ginger		
Groundnut	700	20
Oil palm	1,150	29
Cashew		
Sugarcane		
Cotton		
Hibiscus		
Leafy vegetables	76	6

Mode of sales by crops (MA) (N-70)

(Unit: number of respondents)

Crops	To the market by yourself	To off-taker	To off-taker with advance contract	To processing company with advance contract	To export company with advanced contract
Rice	13	11	0	1	1
Maize	15	4	1	0	0
Sorghum	12	0	0	0	0
Yam	15	1	2	0	0
Cassava	9	4	0	0	0
Millet	0	0	0	0	0
Cocoyam	0	0	0	0	0
Plantain	2	2	0	0	0
Wheat	0	0	0	0	0
Potatoes	0	0	0	0	0
Soybeans	8	5	0	0	0
Tomatoes	6	4	0	0	0
Cowpea	0	1	0	0	0
Okra	16	3	0	0	0
Orange	0	0	0	0	0
Sesame	8	6	0	0	0
Cocoa	4	6	0	0	0
Ginger	0	0	0	0	0
Groundnut	1	0	0	0	0
Oil palm	2	1	1	0	0
Cashew	0	0	0	0	0
Sugarcane	0	0	0	0	0
Cotton	0	0	0	0	0
Hibiscus	0	0	0	0	0
Leafy vegetables	12	0	0	0	0
Total	123	48	4	1	1

Mode of pricing by crops (MA) (N=70)

(Unit: number of respondents)

Crops	spot price given by offtaker	spot price by negotiation	determined in advance
Rice	4	21	1
Maize	1	19	0
Sorghum	0	12	0
Yam	3	14	1
Cassava	5	8	0
Millet	0	0	0
Cocoyam	0	0	0
Plantain	0	1	3
Wheat	0	0	0
Potatoes	0	0	0
Soybeans	2	10	1
Tomatoes	0	10	0
Cowpea	0	1	0
Okra	0	19	0
Orange	0	0	0
Sesame	1	12	1
Cocoa	2	1	7
Ginger	0	0	0
Groundnut	0	1	0
Oil palm	0	0	4
Cashew	0	0	0
Sugarcane	0	0	0
Cotton	0	0	0
Hibiscus	0	0	0
Leafy vegetables	0	12	0
Total	18	141	18

Farmers' experience of mode of contract by crops (MA) (N=70)

(Unit: number of respondents)

Crops	Seed is arranged	Input is arranged	Technical advice given	Day-to day monitoring	Purchase all the harvest	Prohibition of side sales
Rice	16	1	1	2	3	1
Maize	1	0	0	17	9	0
Sorghum	0	0	0	10	0	0
Yam	3	0	3	9	1	0
Cassava	4	0	1	0	2	0
Millet						
Cocoyam						
Plantain	3	0	0	1	0	0
Wheat						
Potatoes						
Soybeans	11	0	0	1	1	1
Tomatoes	0	0	0	9	8	0
Cowpea	0	0	0	1	1	0

Crops	Seed is arranged	Input is arranged	Technical advice given	Day-to day monitoring	Purchase all the harvest	Prohibition of side sales
Okra	3	0	0	4	2	0
Orange						
Sesame	13	0	0	1	0	1
Cocoa	7	0	1	1	1	0
Ginger						
Groundnut	0	0	0	0	0	0
Oil palm	4	0	0	0	0	0
Cashew						
Sugarcane						
Cotton						
Hibiscus						
Leafy vegetables	0	0	0	0	0	0
Total	65	1	6	56	28	3

Means to obtain price information by crops (MA) (N=70

(Unit: number of respondents)

Crops	By going to the market physically	By off taker	By radio	By any mobile application	Others
Rice	26	15	4	1	0
Maize	21	5	0	0	0
Sorghum	12	2	1	1	0
Yam	17	6	4	1	1
Cassava	12	11	5	1	0
Millet					
Cocoyam					
Plantain	4	0	0	0	0
Wheat					
Potatoes					
Soybeans	13	6	0	0	0
Tomatoes	10	4	0	0	0
Cowpea	1	1	0	0	0
Okra	19	3	0	0	1
Orange					
Sesame	14	6	0	0	0
Cocoa	6	4	0	0	0
Ginger					
Groundnut	1	0	0	0	0
Oil palm	3	1	0	0	0
Cashew					
Sugarcane					
Cotton					
Hibiscus					
Leafy vegetables	12	0	0	0	1
Total	171	64	14	4	3

Average amount of revenue and expenditure by farm area class (N=62, effective response)

(Unit: Average amount of respondents, Naira)

Farm area class (ha)	Agricultural gross income	Sales of crops	Non-agricultural revenue	Agricultural expenditure	Other consumptions	Saving
<2	1,808,427	3,598,429	242,857	1,790,001	136,857	1,914,427
2≤ <3	895,357	3,259,143	44,286	2,363,786	117,643	822,000
3≤ <4	1,448,636	2,070,909	4,545	641,000	125,364	1,309,090
4≤ <8	1,391,936	1,887,235	30,000	512,946	140,353	1,263,936
8≤	2,112,917	3,054,167	408,333	938,042	159,917	2,364,542
Total	1,477,818	2,661,148	127,541	1,190,993	135,885	1,461,810

1.4 Investment

1.4.1 Intention to invest

Intention of investment by farm area class (N=70)

(Unit: Number of respondents, Percentage of respondents)

Farm area (ha)	<2	2≤ <3	3≤ <4	4≤ <8	8≤	Total
Total sample	8	14	11	21	16	70
Intend to invest (number)	7	10	4	11	8	40
Intend to invest (ratio)	88%	71%	36%	52%	50%	57%

Intention of investment by farm income class (N=70)

(Unit: Number of respondents, Percentage of respondents)

Farm income (N million)	<0.3	0.3≤ 0.5	0.5≤ < 1.5	≤1.5 < 3	3≤	Total
Total sample	11	14	17	14	14	70
Intend to invest (number)	4	8	10	10	8	40
Intend to invest (ratio)	36%	57%	59%	71%	57%	57%

Utilized financial products and Investment intentions (MA) (N=70)

(Unit: Percentage of respondents)

Intend to invest	Saving account	Remittance at bank account	Remittance by POS agent	Saving account through cooperative's arrangement	Digital apps for saving and remittance	Borrowing from financial institutions	Mobile money	Total samples
Not intend to Invest	47%	0%	33%	0%	0%	0%	3%	30
Intend to invest	95%	18%	45%	0%	8%	0%	0%	40
Total	74%	10%	40%	0%	4%	0%	1%	70

1.4.2 Expected source of finance

Investment amounts and financing methods by investment purpose (MA) (N=70)

(Unit: Number of respondents, Naira)

Investment purpose	Own fund	Borrowing from financial institutions	Borrowing from relatives/friends	Total amount	Average amount
01_Acquire farmland	2	8	1	20,300,008	2,255,556
02_Expand cultivation area within the farm	6	10	5	296,500,007	19,766,667
03_Acquire machineries	20	8	12	62,700,000	2,726,087
04_Expand purchase of seed and input	11	11	9	51,802,000	2,466,762
05_Purchase better seed and input	5	7	0	8,280,000	1,182,857
06_Expand sales outlet	0	2	0	1,030,000	515,000
Total	44	46	27	440,612,015	28,912,930

1.4.3 Challenges for investment

Reasons for difficulty in borrowing from financial institutions (MA) (N=70)

(Unit: Percentage of Respondents)

Investment intention	No hope to be approved	Collateral asset	Farm land not eligible for collateral	High interest rate	Documentation for application	Fear of not being able to repay	Non availability of non-interest finance	Total samples
Not intend to Invest	17%	3%	0%	47%	7%	23%	0%	30
Intend to invest	58%	60%	18%	68%	50%	5%	0%	40
Total	40%	36%	10%	59%	31%	13%	0%	70

1.4.4 Issues for financial institutions to mitigate the challenges

Conditions that are important to farmers when borrowing from financial institutions by purpose of investment (MA) (N=70)

(Unit: Number of respondents)

Purpose of investment	Payment period	Grace period	Interest rate	collateral appraisal	Credit guarantee	Financial advice	Assistance for documentation	Assistance to register farmland title
01_Acquire farmland	7	7	6	6	5	2	2	0
02_Expand cultivation area within the farm	9	15	9	5	5	4	4	1
03_Acquire machineries	10	19	6	2	3	2	2	2
04_Expand purchase of seed and input	10	19	12	7	9	5	5	0

Purpose of investment	Payment period	Grace period	Interest rate	collateral appraisal	Credit guarantee	Financial advice	Assistance for documentation	Assistance to register farmland title
05_Purchase better seed and input	4	7	4	2	3	6	6	0
06_Expand sales outlet	1	2	0	0	0	0	0	0
Total	41	69	37	22	25	19	19	3

2. Cattle breeding

2.1 Basic information of famer

2.1.1 Structure of household

Number of respondents by categories of breeding scale and pastoral income (N=10)

(Number of respondent)

Category of breeding scale (head)	Category of pastoral income (N million)			
	< 2.5	2.5 ≤ < 5.0	5.0 ≤	Total
< 50	0	4	0	4
50 ≤ < 100	1	4	0	5
100 ≤	0	0	1	1
Total	1	8	1	10

Average number of household members by categories of breeding scale and pastoral income (N=10)

(Average number of household member)

Category of breeding scale (head)	Category of pastoral income (N million)			
	< 2.5	2.5 ≤ < 5.0	5.0 ≤	Total
< 50	0.0	5.5	0.0	5.5
50 ≤ < 100	5.0	9.3	0.0	8.4
100 ≤	0.0	0.0	5.0	5.0
Total	5.0	7.4	5.0	6.9

Average number of household members with female head by categories of breeding scale and pastoral income (N=2)

(Average number of household member)

Category of breeding scale (head)	Category of pastoral income (N million)			
	< 2.5	2.5 ≤ < 5.0	5.0 ≤	Total
< 50	0.0	2.0	0.0	2.0
50 ≤ < 100	5.0	0.0	0.0	5.0
100 ≤	0.0	0.0	0.0	0.0
Total	5.0	2.0	0.0	3.5

Average age of household head by categories of breeding scale and pastoral income (N=10)

(Average age)

Category of breeding scale (head)	Category of pastoral income (N million)			
	< 2.5	2.5 ≤ < 5.0	5.0 ≤	Total
< 50	0	48	0	48
50 ≤ < 100	42	52	0	50
100 ≤	0	0	35	35
Total	42	50	35	48

Average age of female household head by categories of breeding scale and pastoral income (N=2)

(Average age)

Category of breeding scale (head)	Category of pastoral income (N million)			
	< 2.5	2.5 ≤ < 5.0	5.0 ≤	Total
< 50	0	50	0	50
50 ≤ < 100	42	0	0	42
100 ≤	0	0	0	0
Total	42	50	0	46

2.1.2 Source of income

Months of receipt of pastoral income (Multiple Responses: MA) and the monthly prorated amount of annual pastoral gross income (Sales - Pastoral Expenses) (N=10)

(Number of response, Naira)

	January	February	March	April	May	June
Number of responses (MA)	0	0	0	0	0	0
Monthly composition	0%	0%	0%	0%	0%	0%
Average pastoral gross income	0	0	0	0	0	0

	July	August	September	October	November	December	Total
Number of responses (MA)	0	0	1	1	8	3	13
Monthly composition	0%	0%	8%	8%	61%	23%	100%
Average pastoral gross income	0	0	250,400	250,400	1,909,300	719,900	3,130,000

Average non-pastoral income by categories of breeding scale and pastoral income (N=10)

(Naira)

Category of breeding scale (head)	Category of pastoral income (N million)			
	< 2.5	2.5 ≤ < 5.0	5.0 ≤	Total
< 50	0	65,000	0	65,000
50 ≤ < 100	0	245,000	0	196,000
100 ≤	0	0	0	0
Total	0	155,000	0	124,000

Average number of members in household earning non-pastoral income by categories of breeding scale and pastoral income (N=10)

(Number of member)

Category of breeding scale (head)	Category of pastoral income (N million)			
	< 2.5	2.5 ≤ < 5.0	5.0 ≤	Total
< 50	0.0	0.5	0.0	0.5
50 ≤ < 100	0.0	0.3	0.0	0.2
100 ≤	0.0	0.0	0.0	0.0
Total	0.0	0.4	0.0	0.3

2.2 Information on farmers' pastoral techniques

2.2.1 Type by breeding use

Type of cattle breeded by use (MA) and the breeding scale of responding cattle farmers (N=10)

（Number of response）

Type of use	Breeding scale (head)			Number of responding farmers
	Average	Minimum	Maximum	
Beef cattle (breeding)	75.3	38	105	10
Cow (Milk)	0	0	0	0

2.2.2 Equipment on cattle breeding

Equipments owned by each farmer and the number of cattles kept by that farmer (N=10)

(Owned by 2 out of 10 farmers)

Farmer ID	Type	Number of equipments	Brand	Price (N)	Cost of Maintenance (N)	Year to purchase (Year)	Status	Brand wish to purchase	Price of Brand wish to purchase (N)	Number of animals (head)
8	Feed milling machine	1	Local made	500,000	200,000	2020	In good conditon	Toyota	3,500,000	38
8	Maize tresser	1	Local made	500,000	20,000	2020	In good conditon	Hunda	2,500,000	38

2.3 Information on farm management

Production by type of use (MA) (N=10)

Type of use	Average number of animals (head)	Average production (ton)		Average yield (ton/head)	
		Last year	2 years ago	Last year	2 years ago
Beef cattle (breeding)	75.3	2.8	2.6	0.037	0.034
Cow (Milk)	0.0	0.0	0.0	0.0	0.0

Price of calf and labor/water/fuel cost by type of use (MA) (N=10)

Type of use	Average price of calf (Naira/head)	Average labor cost per day (N/day)	Number of days of hired workers (day/year)	Average labor cost per year (N/year)	Average cost of water (N/year)	Average cost of fuel (N/year)
Beef cattle (breeding)	244,500	65,417	31	2,027,927	0	0
Cow (Milk)	−	−	−	−	−	−

Selling price and transportation cost by type of use (N=10)

Type of use	Average selling price (N/kg)	Average cost of transportation to market (N/kg)
Beef cattle (breeding)	1,330	46
Cow (Milk)	−	−

Mode of sales by type of use (MA) (N=10)

(Number of response)

Type of use	To the market by yourself	To offtaker	To offtaker with advance contract	To processing company with advance contract	To export company with advanced contract
Beef cattle (breeding)	9	1	0	0	0
Cow (Milk)	−	−	−	−	−
Total	9	1	0	0	0

Method of determining sales price by type of use (MA) (N=10)

(Number of response)

Type of use	Spot price given by offtaker	Spot price by negociation	Determined in advance
Beef cattle (breeding)	1	8	1
Cow (Milk)	−	−	−
Total	1	8	1

Arrangement on purchase agreement that farmers have experienced (MA) (N=10)

(Number of response)

Type of use	Calf is arranded	Other inpur is arranged	Technical advice given	Day-to-day monitoring	Purchase all the animals	Prohibitaion of side sales
Beef cattle (breeding)	0	0	0	8	0	0
Cow (Milk)	−	−	−	−	−	−
Total	0	0	0	8	0	0

Method of obtaining price information (MA) (N=10)

(Number of response)

Type of use	By going to the market physically	By offtaker	By radio	By mobile applicaiton	Other
Beef cattle (breeding)	10	0	0	0	0
Cow (Milk)	−	−	−	−	−
Total	10	0	0	0	0

Income, revenue, and savings by categories of breeding scale (Valid responses, N=10)

(Average amount of respondent, Naira)

Category of breeding scale (head)	Gross pastral income	Sales of product	Non-pastoral income	Expenditure for production	Other consumption	Savings
< 50	-100,000	200,000	500,000	300,000	400,000	0
50 ≤ < 100	1,979,500	2,125,000	0	145,500	233,250	1,746,250
100 ≤	2,336,800	2,640,000	0	303,200	188,400	2,148,400
Total	1,950,200	2,190,000	50,000	239,800	227,500	1,772,700

2.4 Expansion of production

2.4.1 Needs related to expansion of production

Category of breeding scale and investment intention (N=10)

(Number of respondent, % of respondent)

Category of breeding scale (head)	< 50	50 ≤ < 100	100 ≤	Total
Number of respondent	4	5	1	10
Numer of respondent with investment intension	3	5	1	9
Percentage of respondent with investment intention	75%	100%	100%	90%

Category of pastoral income and investment intention (N=10)

(Number of respondent, % of respondent)

Category of pastoral income (N million)	< 2.5	2.5≤ <5.0	5.0 ≤	Total
Number of respondent	1	8	1	10
Numer of respondent with investment intension	1	7	1	9
Percentage of respondent with investment intention	100%	88%	100%	90%

Financial service used and investment intention (MA) (N=10)

(% of respondent)

Investment intention	Saving account	Remittance at bank account	Remittance by POS agent	Saving account through cooperative's arrangement	Digital apps for saving and remittance	Borrowing from financial institutions	Mobile money	Number of respondent
Without investment intention	0%	0%	0%	0%	0%	0%	0%	1
With investment intention	11%	0%	0%	0%	0%	0%	0%	9
Total	10%	0%	0%	0%	0%	0%	0%	10

2.4.2 Expected funding sources

Investment amount and funding sources by purpose of investment (MA) (N=10)

(Number of respondent, Naira)

Purpose of investment	Own fund	Borrowing from financial institution	Borrowing from relatives/friends	Total amont	Average amount
Construction of cattle barn	0	0	0	NA	NA
Acquire land for cattle barn	0	0	0	NA	NA
Expand land for cattle barn	0	0	0	NA	NA
Acquire machineries	0	0	0	NA	NA
Expand purchase of calf and input	7	0	0	18,100,000	2,585,714
Purchase better variety of calf and inpt	1	0	0	NA	NA
Expand sales outlet	1	0	0	2,800,000	2,800,000
Social media and digital marketing	0	0	0	NA	NA
Total	9	0	0	20,900,000	5,385,714

2.4.3 Measures to be taken by financial institutions

Important conditions when borrowing from a financial institution (MA) (N=10)

(Number of respondent)

Purpose of investment	Payment period	Grace period	Interest rate	Terms of collateral appraisal	Credit guarantee	Financial advice	Assistance for documentation	Assistance to register cattle barn
Construction of cattle barn	0	0	0	0	0	0	0	0
Acquire land for cattle barn	0	0	0	0	0	0	0	0
Expand land for cattle barn	0	0	0	0	0	0	0	0
Acquire machineries	0	0	0	0	0	0	0	0

Expand purchase of calf and input	1	0	0	0	0	0	0	0
Purchase better variety of calf and inpt	0	0	0	0	0	0	0	0
Expand sales outlet	0	0	0	0	0	0	0	0
Social media and digital marketing	0	0	0	0	0	0	0	0
Total	1	0	0	0	0	0	0	0

3. Poultry farming

3.1 Basic information of famer

3.1.1 Structure of household

Number of respondents by categories of breeding scale and poultry income (N=10)

(Number of respondent)

Category of breeding scale (bird)	Category of poultry income (N million)			
	< 5.0	5.0 ≤ < 10.0	10.0 ≤	Total
< 500	2	0	0	2
500 ≤ < 1,000	2	0	0	2
1,000 ≤ < 2,000	0	2	0	2
2,000 ≤ < 5,000	0	2	1	3
5,000 ≤	0	1	0	1
Total	4	5	1	10

Average number of household members by categories of breeding scale and poultry income (N=10)

(Average number of household member)

Category of breeding scale (bird)	Category of poultry income (N million)			
	< 5.0	5.0 ≤ < 10.0	10.0 ≤	Total
< 500	5.0	0.0	0.0	5.0
500 ≤ < 1,000	4.0	0.0	0.0	4.0
1,000 ≤ < 2,000	0.0	1.0	0.0	1.0
2,000 ≤ < 5,000	0.0	3.5	2.0	3.0
5,000 ≤	0.0	1.0	0.0	1.0
Total	4.5	2.0	2.0	3.0

Average number of household members with feamale head by categories of breeding scale and poultry income (N=1)

(Average number of household member)

Category of breeding scale (bird)	Category of poultry income (N million)			
	< 5.0	5.0 ≤ < 10.0	10.0 ≤	Total
< 500	4.0	0.0	0.0	4.0
500 ≤ < 1,000	0.0	0.0	0.0	0.0
1,000 ≤ < 2,000	0.0	0.0	0.0	0.0
2,000 ≤ < 5,000	0.0	0.0	0.0	0.0
5,000 ≤	0.0	0.0	0.0	0.0
Total	4.0	0.0	0.0	4.0

Average age of household head by categories of breeding scale and poultry income (N=10)

(Average age)

Category of breeding scale (bird)	Category of poultry income (N million)			
	< 5.0	5.0 ≤ < 10.0	10.0 ≤	Total
< 500	50	0	0	50
500 ≤ < 1,000	52	0	0	52
1,000 ≤ < 2,000	0	43	0	43
2,000 ≤ < 5,000	0	51	49	50
5,000 ≤	0	45	0	45
Total	51	46	49	48

Average age of female household head by categories of breeding scale and poultry income (N=1)

(Average age)

Category of breeding scale (bird)	Category of poultry income (N million)			
	< 5.0	5.0 ≤ < 10.0	10.0 ≤	Total
< 500	39	0	0	39
500 ≤ < 1,000	0	0	0	0
1,000 ≤ < 2,000	0	0	0	0
2,000 ≤ < 5,000	0	0	0	0
5,000 ≤	0	0	0	0
Total	39	0	0	39

3.1.2 Source of income

Months of receipt of poulry income (Multiple Responses: MA) and the monthly prorated amount of annual poultry gross income (Sales - Poulty Expenses) (N=10)

(Number of response, Naira)

	January	February	March	April	May	June
Number of responses (MA)	10	7	5	1	0	0
Monthly composition	23%	16%	11%	2%	0%	0%
Average poultry gross income	1,160,350	807,200	554,950	100,900	0	0

	July	August	September	October	November	December	Total
Number of responses (MA)	0	0	1	3	7	10	44
Monthly composition	0%	0%	2%	7%	16%	23%	100%
Average poultry gross income	0	0	100,900	353,150	807,200	1,160,350	5,045,000

Average non-poultry income by categories of breeding scale and poultry income (N=10)

(Naira)

Category of breeding scale (bird)	Category of poultry income (N million)			
	< 5.0	5.0 ≤ < 10.0	10.0 ≤	Total
< 500	75,000	0	0	75,000
500 ≤ < 1,000	200,000	0	0	200,000
1,000 ≤ < 2,000	0	0	0	0
2,000 ≤ < 5,000	0	400,000	2,250,000	1,016,667
5,000 ≤	0	0	0	0
Total	137,500	160,000	2,250,000	360,000

Average number of members in household earning non-poultry income by categories of breeding scale and poultry income (N=10)

(Number of member)

Category of breeding scale (bird)	Category of poultry income (N million)			
	< 5.0	5.0 ≤ < 10.0	10.0 ≤	Total
< 500	0.5	0.0	0.0	0.5
500 ≤ < 1,000	1.0	0.0	0.0	1.0
1,000 ≤ < 2,000	0.0	0.0	0.0	0.0
2,000 ≤ < 5,000	0.0	1.0	1.0	1.0
5,000 ≤	0.0	0.0	0.0	0.0
Total	0.8	0.4	1.0	0.6

3.1.3 Status of borrowing from financial institutions

Attributes of farmers with borrowing experience and borrowing summary

Attributes of farmer					Experience of borrowing						
Sex	Product	Breeding scale (bird)	Sales of product in 2022 (Naira)	Non-poultry income in 2022 (Naira)	Lender	Purpose	Time of borrowing	Amount (Naira)	Borrowing period (Month)	Interrest rate (%)	Collateral
Male	Live chicken, Egg	1,200	8,000,000	500,000	Union bank	Purchase chick and input	2021	25,000,000	36	4	Land that poultry house is located
Male	Live chicken, Egg	500	600,000	250,000	Lapo microfinance	Purchase chick and input	2022	250,000	12	2	Land that poultry house is located
Male	Live chicken, Egg	800	5,000,000	250,000	Seedvest microfinance	Construction of poultry house	2021	2,500,000	24	10	Land that poultry house is located
Male	Live chicken	2,000	10,000,000	2,500,000	First Bank Plc	Construction of poultry house	2020	5,000,000	12	10	Land that poultry house is located, Equipment

3.2 Information on farmers' pastoral techniques

3.2.1 Type of poultry product

ype of poultry produtc (MA) and the breeding scale of responding poultry farmers (N=10)

（Number of response）

Poultry product	Breeding scale (bird)			Number of responding farmers
	Average	Minimum	Maximum	
Live chicken	1,445	250	7,000	10
Egg	2,070	350	5,000	5

3.2.2 Equipment on poultry farming

Equipments owned by each farmer and the number of chickens kept by that farmer (N=10)

(Owned by 10 out of 10 farmers)

Farmer ID	Type	Number of equipments	Brand	Price (N)	Cost of Maintenance (N)	Year to purchase (Year)	Status	Brand wish to purchase	Price of Brand wish to purchase (N)	Number of animals (bird)
1	Breeding room	1	—	250,000	1,500	2016	In good condition	—	450,000	500
1	Poultry house	2	—	250,000	15,000	2015	In good condition	—	600,000	500
1	Dressing facility	1	—	150,000	1,000	2015	In good condition	—	200,000	500
2	Breeding room	1	—	1,500,000	2,500	2015	In good condition	—	5000,000	1200
2	Feed milling machine	1	Local made	800,000	5,000	2019	In good condition	Local made	4500,000	1200
2	Package machine	1	Local made	250,000	1,000	2014	In good condition	—	850,000	1200
4	Breeding room	2	—	2,500,000	1,500	2012	In good condition	—	3,250,000	2,000
4	Poultry house	2	—	350,000	1,500	2012	In good condition	—	4,500,000	2,000
5	Breeding room	1	—	350,000	1,500	2014	In good condition	—	500,000	800
5	Poultry house	1	—	650,000	1,500	2019	In good condition	—	750,000	800
6	Breeding room	1	—	350,000	1,500	2020	In good condition	—	750,000	1,000
6	Dressing facility	1	—	850,000	2,000	2018	In good condition	—	750,000	1,000

Farmer ID	Type	Number of equipments	Brand	Price (N)	Cost of Maintenance (N)	Year to purchase (Year)	Status	Brand wish to purchase	Price of Brand wish to purchase (N)	Number of animals (bird)
7	Breeding room	1	–	2,500,000	2,500	2015	In good condition	–	2300,000	750
7	Poultry house	3	–	1,650,000	1,500	2019	In good condition	–	3500,000	750
7	Dressing facility	1	–	1,250,000	1,500	2014	In bad condition	–	3500,000	750
8	Breeding room	1	–	260,000	2,500	2003	In good condition	–	550,000	600
9	Breeding room	2	–	1,500,000	1,500	2016	In good condition	None	0	7,000
9	Poultry house	4	–	2,500,000	1,500	2018	In good condition	None	0	7,000
10	Poultry house	1	–	2,500,000	1,000	2014	In good condition	None	0	350
14	Breeding room	1	–	1,500,000	1,500	2019	In bad condition	–	2,500,000	250

3.3 Information on farm management

Production by poultry product (MA)（N=10）

Poultry product	Average number of animals (bird)	Average production (ton)		Average yield (ton/bird)	
		Last year	2 years ago	Last year	2 years ago
Live chicken	1,445	4.0	4.3	0.0028	0.0030
Egg	2,070	4.8	5.0	0.0023	0.0024

Price of chick and labor/water/fuel cost by poultry product (MA) (N=10)

Poultry product	Average price of chick (Naira/bird)	Average labor cost per day (N/day)	Number of days of hired workers (day/cycle)	Average labor cost per cycle (N/cycle)	Average cost of water (N/cycle)	Average cost of fuel (N/cycle)
Live chicken	3,605	1,215	33	40,275	166,056	15,000
Egg	2,683	1,183	42	48,750	126,000	375,000

Selling price and transportation cost by type of use (N=10)

Poultry product	Average selling price (N/kg)	Average cost of transportation to market (N/kg)
Live chicken	1,485	39
Egg	1,410	23

Mode of sales by poultry product (MA)　(N=10)

（Number of response)

Poultry product	To the market by yourself	To offtaker	To offtaker with advance contract	To processing company with advance contract	To export company with advanced contract
Live chicken	4	6	0	0	0
Egg	2	3	0	0	0
Total	6	9	0	0	0

Method of determining sales price by poultry product (MA)　(N=10)

（Number of response）

Poultry product	Spot price given by offtaker	Spot price by negociation	Determined in advance
Live chicken	8	2	0
Egg	3	2	0
Total	11	4	0

Arrangement on purchase agreement that farmers have experienced (MA) (N=10)

(Number of response)

Poultry product	Chick is arranged	Other inpur is arranged	Technical advice given	Day-to-day monitoring	Purchase all the animals	Prohibitaion of side sales
Live chicken	5	5	6	5	7	6
Egg	2	2	3	3	2	1
Total	7	7	9	8	9	7

Method of obtaining price information (MA) (N=10)

(Number of response)

Poultry product	By going to the market physically	By offtaker	By radio	By mobile applicaiton	Other
Live chicken	10	9	9	9	0
Egg	5	4	5	4	0
Total	15	13	14	13	0

Income, revenue, and savings by categories of breeding scale (Valid responses, N=10)

(Average amount of respondent, Naira)

Category of breeding scale (bird)	Gross poultry income	Sales of product	Non-poultry income	Expenditure for production	Other consumption	Savings
< 500	1,335,000	3,225,000	145,000	1,890,000	14,500	1,465,500
500 ≤ < 1,000	152,500	752,500	167,500	600,000	25,000	295,000
1,000 ≤ < 2,000	1,900,000	14,000,000	187,500	12,100,000	877,500	1,210,000
2,000 ≤ < 5,000	3,016,667	7,900,000	1,050,000	4,883,333	1,351,667	2,715,000
5,000 ≤	10,950,000	12,000,000	54,000	1,050,000	52,000	10,952,000
Total	2,677,500	7,165,500	420,400	4,488,000	594,100	2,503,800

3.4 Expansion of production

3.4.1 Needs related to expansion of production

Category of breeding scale and investment intention (N=10)

(Number of respondent, % of respondent)

Category of breeding scale (bird)	< 500	500 ≤ < 1,000	1,000 ≤ < 2,000	2,000 ≤ < 5,000	5,000 ≤	Total
Number of respondent	2	2	2	3	1	10
Numer of respondent with investment intension	2	2	2	3	1	10
Percentage of respondent with investment intention	100%	100%	100%	100%	100%	100%

Category of poultry income and investment intention (N=10)

(Number of respondent, % of respondent)

Category of poultry income (N million)	< 5.0	5.0 ≤ < 10.0	10.0 ≤	Total
Number of respondent	4	5	1	10
Numer of respondent with investment intension	4	5	1	10
Percentage of respondent with investment intention	100%	100%	100%	100%

Financial service used and investment intention (MA) (N=10)

(% of respondent)

Investmnet intention	Saving account	Remittance at bank account	Remittance by POS agent	Saving account through cooperative's arrangement	Digital apps for saving and remittance	Borrowing from financial institutions	Mobile money	Number of respondent
Without investment intention	0%	0%	0%	0%	0%	0%	0%	0
With investment intention	100%	60%	100%	50%	50%	30%	90%	10
Total	100%	60%	100%	50%	50%	30%	90%	10

3.4.2 Expected funding sources

Investment amount and funding sources by purpose of investment (MA) (N=10)

(Number of respondent, Naira)

Purpose of investment	Own fund	Borrowing from financial institution	Borrowing from relatives/friends	Total amont	Average amount
Construction of facility for hatchery	2	2	1	60,000,000	30,000,000
Construction of brooding facility for chicks	2	0	2	4,000,000	2,000,000
Construction of poultry house	2	0	1	40,000,000	20,000,000
Construction of slaughter and dressing facility	1	1	0	4,500,000	4,500,000
Acquire land for poultry house	2	0	0	22,500,000	11,250,000
Expand land for poultry house	3	0	4	56,250,000	14,062,500
Expand purchase of chick and input	7	0	5	72,200,000	10,314,286
Purchase better variety of chick and input.	1	0	0	5,400,000	5,400,000
Expand sales outlet	1	0	0	1,250,000	1,250,000
Total	21	3	13	266,100,000	12,095,455

3.4.3 Challenge in expanding production

Reasons for difficulty in borrowing from financial institutions (MA)(N=10)

(% of respondent)

Investmnet intention	No hope to be approved	Collateral asset	Farmland not eligible for collateral	High interest rate	Documentation for application	Fear of not being able to repay	No accessible to Non-Interest Finance (Islamic finance)	Number of respondent
Without investment intention	0	0	0	0	0	0	0	0
With investment intention	60%	70%	40%	100%	50%	100%	40%	10
Total	60%	70%	40%	100%	50%	100%	40%	10

3.4.4 Measures to be taken by financial institutions

Important conditions when borrowing from a financial institution (MA) (N=10)

(Number of respondent)

Purpose of investment	Payment period	Grace period	Interest rate	Terms of collateral appraisal	Credit guarantee	Financial advice	Assistance for documentation	Assistance to register cattle barn
Construction of facility for hatchery	1	1	2	0	0	0	0	0
Construction of brooding facility for chicks	1	0	1	0	1	2	1	0
Construction of poultry house	2	0	0	1	1	1	1	0
Construction of slaughter and dressing facility	0	0	1	0	1	1	0	0
Acquire land for poultry house	1	0	0	0	0	2	1	0
Expand land for poultry house	1	0	1	0	1	3	1	0
Expand purchase of chick and input	2	1	2	0	1	4	3	3
Purchase better variety of chick and input.	1	0	0	0	0	1	0	1
Expand sales outlet	1	0	0	0	0	1	0	0
Total	10	2	7	1	5	15	7	4

4. Fishery farmers (Aquaculture)

4.1 Basic information of farmers

4.1.1 Household composition

Number of respondents by farmland size and income (N=10)

(Numberof farmers)

Farmland size (ha)	Income (N million)				
	≤ 1	1 < ≤ 10	10< ≤ 100	100<	Total
≤2	2	5	1	0	8
2< ≤5	0	0	1	0	1
5< ≤10	0	0	0	1	1
10<	0	0	0	0	0
Total	2	2	2	1	10

Of those female farmers (N=2)

(Numberof farmers)

Farmland size (ha)	Income (N million)				
	≤ 1	1 < ≤ 10	10< ≤ 100	100<	Total
≤2	0	1	0	0	1
2< ≤5	0	0	1	0	1
5< ≤10	0	0	0	0	0
10<	0	0	0	0	0
Total	0	1	1	0	2

Number of respondents by farmland size and age of household head (N=10)

(Numberof farmers)

Farmland size (ha)	Age of household head				
	≤ 40	40< ≤ 45	45< ≤ 50	50<	Total
≤2	4	1	1	2	8
2< ≤5	0	1	0	0	1
5< ≤10	1	0	0	0	1
10<	0	0	0	0	0
Total	5	2	1	2	10

Of those female farmers (N=2)

(Numberof farmers)

Farmland size (ha)	Age of household head				
	≤ 40	40< ≤ 45	45< ≤ 50	50<	Total
≤2	1	0	0	0	1
2< ≤5	0	1	0	0	1
5< ≤10	0	0	0	0	0
10<	0	0	0	0	0
Total	1	1	0	0	2

Number of respondents by income and age of household head (N=10)

(Numberof farmers)

Income (N million)	Age of household head				
	≤ 40	40< ≤ 45	45< ≤ 50	50<	Total
≤ 1	1	0	0	1	2
1< ≤ 10	3	1	1	0	5
10< ≤ 100	0	1	0	1	2
100 <	1	0	0	0	1
Total	5	2	1	2	10

Of those female farmers (N=2)

(Numberof farmers)

Income (N million)	Age of household head				
	≤ 40	40< ≤ 45	45< ≤ 50	50<	Total
≤ 1	0	0	0	0	0
1< ≤ 10	1	0	0	0	1
10< ≤ 100	0	1	0	0	1
100 <	0	0	0	0	0
Total	1	1	0	0	2

4.1.2 Source of income

Month of receipt of agricultural income (MA) and monthly prorated amount of annual agricultural gross profit (sales – agricultural expense) (N=10)

(Numberof farmers, Naira)

	January	February	March	April	May	June
Numberof farmers (MA)	4	4	4	2	2	6
Monthly composition ratio	9.5	9.5	9.5	4.8	4.8	14.3
Average agricultural gross profit	1,199,850	1,199,850	1,199,850	606,240	606,240	1,806,090

	July	August	September	October	November	December	Total
Numberof farmers (MA)	3	4	2	4	3	4	42
Monthly composition ratio	7.1	9.5	4.8	9.5	7.1	9.5	100%
Average agricultural gross profit	896,730	1,199,850	606,240	1,199,850	896,730	1,199,850	12,630,000

Number of respondents by farmland size and non-agricultural income (N=10)

(Numberof farmers)

Farmland size (ha)	Non-agricultural income (N million)				
	≤ 1	1 < ≤ 10	10< ≤ 100	100<	Total
≤2	7	1	0	0	8
2< ≤5	0	1	0	0	1
5< ≤10	1	0	0	0	1
Total	8	2	0	0	10

Average non-agricultural income by farmland size and non agricultural income (N=10)

(Naira)

Farmland size (ha)	Non agricultural income (N million)				
	≤ 1	1 < ≤ 10	10< ≤ 100	100<	Total
≤2	334,000	1,200,000	0	0	442,500
2< ≤5	0	2,000,000	0	0	2,000,000
5< ≤10	700,000	0	0	0	700,000
Total	380,000	1,600,000	0	0	624,000

4.1.3 Borrowing status from financial institutions

Attributes and loan outline of farmers with borrowing experience

Attributes					Borrowing experience						
Sex	Crop	farmland (ha)	Crop sales in 2022 (N)	Non-agricultural income in 2022 (N)	lender	Purpose of borrowing	Borrowing period	Amount	Period (month)	Monthly interest rate	Collateral
Male	Tilapia	1	2,500,000	150,000	Cooperative	Mechanical equipment	2021/2/1	500,000	6	10,000	cross guarantee
Female	Catfish	3	75,000,000	2,000,000	UNITED BANK OF AMERICAN	Mechanical equipment	2019/5/1	5,000,000	12	50,000	Farm land
Male	Catfish	1	900,000	500,000	Cooperative	Mechanical equipment	2021/8/1	500,000	9	10,000	cross guarantee
Male	Catfish	2	11,000,000	1,200,000	LAPO (micro finance)	Mechanical equipment	2022/10/1	3,000,000	11	350,000	Farm land, cross guarantee
Male	Catfish	10	252,000,000	700,000	OSANTA MICRO	Mechanical equipm	2022/3/1	150,000	6	3,750	cross guarantee

					FINANCE (micro finance)	ent					

4.1.4 Farmland

Farmland ownership by farmland size (N=10)

(Number of farmers)

Farmland ownership	Farmland size (ha)				
	≤2	2< ≤5	5< ≤10	10<	Total
Owned	5	1	1	0	7
Rental	3	0	0	0	3
Both	0	0	0	0	0
Total	8	1	1	0	10

Ownership of farmland and registeration rate (N=10)

(Number of farmers)

Farmland ownership	Registration of right of occupancy			Total	Registeration rate
	Registered	Not registered	No answer		
Owned	0	7	0	7	0%
Rental	0	0	3	3	0%
Both	0	0	0	0	0%
Total	0	7	3	10	0%

Lender of leased farmland, presence of written lease contract (N=3)

（Number of farmers）

Lender	Presence of written lease contract		Total	Ratio of presence of written lease contract
	Presense	Absense		
Family and relatives	0	0	0	0%
Large farmers/landowners	0	0	0	0%
Private enterprises	3	0	3	100%
Total	3	0	3	0%

Period of farmland lease contract (N=3)

(Month)

Lender	Period of farmland lease contract (Month)		
	Max	Min	Average
Family and relatives	NA	NA	NA
Large farmers/landowners	NA	NA	NA
Private enterprises	12	12	12

4.2 Information related to farmers' cultivation techniques

4.2.1 Crops

Crops (MA) and farmland size of responding farmers (N=10)

Crop	Farm size of farmers (ha)			Number of farmers
	Average	Min	Max	
Tilapis	1.0	1.0	1.0	1
Catfish	2.3	1.0	10.0	9

4.2.2 Agricultural machinery/facilities

Agricultural machinery and facilities owned by each farmer, and the status of farmland (N=10)

Farmers' Index	Type of machinery and facility	Number	Brand	Price (N)	Maintenance cost (N)	Purchase period	Status	Brand you want to buy next	Price of the brand you want to buy next (N)	Farmland size(ha)	Farmland ownership
13	Water pumping machine	1	TIGER	80,000	40,000	2019	In Good Condition	TIGER	250,000	1	Rented
13	Fish Pond (earthen pond)	2	Local	175,000	75,000	2019	In Good Condition	Local	500,000	1	Rented
13	Smoking kiln	1	Local	250,000	60,000	2016	In Good Condition	ELECTRIC	3,000,000	1	Rented
5	Water pumping machine	1	ONDER	75,000	35,000	2019	In Good Condition	TIGER	90,000	1	Owned
5	Fish Pond (earthen pond)	4	Local	300,000	100,000	2016	In Good Condition	Local	500,000	1	Owned
5	Fish Pond (concrete pond)	2	Local	500,000	120,000	2020	In Good Condition	Local	800,000	1	Owned
14	Water pumping machine	1	TIGER	3,000 (rental)	NA	NA	In Good Condition	TIGER	12,000 (rental)	1	Rented
14	Fish Pond (earthen pond)	2	Local	120,000	60,000	2002	In Good Condition	Local	350,000	1	Rented
17	Water pumping machine	4	ELEPHANT	175,000	75,000	2017	In Good Condition	ELEPHANT	500,000	3	Owned

Farmers' Index	Type of machinery and facility	Number	Brand	Price (N)	Maintenance cost (N)	Purchase period	Status	Brand you want to buy next	Price of the brand you want to buy next (N)	Farmland size(ha)	Farmland ownership
17	Fish Pond (earthen pond)	30	Local	350,000	150,000	2016	In Good Condition	Local	1,500,000	3	Owned
15	Water pumping machine	1	ONDER	85,000	35,000	2015	In Good Condition	LISTER	250,000	1	Rented
15	Fish Pond (earthen pond)	2	Local	120,000	50,000	2015	In Good Condition	Local	200,000	1	Rented
6	Water pumping machine	1	ONDER	85,000	30,000	2019	In Good Condition	ONDER	150,000	1	Owned
6	Fish Pond (earthen pond)	6	Local	180,000	90,000	2018	In Good Condition	Local	200,000	1	Owned
8	Water pumping machine	2	TIGER	85,000	65,000	2016	In Good Condition	TIGER	200,000	1	Owned
8	Fish Pond (earthen pond)	6	Local	180,000	90,000	2018	In Good Condition	Local	200,000	1	Owned
12	Water pumping machine	4	SUMEC	120,000	150,000	2019	In Good Condition	SUMEC	3,800,000	2	Owned
12	Fish Pond (earthen pond)	25	Local	350,000	50,000	2012	In Good Condition	Local	9,000,000	2	Owned
12	Fish Pond (concrete pond)	12	Local	150,000	100,000	2015	In Good Condition	Local	500,000	2	Owned
12	Smoking kiln	3	Local	1,500,000	50000	2012	In Good Condition	ELECTRIC	25,000,000	2	Owned

Farmers' Index	Type of machinery and facility	Number	Brand	Price (N)	Maintenance cost (N)	Purchase period	Status	Brand you want to buy next	Price of the brand you want to buy next (N)	Farmland size(ha)	Farmland ownership
16	Water pumping machine	1	PARSUN	158,000	80,000	2018	In Good Condition	BARSUN	500,000	1	Owned
16	Fish Pond (concrete pond)	5	Local	300,000	60,000	2018	In Good Condition	Local	200,000	1	Owned
1	Fish Pond (earthen pond)	1	Local	100,000	50,000	2018	In Good Condition	Local	150,000	10	Owned
1	Fish Pond (concrete pond)	1	Local	120,000	60,000	2021	In Good Condition	Local	600,000	10	Owned

4.3 Information on farm management

Production and yield for each crop (N=10)

Crop	Average cultivated area (ha)	Average production (ton)		Average yield (ton/ha)	
		Last season	2 seasons before	Last season	2 seasons before
Tilapia	5.0	2.00	2.00	0.4	0.4
Catfish	1.2	13.8	13.8	11.5	11.5

Juvenile fish and labor wage by crop (MA) (N=10)

Crop	Average of juvenile fish (N/KG)	Average of labor wage (N/month)	Average number of days employed (days/year)	Average labor wage (N/year)	Cropping season (season/year)	Average labor wage (N/season)
Tilapia	2,000	80,000	90	240,000	1	240,000
Catfish	6,963	49,500	151	249,150	2	124,575

Sales price and transportation cost (MA) for each crop (N=10)

Crop	Average sales price (N/kg)	Average transportation cost to market (N/kg)
Tilapia	3,500	40
Catfish	2,736	42

Sales destination by crop (MA) (N=10)

(Number of farmers)

Crop	Go to market yourself	To off-taker	To off-taker with advance contract	To processing company with advance contract	To export companies with advance contracts
Tilapia	1	0	0	0	0
Catfish	4	4	1	0	0
Total	5	4	1	0	0

Method of determining sales price by crop (MA) (N=10)

(Number of farmers)

Crop	Off-taker's asking price	Negotiation at the time of sale	Arranged in advance
Tilapia	0	1	0
Catfish	1	8	0
Total	1	9	0

Purchase contract arrangements that farmers have experienced (MA) (N=10)

(Number of farmers)

Crop	Seed provision/introduction	Provision and introduction of other input materials	Technical advice	Farming monitoring	Whole quantity purchase	Prohibition of side sales
Tilapia	0	0	0	1	0	1
Catfish	0	0	0	5	4	1
Total	0	0	0	6	4	2

How to obtain price information (MA) (N=10)

(Number of farmers)

Crop	Go to the market and check	Hearing from off-takers	listen to the radio and find out	Explore on your mobile device	Others
Tilapia	1	0	0	0	0
Catfish	9	5	0	0	0
Total	10	5	0	0	0

Income, expenditure, and savings by farmland size (N=10)

(Average amount、Naira)

Farmland size (ha)	Agricultural gross profit	Agricultural sales amount	Non agricultural income	Agricultural costs	Other expenses	Savings amount
≤2	1,175,000	3,587,500	392,500	2,577,500	227,500	1,175,000
2< ≤5	7,400,000	75,000,000	1,000,000	68,000,000	600,000	7,400,000
5< ≤10	109,500,000	110,000,000	180,000	650,000	30,000	109,500,000
10<	0	0	0	0	0	0
Total	12,630,000	21,370,000	432,000	8,927,000	245,000	12,630,000

4.4 Expand production

4.4.1 Demands related to production expansion

Farmland size and investment intention (N=10)

(Number of farmers, Ratio)

Farmland (ha)	≤2	2< ≤ 5	5< ≤ 10	10<	Total
Number of respondents	8	1	1	0	10
Investment intention	8	1	1	0	10
Ratio of investment intention	100%	100%	100%	0%	100%

Agricultural income category and investment intention (N=10)

(Number of farmers, Ratio)

Income (N million)	≤1	1< ≤10	10< ≤100	100<	Total
Number of respondents	2	5	2	1	10
Investment intention	2	5	2	1	10
Ratio of investment intention	100%	100%	100%	100%	100%

Financial products (MA) (N=10)

(Ratio of respondents)

Investment intention	Saving account	Remittance at bank account	Remittance by POS agent	Saving account through cooperative's arrangement	Digital apps for saving and remittance	Borrowing from financial institutions	Mobile money	Number of respondents
No	NA	NA	NA	NA	NA	NA	NA	NA
Yes	100%	0%	50%	0%	0%	10%	0%	10

4.4.2 Expected sources of funding

Investment amount and funding method (MA) by investment purpose (N=10)

(Number of farmers, N)

Investment purpose	Own fund	Financial institute	Relatives/friends	Total amount	Average amount
Acquisition of farmland	1	3	0	2,500,000	833,333
Expansion of cultivated area	0	0	0	0	0
Agricultural machinery acquisition	3	9	0	73,850,000	8,205,556
Increase in seeds and materials	0	1	0	500,000	500,000
Purchasing better quality seeds and materials	3	0	0	5,200,000	1,733,333
Expansion of sales points	0	1	0	2,500,000	2,500,000
Total	7	14	0	86,050,000	4,780,556

4.4.3 Challenges in expanding production

Reasons why it is difficult to borrow from financial institutions (MA) (N=10)

(Ratio of respondents)

Investment intention	No hope of passing the examination	Lack of collateral	Farmland cannot be used as collateral	Interest rate is high	Difficult to prepare application documents	It won't be paid	No islamic finance	Total number of respondents
No	NA	NA	NA	NA	NA	NA	NA	NA
Yes	10%	70%	0%	80%	10%	10%	0%	10

4.4.4 Measures that financial institutions should take to address the above issues

Conditions to be considered when borrowing from financial institutions (MA) (N=70)

(Number of farmers)

Investment purpose	Repayment period	Grace period	Interest rate	Collateral valuation	Credit guarantee	Financial advice	Documentation support	Farmland restration support
Acquisition of farmland	3	0	2	0	1	0	0	0
Expansion of cultivated area	0	0	0	0	0	0	0	0
Agricultural machinery acquisition	7	1	6	0	1	0	0	0
Increase in seeds and materials	1	0	0	0	0	0	0	0
Purchasing better quality seeds and materials	1	1	3	0	0	0	0	0
Expansion of sales points	1	0	1	0	0	0	0	0
Total	13	2	3	0	2	0	0	0

5. Market

5.1 Profile of surveyed markets

State	Name of market	LGA	Size (Acre)	Owner	Average number of wholesalers/retailers per day	Total deal per day (N)
Benue	Naka market	Gwer west	10	Community	5,000	30,000,000
Benue	Daudu	Guma	3	Community	4,000	35,000,000
Benue	Wurukum ricemill market	makurdi	5	Local government	1,000	25,000,000
Benue	abinsi market	guma	4	Local government	250	15,000,000
FCT	kwaita market	kwali area council	10	Local government	500	30,000,000
Nasarawa	Keffi cattle market	Keffi	4	Local government	1,000	65,000,000
Nasarawa	Sabo gari market	Keffi	2	Community	300	9,000,000
Ondo	Ala market	Idanre	5	Community	500	25,000,000
Oyo	OWODE MARKET	ORELOPE	9	Community	3,000	20,000,000
Oyo	akesan ultra modern market	atiba	4	Local government	2,000	2,500,000

Note: 1 Acre = 0.405 ha

5.2 Monitoring and regulation of trading price

State	Name of market	How to monitor price?	Disseminate the prices?	Regulate transaction prices?	Target of regulation of prices	Other pricing mechanism
Benue	Naka market	Transactions in the market	No	No	NA	None
Benue	Daudu	Transactions in the market	No	Yes	Members when buying products from farmers	None
Benue	Wurukum ricemill market	No	No	Yes	Transactions in the market	need price regulatory policy
Benue	abinsi market	Transactions in the market	No	No	NA	None
FCT	kwaita market	Transactions in the market	Yes	Yes	Transactions in the market	Not allow to sell above the market price
Nasarawa	Keffi cattle market	Transactions in the market	No	Yes	Transactions in the market	Rule of supply and demand
Nasarawa	Sabo gari market	No	No	No	NA	None
Ondo	Ala market	Transactions in the market	No	Yes	Transactions in the market	None
Oyo	OWODE MARKET	Collect voices of traders/members	No	No	NA	Rule of supply and demand

Oyo	akesan ultra modern market	Transactions in the market	Yes	No	NA	Rule of supply and demand

5.3 Orgamization of the market participants

State	Name of market	Have market associations?	Number of participants	Member fee per year (N)	How to choose the leader?
Benue	Naka market	Yes	980	5,500	By voting
Benue	Daudu	Yes	750	5,000	By voting
Benue	Wurukum ricemill market	Yes	400	1,500	By voting
Benue	abinsi market	Yes	150	2,000	Appointed by community leader
FCT	kwaita market	Yes	50	1,500	By voting
Nasarawa	Keffi cattle market	Yes	100	2,000	Appointed by the owner of the market
Nasarawa	Sabo gari market	No	NA	NA	NA
Ondo	Ala market	Yes	500	200	By voting
Oyo	OWODE MARKET	Yes	23	500	By voting
Oyo	akesan ultra modern market	Yes	25	5,000	By voting

5.4 Trading price, main production place, transportation method, etc.

5.4.1 Rice

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market	450	750	Within LGA		Bus		15
Benue	Daudu	500	700	Within LGA		Truck		15
Benue	Wurukum ricemill market	450	550	Within the state		Bus		25
Benue	abinsi market	500	700	Within LGA		Bus		15
FCT	kwaita market	450	500	Within the state		Truck		15
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							

Oyo	akesan ultra modern market	400	550	Other state	Ekiti state	Bus		20

5.4.2 Maize

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market	400	600	Within LGA		Bus		10
Benue	Daudu	400	500	Within LGA		Truck		15
Benue	Wurukum ricemill market	300	450	Within the state		Bus		20
Benue	abinsi market							
FCT	kwaita market	350	400	Within the state		Truck		15
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market	350	500	Within LGA		Truck		15
Ondo	Ala market							
Oyo	OWODE MARKET	500	600	Within the state		Bus		20
Oyo	akesan ultra modern market	300	400	Within LGA		Motorcycle		15

5.4.3 Sorghum

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market	500	600	Within LGA		Bus		10
Benue	Daudu	900	1000	Within LGA		Truck		15
Benue	Wurukum ricemill market							
Benue	abinsi market	500	600	Within the state		Truck		15
FCT	kwaita market							
Nasarawa	Keffi cattle market							

Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market							

5.4.4 Yam

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market	200	500	Within LGA		Bus		20
Benue	Daudu	200	500	Within LGA		Truck		20
Benue	Wurukum ricemill market	300	500	Within the state		Bus		20
Benue	abinsi market	200	400	Within LGA		Truck		20
FCT	kwaita market	1000	1500	Within the state		Truck		10
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market	550	700	Within LGA		Truck		25
Ondo	Ala market							
Oyo	OWODE MARKET	600	900	Within the state		Bus		20
Oyo	akesan ultra modern market	700	900	Within LGA		Motorcycle		15

5.4.5 Cassava

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market	200	300	Within LGA		Bus		20
Benue	Daudu	200	300	Within the state		Truck		20
Benue	Wurukum ricemill market	150	200	Within LGA		Bus		20

Benue	abinsi market	200	250	Within LGA		Bus		20
FCT	kwaita market							
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market	120	150	Within LGA		Motorcycle		15

5.4.6 Millet

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market							
Benue	Daudu	800	900	Within LGA		Truck		15
Benue	Wurukum ricemill market	600	700	Within LGA		Bus		15
Benue	abinsi market							
FCT	kwaita market							
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market							

5.4.7 Plantain

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market							
Benue	Daudu							

Benue	Wurukum ricemill market							
Benue	abinsi market							
FCT	kwaita market							
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market	200	400	Within LGA		Motorcycle		15
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market							

5.4.8 Potatoes

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market							
Benue	Daudu							
Benue	Wurukum ricemill market	400	550	Within the state		Bus		20
Benue	abinsi market							
FCT	kwaita market							
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market	600	800	Within LGA		Motorcycle		15

5.4.9 Soybeans

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market	300	400	Within LGA		Bus		15
Benue	Daudu	600	900	Within LGA		Bus		20
Benue	Wurukum ricemill market							
Benue	abinsi market	350	450	Within the state		Bus		20
FCT	kwaita market	350	400	Within the state		Truck		15
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market							

5.4.10 Tomatoes

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market	250	300	Within LGA		Bus		20
Benue	Daudu	300	500	Within LGA		Bus		20
Benue	Wurukum ricemill market	350	500	Within LGA		Bus		25
Benue	abinsi market							
FCT	kwaita market	240	300	Within LGA		Bus		10
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market	600	800	Within LGA		Motorcycle		25

5.4.11 Cowpea

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market							
Benue	Daudu							
Benue	Wurukum ricemill market							
Benue	abinsi market	600	800	Within the state		Truck		15
FCT	kwaita market	600	700	Within the state		Truck		15
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market							

5.4.12 Okra

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market	150	250	Within LGA		Bus		10
Benue	Daudu							
Benue	Wurukum ricemill market							
Benue	abinsi market	200	240	Within LGA		Others	boat	20
FCT	kwaita market	160	220	Within LGA		Bus		10
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market	150	200	Within LGA		Motorcycle		20

5.4.13 Orange

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market							
Benue	Daudu							
Benue	Wurukum ricemill market							
Benue	abinsi market							
FCT	kwaita market							
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market	200	300	Within LGA		Motorcycle		20

5.4.14 Sesame

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market	1000	1200	Within LGA		Bus		15
Benue	Daudu	1200	1500	Within LGA		Bus		20
Benue	Wurukum ricemill market							
Benue	abinsi market	950	1000	Within LGA		Bus		20
FCT	kwaita market							
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market							

5.4.15 Cocoa

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market							
Benue	Daudu							
Benue	Wurukum ricemill market							
Benue	abinsi market							
FCT	kwaita market							
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market	2500	2800	Within the state		Motorcycle		25
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market							

5.4.16 Groundnut

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market	400	500	Within LGA		Bus		15
Benue	Daudu	500	700	Within LGA		Bus		20
Benue	Wurukum ricemill market							
Benue	abinsi market							
FCT	kwaita market							
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market							

5.4.17 Oil palm

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market							
Benue	Daudu							
Benue	Wurukum ricemill market							
Benue	abinsi market							
FCT	kwaita market							
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market	1000	1200	Within the state		Truck		25
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market							

5.4.18 Sheep

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market							
Benue	Daudu							
Benue	Wurukum ricemill market							
Benue	abinsi market							
FCT	kwaita market							
Nasarawa	Keffi cattle market	1000	1200	Within LGA		Truck		40
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market							

5.4.19 Goat

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market							
Benue	Daudu							
Benue	Wurukum ricemill market							
Benue	abinsi market							
FCT	kwaita market							
Nasarawa	Keffi cattle market	900	1100	Within LGA		Truck		40
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market							

5.4.20 Poultry

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market							
Benue	Daudu							
Benue	Wurukum ricemill market							
Benue	abinsi market							
FCT	kwaita market	2500	3000	Within LGA		Motorcycle		25
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market	1250	1350	Within LGA		Motorcycle		25

5.4.21 Catfish

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market							
Benue	Daudu							
Benue	Wurukum ricemill market							
Benue	abinsi market							
FCT	kwaita market							
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET	1400	1500	Within LGA		Motorcycle		25
Oyo	akesan ultra modern market							

5.4.22 Pepper

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market	250	300	Within LGA		Bus		15
Benue	Daudu							
Benue	Wurukum ricemill market	250	350	Within the state		Bus		25
Benue	abinsi market	280	400	Within LGA		Others	boat	20
FCT	kwaita market	160	260	Within LGA		Bus		10
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market	150	200	Within LGA		Motorcycle		25

5.4.23 Leafy vegetables

State	Name of market	Farm gate price (N/kg)	wholesale/ retail price (N/kg)	Main producing place	Other state	Main transportation method	Other means of transportation	Transportation fee (N/kg)
Benue	Naka market							
Benue	Daudu							
Benue	Wurukum ricemill market							
Benue	abinsi market	75	150	Within LGA		Others	boat	15
FCT	kwaita market	200	400	Within LGA		Motorcycle		10
Nasarawa	Keffi cattle market							
Nasarawa	Sabo gari market							
Ondo	Ala market							
Oyo	OWODE MARKET							
Oyo	akesan ultra modern market							

6. Agricultural micro small and medium-sized enterprises

6.1 Overview of surveyed enterprises

6.1.1 Number of enterprises by size and ownership (N=100)

(Number of enterprises)

Size by employee	Ownership structure				
	Partnership	Private Limited Liability Company	Public Limited Liability Company	Sole Proprietorship	Total
Micro	7	0	1	79	87
Small	2	1	0	10	13
Total	9	1	1	89	100

Note : Partnership is personal business with more than one person. Sole Proprietorship is personal business with one person.

6.1.2 Average number of employees by size and ownership (N=100)

(persons)

Size by employee	Ownership structure				
	Partnership	Private Limited Liability Company	Public Limited Liability Company	Sole Proprietorship	Total
Micro	4.3	NA	6.0	3.5	3.6
Small	17.5	23.0	NA	21.5	21.0
Total	7.2	23.0	6.0	5.6	5.9

6.1.3 Average number of female employees by size and ownership (N=100)

(persons)

Size by employee	Ownership structure				
	Partnership	Private Limited Liability Company	Public Limited Liability Company	Sole Proprietorship	Total
Micro	2.3	NA	2.0	1.3	1.4
Small	6.5	7.0	NA	6.9	6.8
Total	3.2	7.0	2.0	1.9	2.1

6.2 Finacial figure

6.2.1 Average annual sales by size and ownership (N=100)

(Naira)

Size by employee	Ownership structure				
	Partnership	Private Limited Liability Company	Public Limited Liability Company	Sole Proprietorship	Total
Micro	6,150,000	NA	195,700,000	20,852,278	21,679,080
Small	34,640,000	7,500,000	NA	10,795,000	14,210,000
Total	12,481,111	7,500,000	195,700,000	19,722,247	20,708,099

6.2.2 Average gross profit by size and ownership (N=100)

(Naira)

Size by employee	Ownership structure				
	Partnership	Private Limited Liability Company	Public Limited Liability Company	Sole Proprietorship	Total
Micro	3,587,143	NA	169,900,000	9,378,920	10,757,985
Small	32,965,000	4,000,000	NA	6,775,000	10,590,769
Total	10,115,556	4,000,000	169,900,000	9,086,345	10,736,247

6.2.3 Average profit aftertax by size and ownership (N=100)

(Naira)

Size by employee	Ownership structure				
	Partnership	Private Limited Liability Company	Public Limited Liability Company	Sole Proprietorship	Total
Micro	2,347,500	NA	101,570,000	6,232,094	7,015,378
Small	22,849,400	2,786,000	NA	4,487,700	7,181,677
Total	6,903,478	2,786,000	101,570,000	6,036,094	7,036,997

6.2.4Average total assets by size and ownership (N=100)

(Naira)

Size by employee	Ownership structure				
	Partnership	Private Limited Liability Company	Public Limited Liability Company	Sole Proprietorship	Total
Micro	14,990,000	NA	80,000,000	14,839,058	15,600,179
Small	13,500,000	10,000,000	NA	41,043,050	34,417,731
Total	14,658,889	10,000,000	80,000,000	17,783,327	18,046,461

6.2.5 Average fixed assets by size and ownership (N=100)

(Naira)

Size by employee	Ownership structure				
	Partnership	Private Limited Liability Company	Public Limited Liability Company	Sole Proprietorship	Total
Micro	7,328,571	0	60,000,000	7,153,858	7,775,343
Small	7,500,000	3,000,000	0	34,765,700	28,127,462
Total	7,366,667	3,000,000	60,000,000	10,256,312	10,421,118

6.2.6 Average short-term borrowing by size and ownership (N=100)

(Naira)

Size by employee	Ownership structure				
	Partnership	Private Limited Liability Company	Public Limited Liability Company	Sole Proprietorship	Total
Micro	1,317,000	NA	0	197,785	285,563
Small	750,000	0	NA	677,778	636,752
Total	1,191,000	0	0	251,717	331,218

6.2.7 Average long-term borrowing by size and ownership (N=100)

(Naira)

Size by employee	Ownership structure				
	Partnership	Private Limited Liability Company	Public Limited Liability Company	Sole Proprietorship	Total
Micro	900,000	NA	0	849,038	843,380
Small	500,000	0	NA	74,200	134,000
Total	811,111	0	0	761,978	751,160

6.2.8 Average capital by size and ownership (N=100)

(Naira)

Size by employee	Ownership structure				
	Partnership	Private Limited Liability Company	Public Limited Liability Company	Sole Proprietorship	Total
Micro	2,237,571	0	20,000,000	3,755,003	3,819,634
Small	3,500,000	4,500,000	0	5,784,880	5,334,523
Total	2,518,111	4,500,000	20,000,000	3,983,079	4,016,570

6.2.9 Financial figures by business line (2022) (MA) (N=100)

(Average of respondents, Naira)

Business line / Financial items	Supplier	Mechanization	Crop production	Service provider	Post-harvest & storage	Transportation	Wholesale	Processing	Retail & export	Other including Poultry & Fishery
Total assets	18,075,833	11,000,000	1,087,667	18,350,000	20,296,786	10,000,000	29,866,000	34,225,000	21,525,711	87,310,000
Growth year on year	19%	2%	34%	-33%	37%	-23%	112%	42%	14%	392%
Short-term borrowing	311,364	1,250,000	0	807,000	906,429	0	717,000	1,145,000	697,632	1,095,000
Long-term borrowing	705,833	0	0	5,368,000	2,149,643	0	5,200,000	3,793,125	3,002,632	885,500
Short-term borrowing/ total assets	2%	11%	0%	4%	4%	0%	2%	3%	3%	1%
Long-term borrowing/ total assets	4%	0%	0%	29%	11%	0%	17%	11%	14%	1%
Annual sales	22,301,955	7,600,000	55,220,000	4,954,000	6,010,357	7,500,000	3,676,000	8,902,500	7,855,448	6,335,000
Growth year on year	-39%	27%	-10%	15%	1%	-21%	7%	-39%	-58%	-6%
Number of respondents	57	2	6	5	14	1	5	8	19	4

6.3 Financial literacy

6.3.1 Audited and investment plan (N=100)

(number of respondents)

Audited / Investment plan	Not audited	Audited	Total	Audited (ratio)
Not have investment plan	6	14	20	70%
Have investment plan	58	22	80	28%
Total	64	36	100	36%
Have investment plan (ratio)	91%	61%	80%	

6.3.2 Audites and experience of borrowing (N=100)

(number of respondents, ratio)

Audited / Experience of borrowing	Not audited	Audited	Total	Audit (ratio)
Not Have experience of borrowing	48	26	74	35%
Have experience of borrowing	16	10	26	38%
Total	64	36	100	36%
Borrowing experience (ratio)	25%	28%	26%	

6.3.3 Investment plan and experience of borrowing (N=100)

(number of respondents, ratio)

Investment plan / Borrowing experience	Not have investment plan	Have investment plan	Total	Have Investment plan (ratio)
Not Have experience of borrowing	17	57	74	77%
Have experience of borrowing	3	23	26	88%
Total	20	80	100	80%
Borrowing experience (ratio)	15%	29%	26%	

6.3.4 Experience of borrowing and financial indicators (N=100)

Average of financial figure / Borrowing experience	Annual sales (N)	Number of employees	Operating profit ratio	Current asset (times of monthly sales)
Have borrowing experience	28,495,200	6.2	55%	15.4
Not have experience of borrowing	18,806,245	6.1	60%	15.8

Note : Current asset (times of monthly sales) is an indicator related to necessary working capital

6.3.5 List of experience of short-term borrowing

Respondent ID	Lender	Loan amount (N)	Tenor (months)	Interest rate (annual, %)	Collateral	Purpose	Status
4	OSANTA Micro Finance	500,000	6	36	credit guarantee	Working capital (seasonal)	Current with arrear
5	Omas commodity	20,000,000	6	18	other	Working capital (continuous)	Fully paid
14	FCMB	5,000,000	6	9	personal guarantee	other	Current with arrear
20	Lapo Micro Finance	250,000	24	36	land and building	Working capital (continuous)	Current with arrear
25	Olam	3,000,000	6	9	inventory	Working capital (continuous)	Fully paid
36	Access Bank	2,500,000	12	9	land and building	Working capital (continuous)	Fully paid
37	First Bank Plc	25,000,000	24	9	machinery	Working capital (seasonal)	Fully paid
41	CORPORATIVE	700,000	9	18	credit guarantee	Working capital (continuous)	Fully paid
45	Gurmi	100,000	6	18	personal guarantee	Working capital (continuous)	Fully paid
48	Gurmi	150,000	6	18	personal guarantee	Working capital (continuous)	Fully paid
50	FCMB	10,000,000	6	9	land and building	Working capital (continuous)	Current with arrear
65	Access bank	3,000,000	6	9	inventory	Working capital (continuous)	Current with arrear
	Boaba Microfinance	4,000,000	10	43	land and building	Working capital (continuous)	Current with arrear
	FCMB	5,000,000	6		land and building	Working capital (continuous)	Current with arrear
66	Access back	1,000,000	6	9	other	Working capital (continuous)	Current with arrear
70	Cooperative	100,000	9	18	personal guarantee	Working capital (continuous)	Fully paid
77	Cooperative	150,000	9	20	personal guarantee	Working capital (continuous)	Fully paid
79	Guaranty trust bank	750,000	12	9	receivable/invoice	Working capital (continuous)	Current with arrear
81	Cooperative	100,000	6	18	personal guarantee	Working capital (continuous)	Fully paid
118	Dealers bam	300,000	12	10	personal guarantee	Working capital (continuous)	Fully paid
119	Association of adoka dealers	200,000	12	10	personal guarantee	other	Current with arrear
125	Association of rice mill sellers	1,200,000	12	10	personal guarantee	Working capital (continuous)	Current with no arrear

6.3.6 List of experience of long-term borrowing

Respondent ID	Lender	time of disbursement	Tenor (Months)	Interest rate (Annual, %)	Payment frequency	collateral	Purpose	Status
107	Zion microfinance bank	04/01/2021	36	10	monthly	credit guarantee	Working capital (continuous)	Current with no arrear
106	Ricemill association	02/01/2023	24	10	monthly	credit guarantee	Working capital (continuous)	Current with no arrear
129	Women wing association	03/01/2021	36	10	monthly	personal guarantee	Working capital (continuous)	Current with no arrear
120	Zion microfinance bank	08/01/2021	36	10	monthly	land and building	Working capital (continuous)	Current with no arrear
121	Platinum microfinance bank	04/01/2022	36	10	monthly	personal guarantee	Working capital (continuous)	Current with arrear

6.4 Challenges

6.4.1 Challenges for business by business line (MA) (N=100)

(ratio of respondents)

Business line / Challenges for your business	Supplier	Mechanization	Crop production	Service provider	Post-harvest & storage	Transportation	Wholesale	Processing	Retail & export	Other including Poultry & Fishery
Lack in new investment	11%	0%	33%	40%	21%	0%	0%	13%	11%	25%
Low utilization of production capacity	5%	0%	0%	20%	21%	0%	40%	38%	21%	0%
Available resource&input	25%	0%	17%	40%	21%	0%	0%	13%	5%	25%
Stable procurement of crops&commodities	7%	100%	0%	0%	36%	0%	60%	50%	37%	0%
Sales&marketing	32%	100%	0%	40%	29%	0%	60%	50%	53%	50%
Management capacity	2%	50%	0%	0%	21%	0%	40%	38%	16%	25%
Available finance	47%	0%	17%	40%	14%	0%	20%	0%	32%	50%
Cash flow volatility	7%	0%	0%	0%	0%	0%	0%	0%	0%	50%
Risk of natural disaster	7%	100%	17%	0%	50%	0%	80%	75%	37%	50%
Regulatory compliance	2%	0%	0%	20%	0%	0%	0%	0%	0%	0%
Marketing	16%	50%	0%	20%	21%	0%	20%	38%	21%	25%
Others	14%	0%	0%	20%	0%	0%	0%	0%	0%	0%
No difficulties	4%	0%	33%	0%	14%	100%	0%	0%	11%	0%
Number of respondents	57	2	6	5	14	1	5	8	19	4

6.4.2 Challenges for finance by business line (MA) (N=100)

(ratio of respondents)

Business line / Challenges for finance	Supplier	Mechanization	Crop production	Service provider	Post-harvest & storage	Transportation	Wholesale	Processing	Retail & export	Other including Poultry & Fishery
Lack of collateral assets	30%	0%	0%	20%	7%	0%	20%	0%	16%	75%
Lack of repayment ability in cash flow	14%	50%	0%	60%	14%	0%	20%	25%	32%	25%
Need lower interest rate	68%	100%	67%	80%	64%	100%	60%	75%	58%	75%
Need longer tenure loan	40%	100%	17%	40%	50%	100%	40%	63%	32%	75%
Difficult to prepare application documents	30%	50%	0%	20%	21%	0%	20%	63%	26%	25%
Difficult to register assets for collateral	5%	0%	0%	60%	0%	0%	0%	13%	21%	25%
Program loan such as ABP is not appropriate (in details)	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%
No need external finance	9%	0%	50%	0%	7%	0%	0%	0%	5%	25%
Other	12%	0%	0%	0%	7%	0%	20%	0%	11%	0%
Number of respondents	57	2	6	5	14	1	5	8	19	4

6.5 Investment plan

Investment plan and borrowing demands from financial institutions by business kine (MA) (N=80)

(Average of respondents, Naira)

Business line Investment & finance plan	Supplier	Processing	Wholesale	Crop production	Post-harvest & storage
Investment amount (excluding Land)	52,814,934	35,083,333	20,175,000	1,700,000	27,115,238
Building	26,473,684	5,000,000	800,000	0	2,820,000
Machinery and equipment	10,400,000	15,333,333	11,500,000	1,700,000	11,366,667
Increased procurement	15,941,250	14,750,000	7,875,000	0	12,928,571
Short-term borrowing	11,000,000	5,000,000	0	0	5,000,000
Long-term borrowing	10,814,286	18,166,667	9,500,000	5,000,000	9,891,667
Security asset	25,166,808	41,342,083	40,600,000	1,667,337	27,709,091
Number of companies	57	8	5	6	14