



Food and Agriculture  
Organization of the  
United Nations



## REVIEW OF THE LIVESTOCK/MEAT AND MILK VALUE CHAINS AND POLICY INFLUENCING THEM IN NIGERIA





**REVIEW OF THE LIVESTOCK/MEAT AND MILK VALUE CHAINS AND  
POLICY INFLUENCING THEM IN NIGERIA**

Ilu I. Y. Frank, A. & Annatte, I.

Edited by  
Olanrewaju B. Smith  
Abdou Salla  
Berhanu Bedane

Published by the Food and Agriculture Organization of the United Nations and  
the Economic Community of West African States

2016

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO), or of the Economic Community of West African States (ECOWAS) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO, or ECOWAS in preference to others of a similar nature that are not mentioned.

The views expressed in this information product are those of the author(s) and do not necessarily reflect the views or policies of FAO, or the ECOWAS.

© FAO and ECOWAS, 2016

FAO encourages the use, reproduction and dissemination of material in this information product. Except where otherwise indicated, material may be copied, downloaded and printed for private study, research and teaching purposes, or for use in non-commercial products or services, provided that appropriate acknowledgement of FAO as the source and copyright holder is given and that FAO's endorsement of users' views, products or services is not implied in any way.

All requests for translation and adaptation rights, and for resale and other commercial use rights should be made via [www.fao.org/contact-us/licence-request](http://www.fao.org/contact-us/licence-request) or addressed to [copyright@fao.org](mailto:copyright@fao.org).

FAO information products are available on the FAO website ([www.fao.org/publications](http://www.fao.org/publications)) and can be purchased through [publications-sales@fao.org](mailto:publications-sales@fao.org)

### **Cover photos**

Top row left to right 1. A bucher selling meat cuts in Tajikstan - © FAO / Vasily Maximov 2. A child looking after cattle in Beinam, Niger - © FAO / Ado Youssouf 3. Weighing milk in Naivasha, Kenya - © FAO / Simon Maina

Bottom row left to right 1. Chopping meat in Kumasi, Ghana - © FAO / Pietro Cenini 2. Masai men at livestock market in Kenya - © FAO / Simon Maina 3. A women after milking in Chifra, Ethiopia - © FAO / Giulio Napolitano

# TABLE OF CONTENTS

TABLE OF CONTENTS.....	iii
LIST OF ABBREVIATIONS AND ACRONYMS.....	v
LIST OF TABLES.....	vi
LIST OF FIGURES.....	vi
EXECUTIVE SUMMARY .....	vii
1. INTRODUCTION.....	1
2. Socio-economic Context of the Meat and Milk Value Chains .....	2
2.1 Socio-economic context of the meat and milk value chains .....	2
2.2 Contribution of meat and milk value chains to the national GDP and its trend.....	3
2.3 Contribution to house-hold income, wellbeing, employment.....	3
2.4 Proportion of population engaged in meat and milk value chains.....	4
2.5 The main objectives of producing meat and milk .....	4
3. DESCRIPTION AND MAPPING OF THE MEAT AND MILK VALUE CHAINS .....	5
3.1 The structure of the meat and milk value chains.....	5
Figure 1 b: Structure of the milk value chain .....	6
3.2 Physical flows of meat and milk among the different components (actors).....	6
3.3 Primary production process.....	7
3.3.1 Prevailing livestock farming or other animal production systems .....	7
3.3.2 Average farm size .....	7
3.3.3 Yield per unit per species of animal and milk production per day and per lactation.....	9
3.3.4 Meat and milk post-harvest losses (2009 production aggregates).....	10
3.4 Inputs and factors for primary production .....	10
3.4.1 Type and quantity of input required .....	11
3.4.2 Purchase prices of input per type.....	12
3.4.3 Seasonality in prices and quantities of the main inputs .....	12
3.5 Transportation costs of inputs from various locations .....	12
3.6 Processing stages up to the final commodity .....	12
3.7 Various by-products and/or joint products.....	12
3.8 Geographical location of the different components (agents).....	12
3.9 Amount of land and other natural resources allocated to the meat and milk value chains .....	13
3.10 Competition over the utilization of land or other natural resources .....	13
3.11 Impact of the meat and milk value chains on environment.....	13
3.12 Production and value addition potential .....	13
3.13 Current and potential (future) domestic demand of meat and milk.....	14
3.14 Current and potential (future) foreign demand of meat and milk.....	14
3.15 Specific features of products, including product differentiation.....	14
3.16 The products capacity to fulfill international requirements (sanitary and other standards) .....	14
3.17 Urban rural relationships.....	15
3.18 Synergies with other activities.....	15
3.19 Role in local production systems.....	15
4. INFRASTRUCTURE AND OTHER SUPPORT SERVICES.....	16

4.1 Transport.....	16
4.1.1 Meat transport .....	16
4.1.2 Milk transport.....	16
4.2 Packaging and stocking costs of output.....	17
4.3 Extension and technical support.....	18
5. MARKETING, TRADE AND PRICES .....	19
5.1 Meat marketing, trade and prices .....	19
5.2 Milk marketing, trade and prices.....	19
6. GOVERNANCE AND INSTITUTIONAL ARRANGEMENT.....	21
6.1 The organization and interactions among the different value chain actors .....	21
6.2 Existence of association/cooperatives and their strength.....	21
6.3 Some producers and processors in the milk value chain.....	21
7. PROJECTS FROM WHICH THE VALUE CHAIN BENEFITS .....	22
7.1 Agricultural Transformation Agenda.....	22
7.2 Friesland Capina WAMCO dairy development program .....	23
7.3 Nigerian Dairy Enterprise Initiative: USAID Grant EDH-G-00-03-00017-00 .....	23
7.4 Federation of Rural Dairy Cooperative Associations in Kaduna State, Nigeria.....	23
7.5 Sheep and goat multiplication centre.....	23
7.6 Research and training.....	24
8. POLICIES AND STRATEGIES .....	25
8.1 Natural resource policies.....	25
8.2 Incentives or disincentives to producers and consumers .....	25
8.3 Credit policies .....	25
8.4 Acts, regulations and laws governing the value chain .....	25
8.5 Suggested policies for smooth operation of meat and milk value chains.....	26
9. CONSTRAINTS AFFECTING MEAT AND MILK VALUE CHAINS AND PROPOSED SOLUTIONS.....	27
9.1 Constraints.....	29
9.2 Proposed solutions.....	30
9.3 Prioritized areas of interventions.....	31
10.SUGGESTED PROJECTS AND PROGRAMMES (INVESTMENT PLANS) .....	32
11.CONCLUSIONS.....	34
12.REFERENCES.....	35

## **LIST OF ABBREVIATIONS AND ACRONYMS**

ATA	Agricultural Transformation Agenda
BOI	Bank of Industry
CBN	Central Bank of Nigeria
CPC	Consumer Protection Council
EEG	Export Expansion Grant
FAO	Food and Agriculture Organization
FAOSTAT	FAO Statistics
FCT	Federal Capital Territory
FDL	Federal Department of Livestock
FMARD	Federal Ministry of Agriculture and Rural Development
GES	Growth Enhancement Support
ILCA	International Livestock Center for Africa
ILRI	International Livestock Research Institute
KFMPCAL	The Kaduna Federation of Milk Producers Cooperative Association Ltd
LIBC	Livestock Investigation and Breeding Center
MILCOPAL	Milk Cooperative Associations Ltd
NAERLS	National Agricultural Extension and Research Liaison Services
NAFDAC	National Agency for Food and Drug Administration and Control
NAPRI	National Animal Production Research Institute
NAQS	National Agric. Plant Quarantine Services
NBC	National Bureau of Statistics
NCA	National Council on Agriculture
NIRSAL	Nigeria Incentive-Based Risk Management System for Agricultural Lending
NEPC	Nigerian Export Promotion Council
NIAS	Nigerian Institute of Animal Science
NVRI	National Veterinary Research Institute
ONBS	Open Nucleus Breeding System
PPR	Peste des Petit Ruminants
SON	Standards Organization of Nigeria
SOP	Standard Operating Procedure
WAD	West African Dwarf
FCW	Friesland Campina WAMCO

## LIST OF TABLES

Table 1: Macro Economic Indicators (2006-2010) .....	2
Table 2: Estimated numbers of sheep and goats Slaughtered .....	3
Table 3: Population engaged in meat and milk value chains (Number) .....	3
Table 4: Prevailing Livestock Farming or Other Animal Production Systems .....	8
Table 5: Average farm size .....	9
Table 6: Cost and economics of a 10 bull fattening model unit (Naira).....	9
Table 7: Milk post-harvest losses 2009 production aggregates .....	10
Table 8: Project Cost.....	10
Table 9: Production economic parameters for fattening operations .....	11
Table 10: Purchase prices of inputs per type for feeding schedule .....	12
Table 11: Operational conditions of KFMPCAL vehicles and machineries .....	17
Table 12: Milk Collection Monthly Trade Projections and Budgetary Provisions.....	17
Table 13: Livestock production and trade.....	20
Table 14: Cost of projects/programs and Proposed budget to initiate a baseline National livestock programme.....	31

## LIST OF FIGURES

Figure 1: Structure of the beef value chain.....	5
Figure 2: Core functions of the beef value chain .....	6
Figure 3: Stakeholders in the meat and milk value chains.....	15
Figure 4: Proposed administrative setup for the dairy development programme .....	18



## **EXECUTIVE SUMMARY**

The Nigerian Government under its present Economic Transformation Agenda has refocused its priorities on five core sectors among which the foremost is agriculture. To implement the long term economic blueprint (Vision 20: 2020), the National Planning Commission (NPC) developed a New Medium-Term Plan (MTP) for the period 2010 - 2013; whilst the Federal Ministry of Agriculture in a participatory manner developed the National Agricultural Sector Strategy (NASS) and a five point agricultural agenda which is largely consistent with the four Comprehensive African Agricultural Development Plan (CAADP) pillars which are: land water management, rural infrastructure and trade-related capacities for market access, increasing food supply and reducing hunger and agricultural research, technology dissemination and adoption.

The key programmes of the five -point agriculture agenda are: developing agricultural policy and regulatory systems, food systems network, rural sector enhancement programme, agricultural commodity exchange market, raising agriculture income and sustainable environment, maximizing agricultural revenue in key enterprises, and water, aquaculture and environmental resource management.

The strategic thrust of the Government aims to make Nigeria one of the 20 most advanced economies by 2020 and highlights the primary role of agriculture as the engine of growth and poverty reduction. The proposed intervention is in consonance with Government's policy to address every component of the entire agricultural value chain for crops, livestock (including poultry) and fisheries. This is a vision to re-engineer Nigeria's dairy sector, transforming it to one of the most locally competitive sectors with a possibility of becoming an exporting sector in the long run. It envisions the dairy sector to serve as an "engine of economic growth" for the country and to take the responsibility to "drive the development the socio-economic landscape of rural Nigeria".

### **Objectives of the livestock, Meat and Milk Value Chain Report**

The objective of this report is to review the livestock/meat and milk value chains and the policies influencing them. Specifically, the study addresses the following topics: current status of livestock/meat and milk value chains, an inventory of current policies on livestock/meat and milk value chains to identify gaps, projects and programs for the development/enhancement of livestock/meat and milk value chain, priority investment plans for each value chain,. Policies facilitating the development or enhancement of livestock/meat and milk value chains and mechanism of embedding them in national key policy documents. Moreover, thematic strategies both at the policy level for the government, and at the implementation level for farmers.

The essence of the livestock, meat and milk value chain report revolves around five major issues: a) The data project and rationale of the informal dairy sector reforms; b) Government Policy support for the sector (through supporting laws and supportive policies for Tax, Tariff and trade); c) Linking the farmer to the market mechanism by utilizing expertise of the industry and leveraging the farmer, and d) proposing commercial dairy development projects as practical solutions for injecting funding and technical capacity into the dairy sector in order to enhance the capabilities of pastoralists and other livestock farmers to a level where they can meet the challenges of the livestock feeding and

the potential dairy market markets. This will enable farmers to successfully sustain themselves as private entrepreneurs in the "Federal Government Transformation Agenda". The benefit will initially be for the local Nigerian market and in long term, the possibility of developing linkages with other markets in other regions will be explored.

#### Economic Benefits

Nigeria is a potential market for 1.3 million tonnes of milk valued at about N450 billion annually (CBN 2010). Of the estimated total domestic fluid milk production in 2006 for example, only about 600 000 litres (worth about N232.5 million) passed through the formal marketing channels via corporate commercial dairy farms and other private milk collection co-operatives schemes, or public channels from migrant herdsman. The rest was either consumed by the producing families or traded informally within the producing communities. Imported milk powder and other processed dairy products were estimated at \$275 million in 2006. Industry sources also estimate Nigeria's national herd at 14 million heads (including approximately 900 000 milking cows).

Average yield from the traditional system is 0.7 – 1.5 litres of fluid milk per day. During the dry season, this figure drops to about 0.5 litres /day, but with supplementation using cotton seed cake, could increase to go up to between 1.5 to 2.0 litres/day (Annatte 2010). A further increase of up to 4 litres/day have been reported with improved management and appropriate selection. The "White Fulani" or "Bunadji" breeds are the dominant dairy breed. The pastoralists own and maintain the majority of the cattle which are fed on natural grass under the traditional system with little supplementary feeding regimes in some places. Migrant pastorals move flocks over months and many miles to find pasture during the dry season, and this system often results in weight losses, low yields and high morbidity rates. A few commercial livestock farms maintain crossbreeds of Holstein Friesians, Brown Swiss and Monbeliard for milk production and reported average yield varies from 8 to 18 litres /day compared to only 4 litres/day from local breeds. Foundation stocks for the commercial farms are mostly imported from South Africa, Europe, Australia, and average yield of pure breeds under commercial management conditions could be as high as 30 litres/day.

Currently, most of Nigeria's dairy processors import milk powder which is reconstituted to liquid milk and processed into other dairy products such as yoghurt, ice cream and confectioneries. Others repackage imported powdered milk into small affordable sachets. Imported milk powder and dairy products come from New Zealand, Australia, South America, the EU, India, Ukraine, Poland, and other smaller suppliers Multi-national firms including Friesland Foods (Netherlands), Glanbia (Ireland), Cussons-PZ (UK), Promasidor, etc.; have either partnered with or acquired Nigerian owned dairy firms for re-constituting and/or packaging imported milk powder.

This report finally concludes that the livestock/meat and milk value chain reform is an opportunity to deliver change and modernization to the meat and dairy industry, and therefore unlock the very great potential of the livestock industry of Nigeria.

## I. INTRODUCTION

The livestock sub-sector is an important and integral component of Nigeria's agriculture and is a major source of household wealth and food security. Cattle are the single most important livestock species in terms of outputs and capital value. While sheep, goats, pigs and poultry are raised throughout the country, cattle are largely concentrated in the dry savannah parts of the country including areas that are not tsetse fly free. Large herds of cattle are predominantly managed by semi-sedentary agro-pastoralists and the transhumant pastoralists who hold about 95 per cent of the national cattle population. A large proportion of the national livestock resource is managed under the smallholder production systems, with poultry, sheep and goats owned and raised virtually by every rural household, resulting in a minimal availability of livestock products nationwide.

The livestock sub-sector contributed about 19 per cent of the agricultural GDP in 2007 (CAADP, 2008). Nigeria is one of the four leading livestock producers in Sub-Saharan Africa. In 2007, Nigeria's national livestock population was estimated to consist of 16 million cattle, 52.5 million goats, 33 million sheep, 6.6 million pigs, 19,000 camels and 166 million chickens (FAO, 2009). The national cattle herd population increased at an average rate of 1.4% annually between 1997 and 2007. The low national herd growth rate is supplemented by the importation of live cattle from the neighboring countries through transhumance trading. Ruminant animal production plays important economic roles through the provision of milk, draught power, manure, meat and hides employment and income, and profitable forms of livelihoods for rural and peri-urban dwellers. For example, the use of draught animal power not only increases cultivated areas, but also increases productivity, leading to an increase in available crop residues for ruminant animal feeding, household income and the national gross domestic product.

There has been an increasing demand for beef and milk, the main sources of domestic animal protein in Nigeria, and this has resulted in a domestic supply gap owing to poor production and productivity levels of the indigenous production systems. The current economic situation in Nigeria indicates that domestic supply of animal protein is growing at 1.8% per annum while the overall demand is estimated to be rising at 5.1% annually. In spite of its importance and the existence of an unsatisfied internal demand for livestock products, the livestock sub sector has suffered from inadequate investment by both the public and the private sectors. Although there is limited formal importation of beef into Nigeria, the national supply gap is mainly filled in by the live animals coming in from the neighboring countries. According to the central bank of Nigeria report of 2010 (Bullion 2010), the increasing consumption trends have cost the government a substantial amount of foreign exchange to import dairy products into Nigeria.

## 2. SOCIO-ECONOMIC CONTEXT OF THE MEAT AND MILK VALUE CHAINS

### 2.1 Socio-economic context of the meat and milk value chains

Nigeria is the largest market in sub-Saharan Africa with a population of more than 167 million people, and a population growth rate estimated at three percent annually (NBS 2012). Agriculture accounts for 33 percent of GDP and provides employment, both formal and informal, to more than 60% of the population. However crop production dominates the agricultural sector and accounts for about 85 percent of agricultural activities, with livestock and poultry accounting for 10 percent, and fisheries and forestry, less than one percent. Recent trend of the GDP and some economic indicators from 2006 to 2010 are shown in table 1.

Table 1: Macro Economic Indicators (2006-2010)

Indicators	2006	2007	2008	2009	2010
Nigeria's Total External Reserves(US\$ Million)	42 298.11	51 333.15	53 000.36	42 470.00	32 339.25
Non-Oil Production level at constant Prices	465 628.04	509 965.98	555 607.99	601 855.97	652 567.83 *
Oil Production level at constant Prices	130 193.57	124 285.12	116 594.57	117 121.37	122 957.88 *
Inflation rate (Year-on-change percent)	8.50	6.60	15.10	13.90	12.70
GDP level at 1990 Constant Prices	595 821.61	634 251.10	672 202.55	718 977.33	775 525.71 *
GDP Growth at 1990 Constant Prices (percent)	6.03	6.45	5.98	6.96	7.87*
Oil Sector Growth (percent)	-4.51	-4.54	-6.19	0.45	4.98*
Non-Oil Sector Growth (percent)	9.41	9.52	8.95	8.32	8.43*
Private Final Consumption ( percent) of GDP)	60.34	74.89	63.88	74.36	59.46*
Government Final Consumption( percent of GDP)	6.86	12.46	12.71	12.74	14.46*
Projected Population Figure(Million)	140.43	144.50	148.69	153.42	159.29
Gross Fixed Capital Formation(percent of GDP)	8.27	9.24	8.31	12.49	13.59*
Change in Stock (percent of GDP)	0.01	0.01	0.01	0.01	0.01*
Exports of Goods and Services (percent of GDP)	45.96	33.73	39.88	30.79	45.57*
Imports of Goods and Services ( percent of GDP)	21.44	30.32	24.79	30.38	33.08*

Source: National Bureau of Statistics \* Provisional Estimates

## 2.2 Contribution of meat and milk value chains to the national GDP and its trend

Livestock production systems in Nigeria vary by region and agro-ecological zones. Ruminant (cattle, sheep and goats) production is dominated by the transhumant *Fulani* nomads based in the northern parts of the country. In the northern part of Nigeria, where there is tradition of milk consumption, an average of 50 litres per capita per year is consumed, compared to a national average of 20 to 25 litres per capita per year. This is four times below the minimum quantity recommended by the World Health Organization (WHO) and between 20 and 25 times less than the European average (Annatte 2010). Imported products represent more than 90% of the milk consumed in Nigerian cities, and this figure rarely drops below 75% (Land O'Lakes, 2007). The dependence on imported milk has become a classical vicious circle, and getting out of it has become urgent.

## 2.3 Contribution to house-hold income, wellbeing, employment

Table 2 shows the estimated number of small ruminants slaughtered as an indicator of the contribution of livestock to household income.

Table 2: Estimated numbers of sheep and goats Slaughtered

Slaughter Profile Small Ruminants	Sheep	Goat	Total
Sallah Festival	6 900 000	1 200 000	8 100 000
Formal Slaughter by Butchers	5 200 000	14 300 000	19 500 000

Table 3: Population engaged in meat and milk value chains (Number)

Value chain	Formal Job Sector	Informal Job Sector	Total
Dairy Farming	500 000	2 050 000	2 550 000
Pastoral Farming	20 000	2 000 500	2 020 500
Procurement & Processing	15 000	30 000	45 000
Transportation	1 500	12 600	14 100
Sales and Distribution	9 500	180 000	189, 500
Allied Industries	2 400	160 000	162 400
Meat trade	43 850	343 850	387 700
Village Level Entrepreneurs	87 700	870 000	957 700
Total Employment	679 950	5 646 950	6 326 900

The Nigerian dairy market had total revenues of \$1.4 billion in 2011, representing a compound annual growth rate of 7.2% between 2007 and 2011. Growth rate for Market consumption volumes increased by 4.6% between 2007- 2011, to reach a total consumption of 545.3 million kg in 2011. Market performance was forecast to fall with an anticipated growth rate of 4.4% for the five-year period 2011 - 2016, which is expected to drive the market to a value of \$1.7 billion by the end of 2016.

## **2.4 Proportion of population engaged in meat and milk value chains**

Agriculture accounts for 33 percent of GDP and provides employment, both formal and informal, to more than 60% of the population. However crop production dominates the agricultural sector and accounts for about 85 percent of agricultural activities, with livestock and poultry accounting for 10 percent, and fisheries and forestry, less than one percent.

## **2.5 The main objectives of producing meat and milk**

The overall national goal is to develop the domestic meat and dairy value chains to satisfy domestic demand and reduce the nation's dependence on imported milk products. It is also aimed at improving livelihoods of pastoralists and small-holder livestock producers through organized meat and dairy value chain development models. The Nigerian livestock/meat and milk value chain program aims to address some key factors inhibiting the development of the industry in Nigeria such as: poorly organized group based business cooperatives, low farm level production and productivity, low level of value adding activities

Specifically the goal of the beef transformation agenda is to provide adequate supply of quality meat for the domestic market and develop the potential towards export. The specific objectives are to:

- increase the amount of beef going into the national meat market by 650 000 metric tonnes annually by 2015.
- raise the national average slaughter weight of cattle from 250 to 350 kg
- increase the national herd growth rate from 1.4 to 3.3 percent
- provide commercially viable partnership between livestock producers and markets along the value chain.
- improve the production system along commercial and business operations
- establish a national livestock breeding policy that promotes technology adoption for faster growth of the industry.
- establish a national meat development and marketing corporation for the long term sustenance and growth of the industry.

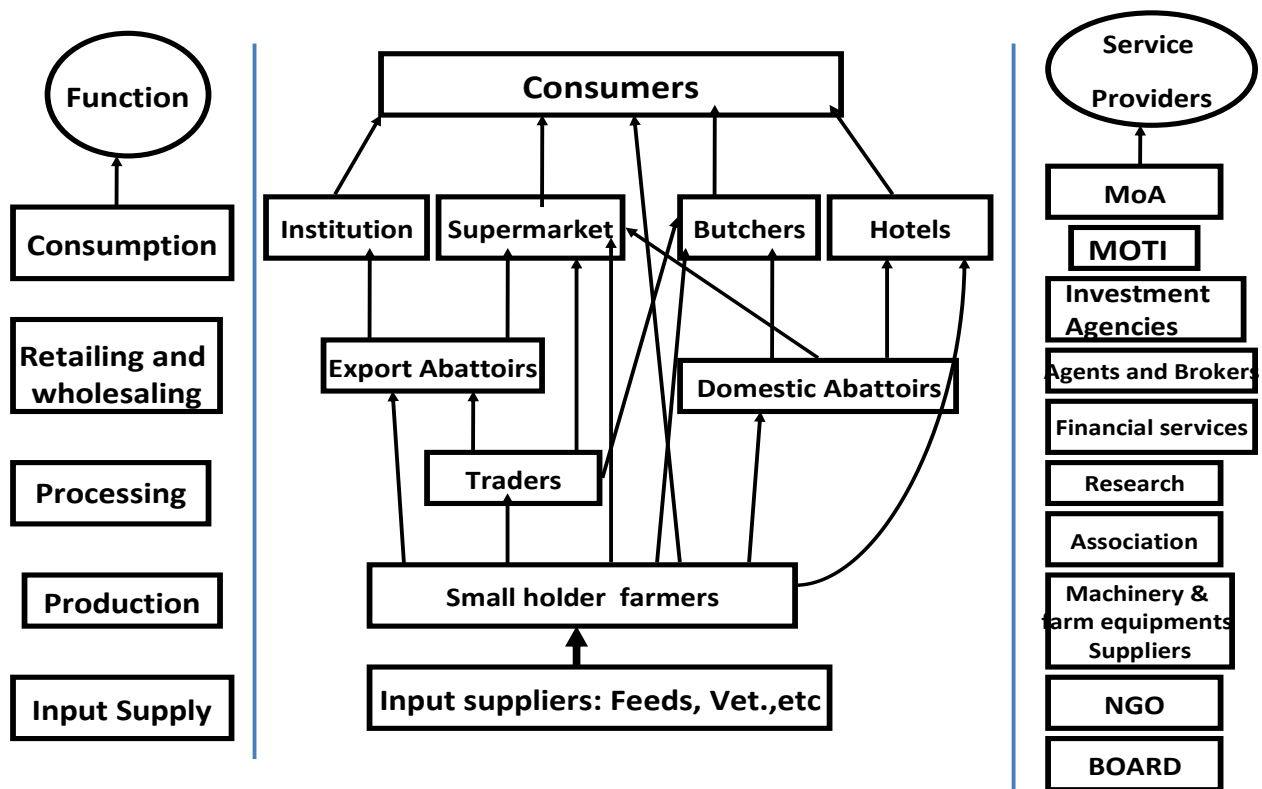
### 3. DESCRIPTION AND MAPPING OF THE MEAT AND MILK VALUE CHAINS

The livestock value chain can be defined as the full range of activities required to bring a product (e.g. live animals, meat, milk, eggs, leather, fiber, manure) to final consumers passing through the different phases of production, processing and delivery. A key objective is to ensure that poor rural people have better access to – and the skills and organization to take advantage of – transparent and competitive markets. Within this framework, expanding the capacity for livestock production and its marketing outlets is a potent catalyst for rural poverty reduction.

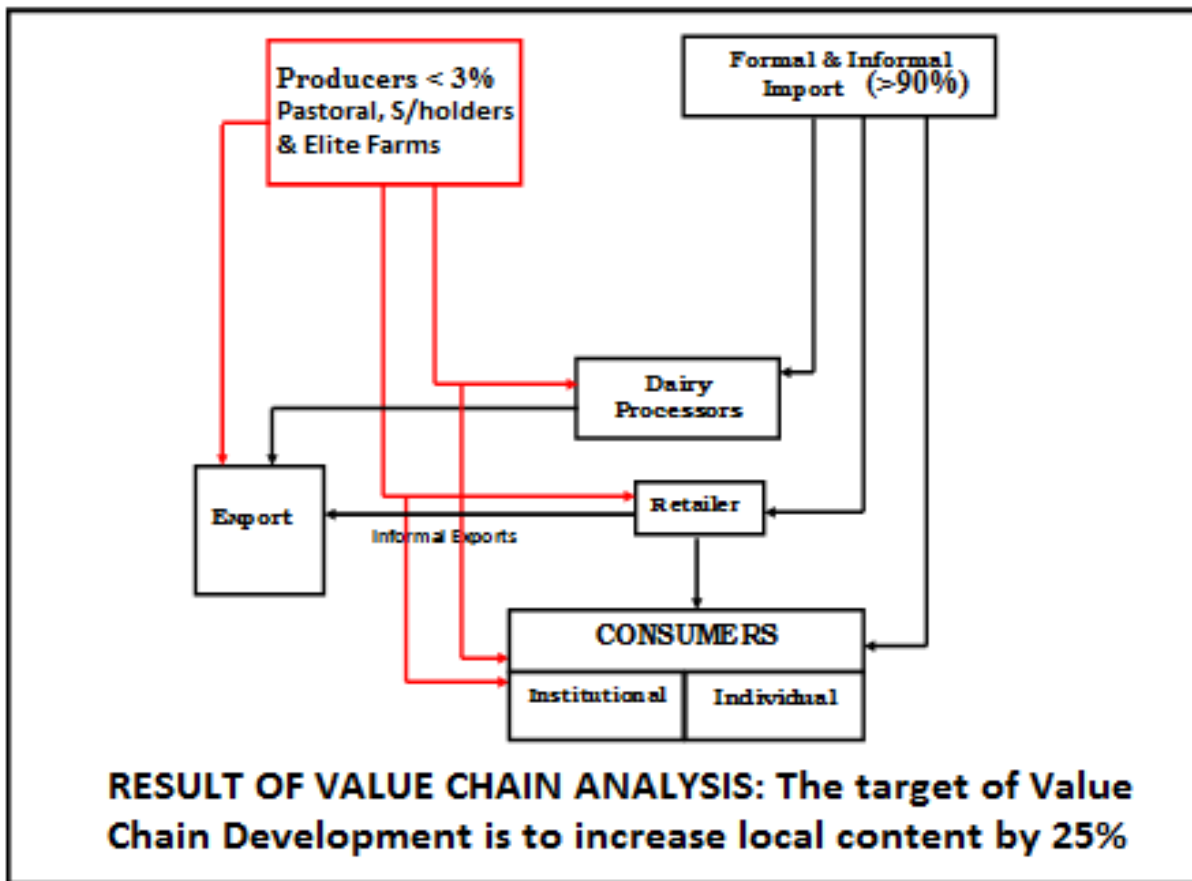
#### 3.1 The structure of the meat and milk value chains

Figure 1 a and b below show the various actors in the meat and milk value chains

Figure 1 a: Structure of the beef value chain



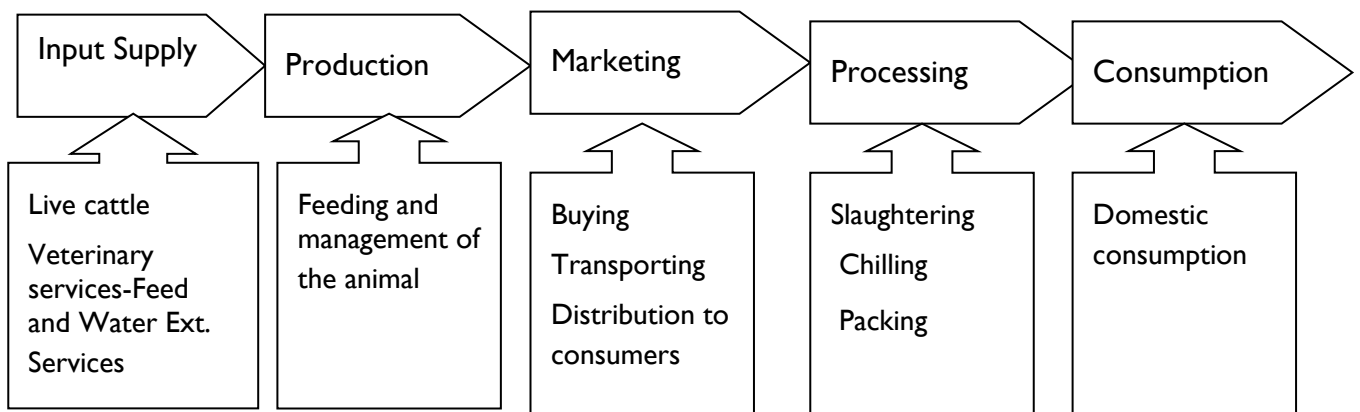
**Figure 1 b: Structure of the milk value chain**



### 3.2 Physical flows of meat and milk among the different components (actors)

The core functions in a beef value chain are inputs supply, production, trade (marketing), processing and consumption. These core functions involve different activities as indicated in figure 2 which provides details of the various activities performed.

Figure 2: Core functions of the beef value chain





### **3.3 Primary production process**

This includes:

#### Supply of inputs/services

- Supply of feeder animals
- Feed supply
- Credit services
- Animal health services

#### Production:

Production in the beef value chain consists of feeding the animal for live weight gains and involves various husbandry practices to fatten the animal for the next core function in the value chain, i.e. marketing. Thus, it includes feeding the animal, watering, provision of veterinary services and housing the animal for better production of the required live weight gain.

#### Marketing

#### Processing

#### **3.3.1 Prevailing livestock farming or other animal production systems**

In Nigeria, livestock is produced under two major production systems: the sedentary mixed farming production system and the nomadic pastoral or agro-pastoral production system. In both systems women play a significant role in livestock production. Table 4 below shows the summary of the prevailing livestock farming systems and other major production systems in Nigeria

#### **3.3.2 Average farm size**

In addition to the pastoral support extension activities, there are 8 dairy farm models (sizes) that are recommended to be promoted. These are farm based on the size of cows (5-cow model); dairy farm (10-cow model); dairy farm (18-cow model); dairy farm (25-cow model); dairy farm (30-cow model); environmentally controlled dairy farm (50-cow model); dairy farm (100-cow model); dairy farm (200-cow model); dairy pastoral (pastoral milk collection activity models of WAMCO and MILCOPAL). Only the 5-cow model and the bull fattening scheme and the rural dairy support scheme are discussed here in more details. The Average farm size and type of activities is presented in Table 5 below.

Table 4: Prevailing Livestock Farming or Other Animal Production Systems (Source: MILCOPAL Survey 2004)

<b>Characteristics of Prod. Systems</b>	<b>Pastoralism</b>	<b>Agro-pastoralism</b>	<b>Mixed farming</b>	<b>Intensive Dairy Farming</b>	<b>Peri-Urban systems</b>
Farm priority	Milk prod. /livestock Number	Subsistence, milk/milk prod./drought	Drought, soil fertility, milk/meat prod.	Sales of milk	Sales of milk
Farmer's attitude	Risk aversion	Risk aversion	Spread of risk, integration	Cash income	Cash income
Species	Camel, sheep, goat, cattle	Cattle, sheep, goat	Cattle	Cattle	Cattle
Feed Resources	Communal grazing	Communal grazing, crop residues	Crop residues, cultivated fodder, communal grazing	Cultivated fodder, purchased concentrate	Purchased roughage, concentrate
Farmer's mobility	Mobile	Sedentary	Sedentary	Sedentary absent	Sedentary
Type of enterprise	Extended family	Small holder, extended family	Small holder	Small holder, communal farm parastatals	Small holder, commercial farm
Surplus milk Yield/cow/day (Kg) Surplus/farm/day (Kg) Land area/animal/ha	Seasonal 0.5-1 1-5 5-10	Seasonal 0.5 1-5 2-5	Mainly Seasonal 1-5 2-5 0.5-2	Continuous 5-15 5-15(small holder) 0.5	Continuous 5-15 5-30(small holder) 0-0.5
Input use	Vet. Services (vaccination)	Vet. Services (vaccination)	Vet services, feeds, minerals, extension, credits	Concentrates, breeding, credits, extension services, training, vet. Services	Conc. Purchased roughage, breeding services, credit, extension services, training, vet. Services.
Main constraints	Land, animal nutrition., animal health, low milk density	Land, animal nutrition, animal health, low milk density	Anim. Nutrition., infrastructure, marketing, knowledge of crop/ livestock. Integration	Anim. Nutrition, genetic potentials, breeding, infrastructure marketing. Extension services	Anim. Nutrition., genetic potentials, breeding, infrastructure/ marketing. Extension services
Potential for commercialization	No/ very limited	No/limited	Yes	Yes	Yes

Table 5: Average farm size and type of activities

	Model	Average Farm size Activity	No	Unit cost (000 Naira)	Capital Cost (000 Naira)
1	2-cow model	Rearing of single female calf wherever two animals	500	337 391.60	169
2	5-cow model	calf rearing as a separate activity with 5 female calves	500	326 508.00	164
3	10-cow model	Calf rearing as a separate activity with 1 female calf	5 000	522 412.80	2 620
4	10 bull Fattening model	Fattening bulls calves as a separate activity with 10 male Bunadji calves	5 000	236 718.30	1 184
<b>TOTAL</b>			<b>11 000</b>	<b>-</b>	<b>4 137</b>

### 3.3.3 Yield per unit per species of animal and milk production per day and per lactation

The average Nigerian cow weighs only 250 kg at slaughter compare to 450 kg average slaughter weight in Brazil and more in the US and Australia. Moreover, in most countries, the bulk of the industry's value comes from value addition after slaughter with only 20 percent occurring before slaughter. Nigeria, in contrast, produces few value added products (i.e. processed and packaged beef). Examples are provided in table 6

Table 6: Cost and economics of a 10 bull fattening model unit (Naira)

<b>A. Project Cost</b>	<b>Naira</b>
Cost of heifer including transportation cost	330 000
Cost of construction of shed for adult animals	60 000
Cost of construction of shed for calves	20 000
Cost of chaff cutter	50 000
Cost of equipment	10 000
Capital cost	470 000
Cost of concentrate feed for first batch for first month	4 800
Cost of fodder cultivation on 2 acres	9 000
Insurance of first batch of milk cows	16 000
Recurring cost	29 800
Total cost	499 800
Total cost rounded to	500 000
Margin (15%)	75 000
Bank loan	425 000

### 3.3.4 Meat and milk post-harvest losses (2009 production aggregates)

Data on meat post-harvest losses were not available. Milk post-harvest losses are presented in Table 7 below.

Table 7: Milk post-harvest losses 2009 production aggregates

Parameters	Values
Milk Produced	1 830 000 kg
Milk Marketed	1 445 700 kg
Milk Lost	384 300 kg
Percentage	21 percent

### 3.4 Inputs and factors for primary production

Table 8: Project Cost

<b>A. Project Cost</b>	<b>₦</b>
Cost of Heifer animals including transportation cost	330 000
Cost of construction of shed for adult animals	60 000
Cost of construction of shed for calves	20 000
Cost of chaff cutter	50 000
Cost of equipment	10 000
Capital cost	470 000
Cost of concentrate feed for first batch for first month	4 800
Cost of fodder cultivation in 2 acres	9 000
Insurance of first batch of heifer animals	16 000
Recurring cost	29 800
Total cost	499 800
or rounded to	500 000
Margin (15%)	75 000
Bank loan	425 000

### 3.4.1 Type and quantity of input required

Table 9: Production economic parameters for fattening operations

<b>B. Production economic parameters</b>	
Type of animal	Fattening Bulls
No. of animals	10
Cost of animal (N/animal)	32 000
Transportation cost/animal	1 000
Average milk yield (litre/day)	8
Floor space (square feet) per adult animal	60
Floor space (square feet) per calf	20
Cost of construction per square feet (N)	100
Cost of chaff cutter (power operated) (N)	50 000
Cost of equipment per animal (N)	1 000
Cost of fodder cultivation (N/acre/season)	4 500
Insurance premium (% per annum)	5
Veterinary aid/animal/ year (N)	250
Cost of concentrate feed (N/kg)	8
Cost of dry fodder (N/kg)	1.50
No. of labourers	1
Salary of labourer per month (N)	3 000
Cost of electricity and water/animal/year (N)	150
Margin (%)	15
Rate of interest (%)	12
Repayment period (years)	7
Selling price of milk/litre (N/kg)	16.50
Sale price of gunny bags (N/bag)	10
Lactation days	270
Dry days	150

- Freshly calved animals in 1st or 2nd lactation are purchased in two batches of five animals each at an interval of 5 to 6 months.
- Cost of rearing calves not considered as it will be nullified by their sale value or retention value.
- Fodder cultivation considered in two acres and working capital for one crop / season considered. Two crops considered per year.
- Manure utilized for fodder cultivation.

### 3.4.2 Purchase prices of input per type

Table 10: Purchase prices of inputs per type for feeding schedule

	Lactation			Dry	
	Price (N)	Qty. (kg)	Cost Per Day (N)	Qty. (kg)	Cost Per Day (N)
Concentrate feed	25.00	4	32.00	1	8.00
Green fodder	Home grown	25	0.00	20	0.00
Dry fodder	1.50	4	6.00	5	7.50
Total			38.00		<b>15.50</b>

### 3.4.3 Seasonality in prices and quantities of the main inputs

Data on seasonality changes in prices and quantity of main inputs were not available

### 3.5 Transportation costs of inputs from various locations

Animal haulage and transportation costs are usually built into the cost price of the inputs.

### 3.6 Processing stages up to the final commodity

- Inputs into production
- Livestock production
- Milk production, Quality control, collection, Bulking, Transport and processing
- Primary slaughter and processing
- Secondary meat processing
- Distribution, transport and trade
- Meat and milk retailing and catering
- Food promotion and labeling

### 3.7 Various by-products and/or joint products

The dairy market consists of retail sales of cheese, milk, soy products, spreadable fats and yogurt. Meat consist of fresh meat, Nigerian shish kebab(*Suya*), barbecued (*Balangu*), dried meat (*Kilishi*), shredded (*Dambunama*), meat pies and pastries, corned beef etc.

### 3.8 Geographical location of the different components (agents)

The “White Fulani” or “Bunadji” breeds are dominant. The local herdsmen (mostly in the dry northern Nigeria) own and maintain the majority of the cattle and the cattle are fed on natural grass

under the traditional system. Migrant pastorals move flocks over months and many miles to find pasture during the dry season, which often results in weight loss, low yields and sickness. Both milk and beef productions are relatively dispersed throughout the states on small and large farms. Most pastoral herds come into Nigeria across the borders, sell their animals and return home with their proceeds. In beef production, however, once the early phase of cattle rising is complete, the later stages—grazing and feedlot feeding—are concentrated in the sub humid and savannah belt. Different breeds are used in each state of the federation but the most predominant breeds are the Bunadji and are readily available in the market for such as milk production for dairy, or weight gain and marbling for beef.

### **3.9 Amount of land and other natural resources allocated to the meat and milk value chains**

No data is available on the exact figure of the amount of land and other natural resources that are available to the meat and milk value chain. But it is important to point out that Nigeria has well over 450 grazing reserves, some are gazette and some are not. There were recent efforts to invest in some of the model grazing reserve to increase their holding capacity.

### **3.10 Competition over the utilization of land or other natural resources**

Nigeria's development potential, although large, is constrained by rapid depletion and poor management of natural resources and environmental pollution coupled with environmental crisis between the crop farmers and the herders. Between 1980 and 1990, grazing land and forest area declined by 30 percent (NARP 1995; Suleiman, 1990). It is predicted that if loss of rangeland and grazing reserves continues at this rate without adequate reclamation through farm reorganization and integration of systems, Nigeria will be completely overgrazed within 25 years and there will be an increase in social conflicts over land resource use. According to the NARP report, uncontrolled expansion of farming into grazing reserves, forest zones and fragile range areas is taking place due to population and commercial pressures and inappropriate policies. This is adversely affecting the soil fertility, and is adding to the problem of soil erosion. Similarly, rapid expansion of irrigation, particularly in fadamas has resulted in lowering of water table where extraction exceeds potential recharges of ground water resources.

### **3.11 Impact of the meat and milk value chains on environment**

- Constant and widespread farmers-pastoralists conflicts
- Loss of rangeland and grazing reserves
- Overgrazing
- Poor land use management due to inappropriate production systems

### **3.12 Production and value addition potential**

Nigeria is a potential market for 1.3 million tonnes of milk valued at about N450 billion annually. Of the estimated total domestic fluid milk production in 2006 for example, only about 600 000 litres (worth about N232.5 million) passed through the formal marketing channels via

corporate commercial dairy farms and other private milk collection co-operatives schemes, or public channels from migrant herdsmen. The rest was either consumed by the producing families or traded informally within the producing communities.

### **3.13 Current and potential (future) domestic demand of meat and milk**

The Nigerian dairy sector currently meets less than 50% of domestic demand (600 000 tonnes, compared to a demand of 1,300,000 tonnes). Consumer demand for value-added dairy products (butter, cheese, ice cream, yoghurt and other milk beverages) is rising rapidly on the back of 'growing population, increasing urbanization, and rising per capita income'. According to USDA, outdated technologies, rising input costs and underlying competitiveness challenges mean that the local dairy sector is poorly placed to meet rising consumer demand.

### **3.14 Current and potential (future) foreign demand of meat and milk**

More efficient dairy processing by the multinational companies should provide U.S. and other international suppliers an advantage over current Nigerian local produce suppliers in exporting processed dairy products into the local markets. Though if the local production is improved, there is export potential for livestock, fodder and dairy-based food processing inputs which will likely increase if local infrastructure is improved and production/processing costs lowered.

### **3.15 Specific features of products, including product differentiation**

Anything sells in Nigeria as long as it is food of good quality and it is well packaged and made with specific target group in mind. But Nigeria needs to develop what we called 'Cluster Youth Dairy Development Programs'.

### **3.16 The products capacity to fulfill international requirements (sanitary and other standards)**

The detected Critical Control Points in the rural milk collection systems were the aspects of milk production, specifically the healthy cow selection at milking, milking of healthy animals and milking hygiene, milk procurement (sources, time of collection, distance travelled, quality control procedures, type of handling vessels, bulking (mixing of milk from different sources), mode of transport and prices paid); milk handling (time to re-sale, storage, method of cleaning, water source); milk sale (type of buyers, quantities sold, packaging, prices received); and hygiene of premises and personnel (Marshal 1992; Adesiyu *et al* 1995; ILRI, 2006; ILRI, 1999; and Jaffee, 1994).

The National Directorate of Food and Drug Administration and Control (NAFDAC) have has laid down strict guidelines for the monitoring of the milk and dairy products (Cheneau, 1993; ILRI, 1999; Das, 2002; ILRI, 2006). Samples are taken monthly to ensure adherence to these regulations and the Food and Drug Administration food safety program. The commissioned laboratory analyzes these



samples and reports their findings to the company. The laboratory's microbiologists are dedicated to providing quality testing. They maintain state certifications for milk and dairy testing and routinely perform proficiency testing to insure the public has safe dairy products.

### 3.17 Urban rural relationships

Growing population, increasing urbanization, and rising per capita income are expected to stimulate rising demand for dairy based products. Meanwhile, domestic production remains insufficient due to increasing production/processing costs, non-competitiveness of the industry, and the failure to incorporate more advanced technologies.

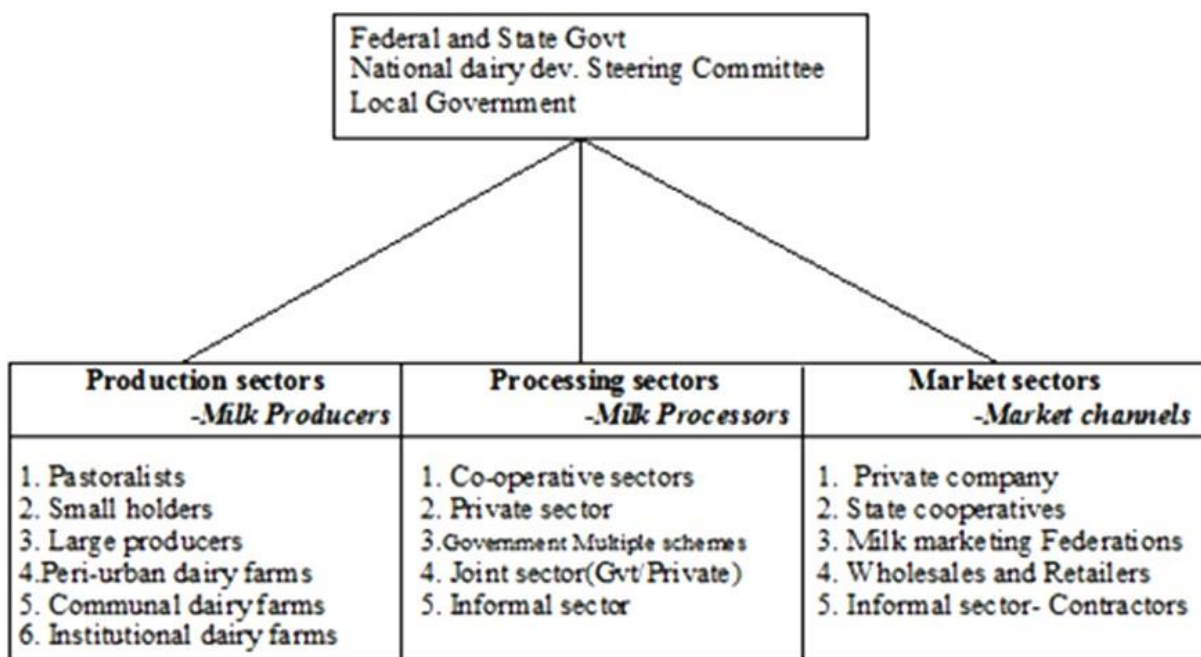
### 3.18 Synergies with other activities

Dairy and Beef value chains have a very high variability index with 10 agricultural commodities in Nigeria that are receiving the attention of the both the state and the federal government. These commodities are maize, rice, sorghum, wheat, sugar cane, ground nut, potato, cotton, cassava, oil-palm, poultry etc. The products and by-products from the servicing industry play important role in the livestock industry.

### 3.19 Role in local production systems

In redefining roles in local production we address the more general issue of changing and upgrading of clusters and local production systems. The major stakeholders and their role in Meat and milk value chain development are as presented in figure 3 below.

Figure 3: Stakeholders in the meat and milk value chains



## **4. INFRASTRUCTURE AND OTHER SUPPORT SERVICES**

### **4.1 Transport**

#### **4.1.1 Meat transport**

There are no known organized and structured transport arrangements for either livestock or fresh meat in the Nigerian local markets. The value chain is operated almost entirely by the private sector. The public sector used to contribute in the provision and management of abattoirs and livestock markets as well as meat inspection. In the recent time though the Federal Capital Territory Administration (FCTA) set conditions for haulage of meat in and around the Federal Capital City, Area Councils and Satellite towns. Under the new conditions, it banned the use of rickety vehicles and motorcycles, popularly known as Okada, for haulage of meat in Abuja as it rolled a new policy that on no account should haulage of meat be exposed in an untidy manner. Tricycle meat vans were to be used to convey meat to distances not more than 3 km from the slaughter points, while the four wheel meat vans would serve for meat haulage to longer distances. The specifications for acceptable vehicles required for meat transportation are solely dedicated special purpose-made tricycles with meat haulage compartments. "The internal coverings of the meat compartment of the vehicles are stainless steel sheets. The emphasis on stainless steel coverage is to ensure non-metal contamination of meat. This measure is in line with the NAFDAC standards. Other major players in the industry make adequate provision for meat haulage, cold chain and slaughter at relatively cheaper rate compared to the local processing conditions.

#### **4.1.2 Milk transport**

MILCOPAL (Nig.) Ltd is one of the existing dairy cooperative projects in Kaduna state, Nigeria. Table 11 shows the operational status of the vehicles purchased for the haulage of raw milk from the farm and distribution of the products. There are no data on the status of milk transport in the company. The bottom line of milk transport in the emerging cooperative arrangement is that farmer groups are not viable enough to maintain milk transport vans without heavy external support. There are currently three methods of milk transport in operation. Transport from farm to collection centres, bulk milk transport and milk can transportation.

The ideal and economically viable transport arrangement could be achieved if viable cooperative groups are formed and support sustainably. Milk cooled on the farm or cooling centre may be transported in milk cans or in bulk tankers. Bulk tankers are insulated, so the milk will remain cold until it reaches the plant (provided the transport is fast, i.e. short distance or good roads enabling milk to be delivered before the temperature of milk rises above 10° C). Alternatively, such milk may be carried in cans and transported in milk cans.

Table 11: Operational conditions of The Kaduna Federation of Milk Producers Cooperative Association Ltd (KFMPICAL) vehicles and machineries

S/no	Vehicles	Good	Bad	Total
1.	Refrigerated vans	4	6	10
2.	Pick-up van	1	1	2
3.	Nissan patrol	-	1	1
4.	Land cruiser	-	1	1
5.	Nissan UD	-	1	1
	Total	5	10	15

Source: MILCOPAL, 2004

## 4.2 Packaging and stocking costs of output

Data on the milk collection, processing, packaging and stocking cost for one month is presented in Table 12

Table 12: Milk Collection Monthly Trade Projections and Budgetary Provisions, an example from a company

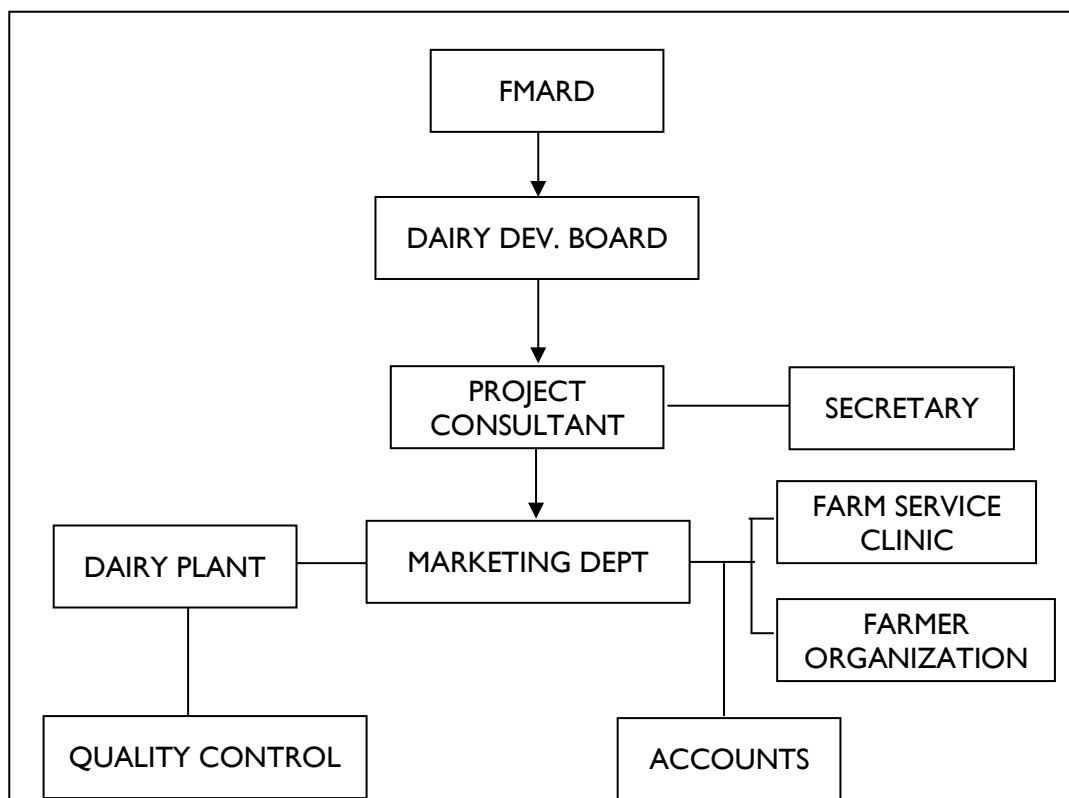
S/no	Budget items	Monthly Provisions
1.	Project Revenue	1,500,000.00
2.	Purchase of inputs	1,400,000.00
3.	<u>OVERHEAD EXPENSES</u>	120,000.00
	Salaries & Wages	15,000.00
	Electricity Bill	7,000.00
	Water Rates	45,000.00
	Diesel	15,000.00
	Quality control	
4.	<u>PROCUREMENT EXPENSES</u>	100,000.00
	Fuelling	80,000.00
	M/vehicle repairs	
5.	<u>MARKETING &amp; DISTRN EXPENSES</u>	80,000.00
	Fuelling	25,000.00
	M/vehicle Repairs	5,000.00
	Selling Expenses	
6.	<u>PLANT AND ADMIN EXPENSES</u>	50,000.00
	Fuelling	10,000.00
	M/vehicle repairs	150,000.00
	Plant maintenance	
7.	<u>GENERAL OVERHEAD EXPENSES</u>	20,000.00
	Taxation(vat)	30,000.00
	Office maintenance	20,000.00
	Staff welfare	3,000.00
	Stationeries	0.00
	Telephone charges	10,000.00
	Bank charges	
8.	Project Net earnings	100,000.00

Source: MILCOPAL, 2004

### 4.3 Extension and technical support

The current scenario of livestock/meat and milk value chains and the projected population growth in Nigeria needs dairy extension services to sustain development and meet perceived needs. Dairy extension services are very important for achieving productivity outcomes, and dairy extension can play a major role in improving production and efficiency of the dairy industry. The public and private sectors in the country need to work hand in hand, while extension professionals need to provide effective delivery of the services. Moreover, the dairy farmer needs to be more adoptive of the new practices and technologies in order to face the challenges of the increased demand. Profitability and productivity will not increase unless the dairy farmers in Nigeria adopt innovations and mechanization. The international community, governments and NGOs need to encourage investment in the dairy sector if it is to reach its potentials as a food provider for the Nigeria nation. In addition the duplications and infiltrations of dairy programs or projects across the country must also be considered in order to utilize the available limited funds properly and effectively. To achieve all these, the following structural reforms are required (figure 4).

Figure 4: Proposed administrative setup for the dairy development programme



### 4.4 Quality control and certification

- Quality control and certification can be achieved by:
- Strict compliance with Monitoring Norms / Testing Methods
- Preventing the high rates of adulteration. Also, unhygienic practices need to be regulated while premium for quality should be addressed
- Organizing Training programs for milk producers and personnel involved in the collection and transport and retail of milk.

## 5. MARKETING, TRADE AND PRICES

### 5.1 Meat marketing, trade and prices

The annual meat consumption per person is estimated to more than double in sub-Saharan Africa from 2000 to 2050, leading to a doubling of total meat consumption by 2050 (IFPRI, 2011). The FAO estimates that between 1997-99 and 2030, annual meat consumption in sub-Saharan Africa (excluding South Africa) will increase from 9.4 to 13.4 kg per person. Growth in human population, increasing incomes and changing consumer tastes are among the main drivers of this rise in demand for high-quality meat products in much of the developing world, a trend that is expected to continue. In Nigeria, the growing demand for high-quality meat products presents an opportunity for livestock producers to take advantage of the emerging markets for value-added meat products. However, several institutional barriers, such as unfavourable policies and poorly enforced regulations, limit the extent to which small-scale meat producers and market agents in the region can benefit from these opportunities.

The study examined consumers' perspectives on meat quality and safety and found that high-income consumers prefer to buy meat from upper-end markets like priority stores and supermarkets. They associate well packaged meat, clean premises and veterinary stamped-products with good quality and safety, and are indeed willing to pay a premium for these attributes. On the other hand, low-income consumers mostly purchase their meat products from local butcheries.

### 5.2 Milk marketing, trade and prices

#### Local Dairy Products

- Average farm gate price of raw fluid milk is ₦60 per litre.
- Average market price of pasteurized fresh milk is N150 per litre.
- Using locally available raw milk, Average profit on local dairy processing is 8% of production cost.

#### Imported dairy products costs and prices (Long term averages)

- Average FOB price of imported dairy products is \$2 000 per tonne.
- Average clearing costs including tariffs and port inspections charges and land haulage (to warehouse), \$415 per tonne.
- Average warehousing, processing and marketing/distribution costs, \$365 per ton.
- Average production cost, \$3 000 per tonne.
- Average selling price, \$3 450 per tonne.
- Average percentage profit on imported milk powder, processing/marketing is 15 percent per ton.

(Note: One 20-foot container holds an average of 17 tonnes of whole milk powder Imported whole milk powder is mostly loaded and sold in bags of 25 kg).

Live Cattle:

- Cost of imported Holstein Friesian and Brown Swiss breeds range from N434 000 (\$2 800) to N525 000 (\$3 500) per tonne (live weight).
- Import duty is twenty (20) per cent and tax/surcharges range between 5 and 10 per cent of cost.
- Average cost of local breeding stock is N100, 000 to N200 000 (\$650) per tonne (live weight).
- It costs about \$5 per day to feed a cow (breeds of imported Holstein Friesians, Brown Swiss and Montpellier) on quality local processed fodder.

Table 13: Livestock production and trade

Production (000 tonnes)	Meat		Meat	
	1995	2007	1995	2007
World	206 853	285 700	54 191	61 881
Developed. countries	99 572	110 250	30 774	29 398
Nigeria	847	1 108	267	287
Nigeria as percent of world	0.41	0.39	0.49	0.46
Nigeria as percent of Developed. countries	0.85	1.00	0.87	0.98
Trade in Livestock Products (million US\$)				
	Livestock imports		Livestock exports	
	1995	2006	1995	2006
World	73 972.5	117 599.4	74 264.9	120 258.7
Dev. countries	58 780.6	90 760.6	65 181.8	98 939.1
Nigeria	277.2	323	0.1	0
Nigeria as percent of world	0.37	0.27	0.00	0.00
Nigeria as percent of Dev. Countries	0.47	0.36	0.00	0.00
Meat consumption kg/person/year				
	1995	2005		
World	35.7	41.2		
Dev. countries	77.3	82.1		
Nigeria	7.8	7.5		

## **6. GOVERNANCE AND INSTITUTIONAL ARRANGEMENT**

### **6.1 The organization and interactions among the different value chain actors**

Small-scale producers are responsible for the production of over 90% of the food produced in Nigeria (FMARD, 2008). The implications of this for development agencies are that technologies that have been developed for intensive large-scale agricultural production cannot be adopted by a clear majority of farmers in Nigeria. The situation is even more critical in the case of livestock production. The peculiarities of producers dominated by nomads, pastoralist, peri-urban producers, mixed farming predominate create enormous challenges for the adoption of these intensive large scale production systems.

Livestock production in Nigeria remains subsistent with limited market-orientation and poor institutional support. Market driven production requires re-orientation of the actors within the production systems and responsive institutional support services for extension, research, input supply, rural finance and marketing. Governments have been the main supplier of major inputs. Limited credit facilities to support livestock development have been provided by microfinance institutions, small-scale micro enterprises and NGOs. Knowledge of sustainable animal production systems is increasing as a result of the works of scientists and technocrats with farmers and herder. If the exposure is sustained, science and practice can mutually benefit from their cooperation and provide consumers with validated choice of sustainable animal products.

### **6.2 Existence of association/cooperatives and their strength**

The “Miyetti” Allah Cattle Breeders Association of Nigeria is one of the most prominent and active farmers’ organizations championing the course of the pastoralists in Nigeria. The association is not only strong but it also has full recognition of regional governments in the West African sub-region. However, the cultural and social activities of the association far out- weigh its economic activities.

### **6.3 Some producers and processors in the milk value chain**

There is a paucity of data on the number of NGOs supporting the livestock, meat, and milk value chains in Nigeria. However, the following: integrated dairy farm, Maizube farm, Fan milk, cowbell, Niyya Farms, Nagari integrated dairy farm, Jamil Farm, Sebore farm, Friesland Campina, Wamco and MILCOPAL are the top 10 milk processors that together supplied 3 percent of the local milk delivered to the market.

## **7. PROJECTS FROM WHICH THE VALUE CHAIN BENEFITS**

### **7.1 Agricultural Transformation Agenda**

The overall Transformation agenda (2011-2015) is aimed at changing the Nigerian economic dependence on oil revenues. One of the key sectors through which this objective is to be achieved is the agricultural sector. The agricultural transformation agenda has put in place policies and framework for transforming agriculture. The value chain approach has been chosen as the strategy for achieving the objective. The objectives of the national policy are:

- enhance generation of national and social wealth through greater export and import substitutions
- enhance capacity for value addition leading to industrialization and employment opportunities
- efficient exploitation and utilization of available agricultural resources, and
- enhance the development and dissemination of appropriate and efficient technologies for rapid adoption

In pursuit of these policy pillars, the FMARD is focusing on the development of six value chains (dairy, beef, sheep/goat, poultry, leather and piggery) in the livestock subsector. The transformation will focus on key aspects of the value chain such as provision of inputs that will include improved breed stocks, day old chicks, forage and feed concentrates etc.

The dairy transformation agenda seeks to create a new generation of livestock farmers, oriented towards commercial production and farming as a business. This is with the aim of turning the industry into a major player in the local supply of milk and milk products.

The dairy value chain is expected to generate the following outputs.

- 44 commercial livestock breeding centres to produce required animals for herd growth and fattening
- 8 artificial insemination outfits
- 35 000 smallholder fattening operators to produce well fed animals for slaughter.
- 140 commercial feedlot operators
- 76 standard abattoirs linked to 76 cold stores.
- 700 000 jobs in direct employment and spinoff
- A National meat development and marketing corporation
- A livestock breeding policy

The sheep and goat value chain is aimed at improving the household incomes and food security. The objective of the value chain is inter alia to: change sheep and goat production paradigm from the traditional low-input subsistence system to commercial/intensive production by 2015; increase meat output from the current 440 109 to 585 785 tonnes; increase population of animals by 30 percent from 92 043,900 to 119 657,070 through a 70 to 80 percent improved vaccination coverage and improved nutrition and; generate over 450 000 new jobs in Nigeria by 2015.



## **7.2 Friesland Capina WAMCO dairy development program**

Kwara State government commissioned a dairy development program at Shonga in the Edu Local Government in 2010. The Shonga dairy consortium currently has one of the largest dairy farms in the country. This public-private-partnership is expected to add value to local product, help promote the development of local dairy industry in the country and also help facilitate the use of locally produced milk by indigenous companies.

## **7.3 Nigerian Dairy Enterprise Initiative: USAID Grant EDH-G-00-03-00017-00**

The USAID 2002 dairy enterprise initiative programme provided established dairy enterprises in Nigeria and Tanzania. The Nigeria dairy enterprise was implemented between 2004 and 2006. The overall goal was to develop the domestic farm-market dairy value chain and initiate an approach to reduce the nation's dependence on imported milk products. Its purpose was to improve livelihoods of small-holder livestock producers through peri-urban dairy development around Abuja, the federal capital of Nigeria.

## **7.4 Federation of Rural Dairy Cooperative Associations in Kaduna State, Nigeria**

MILCOPAL was registered in 1989 by the Federation of Rural Dairy Cooperative Association in Kaduna state to provide milk outlets and extension services to its members. They registered a total of 2000 pastoral farm family holdings in 36 cooperative associations scattered over a milk-shed range of 150 to 200 kilometres. All the associations are managed from one operational centre for routine milk collection, ambulatory services and disease surveillance.

## **7.5 Sheep and goat multiplication centre**

The Federal livestock department in 1978 started sheep and goat meat production in 3 sites, one for goats and 2 for sheep. The sheep projects are located at Tuma (940 hectares) and Ladanawa (800 hectares) in Katsina, Kaduna State, while the goat project is at Zugu (14.5 square km.) in Sokoto State. The objectives of the project are to:

- preserve pure breeds of Sokoto goats and Balami sheep.
- identify suitable management for sheep and goat production through optimum pasture utilization, supplementary feeding as necessary, controlled mating programmes, genetic selection within the breeds and adoption of a sound animal health programme.

Sheep and goat multiplication centres have also been set up by some states of the Federation, with the main objective of providing breeding animals to local farmers. Such projects are located at Pampegua in Kaduna State, Kaltungo in Bauchi State, Marguba in Borno State, Rano in Kano State and Fasola in Oyo State.

## **7.6 Research and training**

ILCA Humid Zone Programme – Before changing to The International Livestock Research Institute (ILRI), ILCA based in Ibadan, through an interdisciplinary team of scientists, has been researching into ways of integrating sheep and goats into the existing farming systems in southern Nigeria. Apart from the on-farm studies, the centre has focused on basic collaborative research with the national institutes to improve small ruminant production (ILCA, 1976). The programme organized seminars, and trained research and extension staff in techniques for the establishment and management of alley farms.

National Universities. Various universities in the humid zone have embarked on small ruminant research and training. Notable among these is the Department of Animal Science of Obafemi Awolowo University Ile-Ife, which is researching on management of West African dwarf goats, in collaboration with the National Agricultural University of Wageningen, the Netherlands, and the International Livestock Centre for Africa.

Research Institutes. Among the institutes engaged in small ruminant research and training in Nigeria are the National Animal Production Research Institute (NAPRI) at Shika, and the National Veterinary Research Institute (NVRI) at Vom.

## **8. POLICIES AND STRATEGIES**

The agriculture sector in Nigeria contributes significantly to many national objectives and goals, including: food security, import substitution to preserve foreign reserves, wealth creation, contribution and the achievement of the relevant Millennium Development Goals.

### **8.1 Natural resource policies**

- Nigeria's food imports are growing at an unsustainable rate of 11 per cent per annum.
- Relying on the import of expensive food on global markets fuels domestic inflation.
- Excessive imports puts high pressure on the Naira and hurts the economy
- Nigeria is importing what it can produce in abundance.
- Import dependency is hurting Nigerian farmers, displacing local production and creating rising unemployment.
- Import dependency is neither acceptable, nor sustainable fiscally, economically or politically.

### **8.2 Incentives or disincentives to producers and consumers**

Government incentives to support investors in agriculture include:

- New fiscal incentives to encourage domestic import substitution
- Removal of restrictions on areas of investment and maximum equity ownership in investment by foreign investors
- No currency exchange controls - free transfer of capital, profits and dividends
- Constitutional guarantees against nationalization/expropriation of investments
- Zero percent duty on agricultural machinery and equipment imports
- Pioneer tax holiday for agricultural investments
- Duty waivers and other industry related incentives e.g. based on use of local raw materials, export orientation etc.

### **8.3 Credit policies**

The Nigerian incentive-based risk sharing system for agricultural lending is a policy instrument designed by the CBN to encourage and stimulate local banks to lend with confidence to value chain actors within the agricultural sector, by offering strong incentives and technical assistance.

The instrument provides incentives to (a) stimulate innovations in agricultural lending, (b) encourage banks that are lending to agricultural sectors, (c) eliminate state dependency by banks for deploying loanable funds to agriculture, (d) leverage commercial bank balance sheet for lending to agriculture, and most importantly (e) ensure risk sharing approaches that will build a business approach where banks share in the risk to lending to the sector (AGRA and PWC 2010). Value chain financing is one innovation that could encourage banks and other financing institutions to increase lending to the agricultural sector.

### **8.4 Acts, regulations and laws governing the value chain**

The responsibility for regulating and monitoring food safety standards and practices in Nigeria is carried out by several government ministries, departments and agencies.

Ministries: Federal Ministry of Health, Federal Ministry of Agriculture & Water Resources and Federal Ministry of Commerce

Departments: Federal Department of Fisheries and Federal Department of Livestock

Agencies: National Agency for Food and Drug Administration and Control (NAFDAC), Standards Organization of Nigeria (SON), Nigeria Agricultural Plant Quarantine Services (NAQS) and Consumer Protection Council

#### Section I. Food Laws:

The following are the major food laws in Nigeria.

- Food and Drugs Act (Cap 150) of 1990 as amended by Decree 21 of 1999 (formerly called Food and Drugs Decree 35 of 1974)
- The Animal Disease Control Decree 10 of 1988
- The Marketing of Breast Milk Substitutes Decree 41 of 1990
- Counterfeit and fake drugs and unwholesome processed foods (Miscellaneous provisions) Decree 25 of 1999
- NAFDAC Marketing of infant & young children food and other designated products (Registration, Sales, etc.) Regulations 2005
- The National Agency for Food and Drug Administration and Control (NAFDAC) Decree 15 of 1993 (as amended by Decree 19 of 1999)
- Drugs and related products (Registration etc.) Decree 1993
- Non-nutritive sweeteners in drug products (Prohibition) Regulations 1996
- Pre-packaged food (Labeling Regulation) 1995
- Food grade table or cooking salt regulations 1996
- Pre-shipment inspection of exports Decree 1996
- Pre-shipment inspection of imports Decree 1996
- Consumer protection council Decree 66 of 1992
- Inland fisheries Decree 108 of 1992

### **8.5 Suggested policies for smooth operation of meat and milk value chains**

New policies, institutions and financing structures to drive sector growth:

- Facilitating the development of small holder farmer-based organizations
- Deregulation of seed and fertilizer sectors
- Encouraging the commercial development of fodder farms
- Making markets work better for the poor
- Innovative financing for agriculture
- New for agricultural investment framework

## 9. CONSTRAINTS AFFECTING MEAT AND MILK VALUE CHAINS AND PROPOSED SOLUTIONS

SWOT Analysis of dairy value chain

### Strengths

- The large livestock population of the country could prove to be vital assets for the country and unlike many other natural resources which will degrade over the years, a sustainable livestock production systems continue to propel Nigerian economy.
- As the milk productivity the animals is low, there is a vast scope for improvement of the milk production and consequently increase marketable surplus of the milk for population
- Purchasing power of the consumers is on the increase with growing economy and increasing population of the middle class
- Milk consumption in Nigeria is a regular part of the dietary habit irrespective of the region and hence demand is likely to continuously rise
- Nigerian dairy farming thrives largely on the feeding of crop residues and agricultural by-products thus keeping the feed costs low. Labour cost is also fairly low making the industry fairly profitable
- The industry continues to grow and the profit margins are still fairly reasonable.
- A large number of dairy plants are in public and multinational sectors and several others in the private and cooperative sectors is coming up.
- Pool of highly trained and qualified technical manpower is available at all levels to support industrial operations

### Weakness

- Though cross breeding programmes have been shown to significantly improve animal productivity, milk production systems in many parts of the country still predominantly use low yielding breeds
- Poor condition of roads and erratic power supply remain a major challenge for procurement and supply of good quality raw milk. Furthermore, raw milk collection systems Nigeria is costly and poorly developed.
- Maintenance of cold chain is still a major handicap. Organized producer cooperatives still have to transport milk to nearby processing plants at a high cost to cover cold storage and transportation costs
- Majority of the producers are unaware of modern farming systems that are built around the value chain and produce safe milk.
- Absence of comprehensive and reliable milk production data and research support required for improvement are still unavailable. Continuous investments in dairy research as lagging behind and are not commensurate with potential returns

### Threats

- Excessive grazing pressure on marginal and small community land has resulted in almost complete degradation of land and rising land use conflicts.
- Indiscriminate cross breeding for increased milk productivity could lead to disappearance of valuable indigenous breeds.

- Cost effective technologies, mechanization and quality control measures are seldom exercised in unorganized traditional production sector and remains issues to be addressed.
- Middlemen still control a very large proportion of the milk procurement. Serious efforts need to be taken to eliminate them from the supply chain.
- Low availability of quality feeding ingredients viz molasses, is making domestic production rely on low energy natural straw.

#### Opportunities

- The Nigerian economy is buoyant, and money is not a limiting Expanding markets will see creation of enormous job and self-employment opportunities
- Economy is growing, consequently, the investment opportunities are also increasing continually
- Demand for dairy products is income elastic. Continued rise in middle class population will see shifts in the consumption pattern in favour of value added products as well as an increase in the demand for liquid milk.
- factor for development.

#### Strategic recommendations

- Through the Nigerian Model Farm program, identify best practice farm management systems, taking into account regional variation and farm sizes, and disseminate these practices through the industry. Critically, these farm management systems must enhance profitability and be attractive to investor.
- Through the Nigerian dairy cooling tank program and working in conjunction with several other initiatives, improve the quality of milk delivered to consumers and processors from the pastoral communities.
- Through both incentives and penalties, discourage adulteration and encourage respect for milk throughout the supply chain.
- Identify a model for delivering cost effective pasteurized milk to a much wider proportion of the population.
- Improve the service offered by supporting professionals, and improve access to these support services.
- Review professional education methods and improving them if necessary.
- Building upon present training initiatives.
- Integrate training approaches at various levels, in order foster and enable a common understanding and improved effectiveness.
- Allow access to 450 gazetted grazing reserves to more the farming rural population
- Co-ordinate the many on-going milk and meet improvement programs
- Recognize dependencies, phase the provision of required support and build institutional capability.
- Advocate for required infrastructure improvement in milk producing areas.
- Build a thriving commercial beef fattening and dairy farming sector, through the implementation of modern but localized farming systems, based on robust financial analysis and performance.
- Build industry required human resources

- Create conditions under which further investment in the industry, whether from domestic or foreign sources is attracted.
- Ensure at the least that Nigeria can meet the needs of its consumers without the need for imports.
- Promote linkages between the formal sector and micro finance providers, so that the financial wellbeing of farmers and farming communities is enhanced.
- Build a network of rural entrepreneurs operating in support of the farming community.
- Implementation of the proposed pasteurization law and enforcement of quality standards for milk.

Critically, the dairy sector must cater to a wide variety of stakeholders, including government, donor agencies, processors, and people working within the industry, consumers and no doubt most importantly the livestock farmers of Nigeria. Strategies will be modified and changed over time, but the goal of driving the development of the livestock meat and dairy industry to the satisfaction of these stakeholders, in a balanced and fair manner, must remain paramount.

## 9.1 Constraints

Land Ownership: An improvement of the dairy sector using traditional livestock producers is feasible because they own over 90 percent of the cattle and supply over 80percent of milk consumed. However, it is an onerous task organizing producers that are constantly on the move, because the land they inhabit belongs to a crop farmer, or that the one they own could be taken over by government for other uses.

Productivity of the local cattle breed. Milk yield of local breeds is relatively low. The average milk yield per cow per day during the wet season is between 1 to 5.1 litres and could drop to about 0.6 litres during the dry season, although it could remain at the higher level during this season with some supplementation using cotton seed cake. Nevertheless, it should be noted that this levels may not reflect the genetic ceiling of the local breeds.

Organizing producer groups. The spatial distribution of traditional livestock producers and the unfavourable terrain makes it very difficult to reach the producers, and also introduces an additional cost dimension to inputs supply, access to markets and business development services. Illiteracy clan-biased ethnocentrism, mutual distrust, erosion of traditional leadership, all combine to compound the problem of organizing pastoral livestock producers into associations or cooperatives. The inefficiencies and ineffectiveness of relevant agencies responsible for formation of cooperatives and associations further increases the burden.

Integrated Dairy Farms. Although integrated modern dairy farms are operating at high overhead costs, they are reluctant to partner with traditional milk producers because of lack of skill and resources to organize the milk collection network, and the lack of strategic infrastructure such as water, roads, and electricity to support the cold chain.

Bureaucracy. Wading through the difficult bureaucratic bottle necks to arrive at strategy for collaboration with in-country institutions takes an inordinate amount of time. After several meetings and review, participating institutions eventually find it very difficult to meet their obligations.

Capacity of existing relevant public and private institutions. Although public institutions have the professional capacity they often lack the required financial capacity to cover logistics and administrative demands of projects. This deficiency often limits their ability to effectively participate as collaborators in project implementation.

Livestock production as a business. Transitioning from subsistence to business oriented livestock production is a possible but very arduous task. Producers who have been producing livestock and selling milk all their lives, nevertheless would require training on producing to meet market demands, keeping proper records in order to differentiate between revenue and profits.

Private sector participation. There is very negligible private sector participation in dairy. This low participation could be attributed to the high cost of establishing dairy enterprises, considering that equipment and support supplies are imported.

Strategic infrastructure. Strategic infrastructure such as water, roads, and electricity, which are required to support dairy development, is lacking or inadequate. The cold chain and collection networks require a steady supply of clean water, efficient and effective power supply and good road network, respectively.

Gender Issues. Throughout the country, cows are owned by the male, and milking of cows is also done by the male members of the household. However, milk handling, processing and marketing activities are solely the responsibility of females. Proceeds from milk sales is an exclusive preserve of the women, they decide how the income from milk is dispensed.

## **9.2 Proposed solutions**

### Targeted dairy development.

The Nigerian vision is to build a more modern dairy sector that can move the country from the present level of 3 percent local content delivery to 25 percent of the local demand in the next five to ten years. To achieve this, Nigeria requires a modernized dairy sector. A “Modernized Dairy Industry” is defined as one, which meets the needs of major stakeholder groups including:

- Consumers
- Farmers (Pastoralist, potential young graduate farmers clubs, etc.)
- Processors

### Meeting the Needs of the Nation and other Stakeholders

Below is the relational model of the proposed integrated approach to dairy sector development in Nigeria.

### Integrated approach to dairy sector development:

We believe there is need for radical transformation of the informal dairy sector into a more formal and organized sector that is driven by the organized private sector. For this transformation to really happen the sector requires a commercially driven development program. The key stimuli of such an approach may include:



- Strong regulatory instruments, good databases, marketable model farm prototypes, Farm support services and Farmer mobilization to stimulate change at a production level, encouraging technological and especially farm management advancement with small groups and on smallholding farms, and an increase in the number of supervised cooperative farms.
- Organizing the milk supply chain and legitimizing the role of milk trade

This envisaged industry will be capable of delivering significant gains to the economy. It will:

- Create more jobs.
- Through import substitution and some export save foreign exchange reserves
- Contribute to a well-organized and documented dairy sector
- Expand cash to rural Nigeria
- Move Nigeria from basic rural landscape into commercially oriented agro-enterprise.

### 9.3 Prioritized areas of interventions

- i. Livestock data project
- ii. Support farm service clinics and technical training
- iii. Business model programmes
- iv. Cooling tank programme and mobile milk collection units
- v. Bulk vending of pasteurized milk: MILCOPAL Model
- vi. Dairy cluster business model program for young Herders clubs
- vii. Development of milk sheds
- viii. Model farm program and establishment of infrastructure for young farmers club
- ix. Nigerian green field project (develop commercial hay markets)
- x. Livestock business advocacy programme

Table 14: Cost of projects/programs and Proposed budget to initiate a baseline National livestock programme

Description	Costs in Naira (million)	Costs in US(\$millions)
Fund Request from Donor Agency	64 192.66	401.21
Equity/Loan financing/other sources	46 484.34	290.53
Total	110 677.00	691.74

Various stakeholders including the prime implementer, livestock owners' organizations livestock traders and veterinary service providers will implement the project through Public-Private partnership arrangements. The project will also build and support the capacity of the Federal Ministry of Agriculture and Rural Development staff in Multiple Dairy Project Management as well as lead implementation for cooperative development, dairy processing and marketing. The project will support the Government of Nigeria by addressing key policy constraints to cooperative infrastructure development and marketing of livestock and milk products. It will also built government capacity to support the target communities by closely associating them with planning, training, monitoring and evaluation, and providing them with regular feedback reports that will fit into the national policy documents of livestock development in Nigeria.

## 10.SUGGESTED PROJECTS AND PROGRAMMES (INVESTMENT PLANS)

i. Livestock Database Project. The objective here is to set up mechanisms and institutional linkages to improve the quality of livestock data and promote pro-poor investments in the livestock sector'. What is holding back the sector is simply a dearth of data on livestock. What data is to the bank is what it should be to livestock industry. Without a reliable national data, it's difficult to invest. Without livestock data, investors don't know where to invest and governments cannot make policies that support the sector.

ii. Nigerian green field project (development of commercial hay markets)

iii. Establishment of infrastructure for young farmers club. Development of dairy cluster production and aggregation centres. Cluster production encourages production of specific commodities in a defined geographical area. The intensity of activities generate the critical mass of products, enhance concentration of infrastructure for mass use, create market centres and reduce product mobilization cost. Again, the approach allows easy transfer of technologies and also attracts agro-processing investment.

iv. Livestock business advocacy program: The importance of business advocacy need not be over emphasized. Business advocacy or public relation and lobbying for the development of dairy sector would mean educating the government on the endogenous and exogenous businesses and commercial needs of the dairy sector. Nigeria will work closely with companies and institutions like Friesland Campina WAMCO Nig. PLC and other multinationals to establish an advocacy and lobbying functions. Goals include advocacy on tax and tariff rationalization in the sector, for an effective import and export regime, preferential agreement and changes in the multilateral trading system.

### Specific dairy development agenda (mid-term: three to seven years) proposed projects

Dairy development projects are designed to deliver a number of specific development models through investment in infrastructure and human capital

i) 10 000 smallholder model farms in replicates of 1 000 farmers per cluster will be established, to introduce enhanced farm management and to demonstrate commercially viable dairy farms with best farm practices.

ii) Farmer cooperatives in each of the cluster will by extension establish their milk collection centers and cooling tanks (Milk chillers) that will be provided under a 100percent soft loan scheme. The majority of these tanks will be used to create additional collection clusters, thus enhancing the opportunity for farmers to link to the market, and improve milk quality by chilling a greater amount of milk.

iii) Mobile milk collection units will be provided under the rural entrepreneurship program.

iv) Farmer technical training program will be initiated as a vocational training program and will be implemented in two phases.

v) Developing pastoral milk sheds: It is considered that there will be milk sheds throughout Nigeria for pastoralists that are distant from formal processors but accessible to underserved regional markets. A number of projects will be undertaken to develop a full potential of these milk sheds in terms of basic needs of pastoral communities and access to professional services and good markets. It is reiterated that the three main problems to be solved in order to develop the dairy sector in Nigeria are: profitability, quality and increased milk production level.

#### Policy support

A good level of policy support is also requested from the government for developing the dairy sector. The main recommendations are as follows:

- Zero rating tax regime for value added dairy products, to allow specific dairy related inputs to be taxed and duty-free.
- A reduction of import duty tax on raw and packaging material from the current 25 percent to 0 percent Additional special tax incentives to be provided to licensing, quality production, setting up of corporate dairy farms and setting up processing units. This will create livelihood opportunities in the regions and increase milk supply pockets.

Infrastructure support by the government (e.g. farm to market roads, etc.)

It is relevant to note that no development model can work without government support especially relative to basic essentials for the dairy development model:

- a) Farm to market roads.
- b) Provision of energy and water connections in villages.
- c) A reasonable electricity tariff for milk chiller
- d) Acknowledging social collateral for farmers for obtaining financial services for livestock and dairy development.

## **II. CONCLUSIONS**

The Federal Government of Nigeria policies highlight the primary role of agriculture as the engine of growth and poverty reduction. This will be achieved through the development of the different value chains which include crops, livestock, poultry and fisheries. Improved production and productivity of these value chains and in particular, the livestock/meat and dairy value chains will also contribute to reduce the ever increasing dependency on import, in addition to creating more jobs and income at all levels. The country has a huge potential for meat and milk production owing to its large livestock population and relatively cheap labour. The size of the population and increasing purchasing power is another opportunity stimulating production. However, the poor genetic make-up particularly for milk production, overgrazing, poor infrastructure mainly roads and electricity, the need to educate farmers on better husbandry are some of the challenges facing the two value chains.

Other areas which may require intervention are improvement of feed particularly commercial fodder production and the use of agro-industrial by-products, innovative way of financing livestock enterprises including encouraging small scale producers and restructuring the markets as middlemen are those controlling the bulk of transactions.

## 12. REFERENCES

Adesiyun, A. A. Webb, L. & Rahaman, S. 1995 Microbiological Quality of Raw Cow's Milk at Collection Centers in Trinidad. *Journal of Food Protection*, 58(2) 139-146

Annatte, I. (2010a) Evaluation of the Technical and Economic Efficiency of the Federation of Rural Dairy Cooperative Associations in Kaduna State, Nigeria. PhD thesis in Epidemiology and Economic in the Department of Veterinary Public Health and Preventive Medicine at the University Of Ibadan, Ibadan. Nigeria. 275pp

Annatte, I. (2010b) Nigeria- Milk production Fact Sheet. In: IFCN Dairy Report 2009, International Farm Comparison Network, Dairy Research Center, Kiel, Germany Vol. 3.63 (129)

Center for Cooperatives, 2004. Working together for stronger cooperatives. University of Wisconsin, Madison, U.S.A.

Cheneau, Y. 1993. New strategies for Zoo sanitary interventions in developing countries. *World Animal Review* (No. 74/75) 12-16

Das, S.C. 2002. The story of 'MILKVITA' in Bangladesh. Bangladesh cooperative

FAO. 1991. Land resource management study, Report no: 32/91 CR NIR 42 SPN. Investment Center, Rome, 4 April 1991 pp.35

FAO. 2004. State of the world's animal genetic resources: Nigeria country report. pp.61

FAO. 1988 Agricultural development in Nigeria 1965–80. Food and Agriculture, Rome.

FAO. 1993. Identification of agricultural investment projects in Nigeria. FAO report No. 72/93 (ADB – NIR.57) pp.30.

FAO. 2001. Report of the FAO email conference in small scale milk collection and processing in developing countries organized by Animal production service, Animal production and health Division, Food and Agricultural Organization of the United Nations Rome. pp.146

FAO/WB. 1992. Livestock sub sector review, Report no. 102/92 CP –NIR 49 SR. Investment center, Rome, 5 August 1992. pp. 2

FLD. 1992. Livestock Subsector Review Report No.102/92CP-NIR 49 SR/5/8/92.

FMARD 2011b. Dairy Transformation Action Plan. Agricultural Transformation Agenda. Federal

Ministry of Agriculture and Rural Development. 9th September 2011 20pp

### FMARD. 2008

FMARD. 2011a. Beef Transformation Action Plan. Agricultural Transformation Agenda. Federal

Ministry of Agriculture and Rural Development. 9th September 2011 44pp

IDF/FIL. 1990. Handbook on Milk Collection in warm Developing Countries. IDF. Special issue No. 9002.

ILCA. 1976. Livestock production in the sub humid zone of West Africa Systems study 2. Addis Ababa: Internal Livestock Center for Africa (ILCA). 40 pp.

ILRI. 2006 Urban dairy training manual. (Amharic version). Nairobi (Kenya): ILRI.

ILRI. 1999. Smallholder dairy technology in coastal Kenya. An adoption and impact study. ILRI Impact Assessment Series. ILRI. No. 5. 68pp.

ILRI. 2009. Integrated Animal and Human Health Management Project: Assessment of risks to human health associated with meat from different value chains in Nigeria using the example of the beef value chain. 112pp

Jaffee. S. 1994. Perishable profits: Private sector dairy processing and marketing in Kenya. In: Jaffee, S. and Morton J. (Eds.). Marketing Africa's high-valued foods: Comparative experiences of an emergent private sector. Kendall-Hunt, Dubuque, Iowa, USA. pp. 199-253.

Land O'Lakes. 2007. Dairy Enterprise Initiative Programme-Nigeria. USAID Grant EDH-G-00-03-00017-00. Final report November 2006. 37pp.

Marshall. R. T. 1992. Standard Methods for the determination of Dairy Products. 16th ed. Publ. American Public Health Association.

#### MILCOPAL. 2004

NAERLS and CPU. 2005. Field situation assessment of 2005 wet season agricultural production in Nigeria. Report of the study conducted by NAERLS and CPU. December 2005. pp 104.

NARP. 1995. National Agricultural Research Strategy Plan 1996-2010. Vol. I of October 1995. Published by the Department of Agricultural science, Federal Ministry of Agriculture and National Resources, Nigeria. 310 pp.

National Dairy Council. 2005. Dairy farming. Microsoft® Encarta® 2005. © 1993-2007 Microsoft Corporation. All rights reserved.

Suleiman, H. 1990. Policy issues in pastoral development in Nigeria. In Gefu, J. O. Adu, I. F. Lufadeju, E. A. Kallah, M. S. & Awogbade M. O. (Eds). Pastoralism in Nigeria: past, present and future. Proceedings of the national conference on pastoralism in Nigeria, NAPRI, Shika-Zaria 26-29th June

UNDP. 1992. Livestock programme support document, Fed. Min. of Finance and Economic Development/ UNDP. Abuja, Nov. 1992. Union Ltd (AMUL), National Dairy Development Board (NDDDB) and Operation Flood Programme of the Indians. Report of the Indian training programme number: 72 of 1996. pp.3



