ANALYSIS OF CATTLE VALUE CHAIN IN MAIDUGURI METROPOLIS, BORNO STATE, NIGERIA

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ABSTRACT

The study examined the cattle value chain within Maiduguri Metropolis, Borno State, Nigeria. Major cattle value chain actors (namely fatteners, traders, retailers and processors) were selected for the study. Simple random sampling technique was used to select 41 fatteners, 60 traders, 23 retailers while stratified random sampling was used to select 77 processors making a total of 201 respondents for the study. Primary data were obtained using structured questionnaires. The data were analyzed using descriptive statistics, value chain map and Marketing Efficiency Index (MEI). The study revealed that, fatteners sale their cattle to traders, butchers and consumers. The traders buy cattle from fatteners and sell to other traders, butchers and consumers. The retailers buy beef and offal in bulk from butchers and sell directly to consumers or processors in smaller quantities while the processors convert cattle products into ready- to- eat products in form of (*Tsire*, *Kilishi* and soup) and sell to consumers. Majority of the value chain actors (82.9%, 93.3%, 87.0% and 79.2% of fatteners, traders, retailers and processors, respectively) shared information on price. Fatteners, traders and processors in the proportion of 73.2%, 86.7%, and 58.4%, respectively assisted one another in supplying inputs with 56.5% of retailers assisting one another in pricing. The results further revealed that the fatteners were the only inefficient actors in the chain with an MEI of 0.8, while the traders, retailers and processors had 9.4, 3.2 and 1.8 MEI respectively. The relationship within the chain is cordial as the actors shared information and assisted one another. The results also revealed that, only fatteners operated inefficiently in the chain. It was recommended that, fatteners could increase their efficiency by increasing the number of cattle fattened via pulling their resources together so as to enjoy economies of scale. Also, the use of improved technology should be encouraged in the value chain so as to ease activities and reduce cost of production which will ultimately attract employment.

Keywords: Value chain; Cattle; Maiduguri; Nigeria

INTRODUCTION

Livestock production is an integral part of Nigeria's agricultural sector and plays a vital role in the nation's economy. It supports the livelihood of a large percentage of the

population, contributing about 2.3% to the nation's Gross Domestic Product (GDP) and 15.3% to the agricultural GDP (CBN, 2010). Federal Livestock Department (FLD) (2012) reported that the livestock population in Nigeria comprises about 16 million cattle, 34 million goats, 23 million sheep, 100 million poultry and 1 million traction animals like horses, donkeys and camels.

Cattle are the most predominant and highly valued livestock in Nigeria (Mukasa *et al.,* 2012). Cattle production and marketing are notable employment and income generating activities for many Nigerians. Millions of people in the country make their livelihood in the cattle value chain as producers, marketers, transporters, processors, feed millers and input suppliers (Umar *et al.,* 2008). Cattle help in the provision of agricultural manure, draught power that is widely used for cultivation, transportation, water lifting and powering of equipments (Fakoya, 2007). Their hooves and horns are used by manufacturing industries while blood and bones are used in livestock feeds among others. Although there are many sources of animal protein, products from cattle are the most commonly consumed (Emokaro and Amadasun, 2012).

The demand for animal protein in Nigeria is far from being met. The average minimum supply of animal protein per head per day was put at 13.26g, far below the recommended minimum of 35g expected to come from meat products (Emokaro and Amadasun, 2012). Beef alone accounts for about 70% of total national meat supply (Mafimisebi *et al.,* 2013). Borno state has the highest population of cattle in Nigeria with an estimated number of about 2 million (Ministry of Animal Resources and Fisheries Development, 2011). A large number of cattle are traded in Maiduguri at the cattle market locally known as *Kasuwan shanu*. It is one of the largest cattle markets in North-eastern Nigeria and also serves as a major supplier of animals slaughtered at the Maiduguri abattoir and the country at large (Idowu, 2015). Although the cattle sector is dominated by traditional systems of production (Umar *et al*., 2014), processing (Iliyasu, 2005) and marketing (Bulama, 2004), it still provides means of livelihood for a significant proportion of the participants in the value chain. It also generates a lot of revenue to the state through various forms of taxation (Umar *et al*., 2008).

Value chain is described as the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers and final disposal after use (Kaplinsky and Morris, 2001). Thus, a cattle value chain can be viewed as the full range of activities required to bring cattle products (e.g live animals, beef, milk, hide, hooves, horns, offal, manure, bones, blood) to final consumers passing through the different phases of production, processing and delivery.

The cattle value chain in the study area starts with the fattening or collection of animals from production areas and moving on to consumption points. Cattle pass successively through a number of actors and a series of links in the value chain before it reaches the end-users. Improvement on the availability and quality of beef and other cattle by-products required by consumers at the right time, form, place and affordable rates requires an efficient distribution system. A holistic study of the distribution system is however lacking as most studies on cattle in the study area have been on economics of production (Umar *et al.,* 2014), marketing (Bulama, 2004), processing (Iliyasu, 2005) or consumption/demand (Zongoma, 2003; Maina, 2012), with less emphasis on value chain. In view of this, there is need for a more encompassing view of the cattle value chain in order

to understand the network and linkages along the chain, hence the need for this study. The study, therefore, determined the roles of the cattle value chain actors, identified the linkage between the actors in the value chain and estimated the marketing efficiency along the cattle value chain in Maiduguri Metropolis, Borno State, Nigeria.

For this study, producers engaged as only fatteners were considered. The categories of marketers include sellers of live animals (traders) and cattle by- products (retailers). Processors include producers and marketers of *Tsire*, *Kilishi* and food sellers (restaurants).

MATERIALS AND METHODS

The Study Area

The study was conducted in Maiduguri Metropolis, Borno State, Nigeria. The area lies between latitudes 11^0 $54^{'}$ to 11^0 $45^{'}$ N and longitudes 13^0 08' to 13^0 $14^{'}$ E (GEONETcast Unimaid, 2015). It has a projected population of 940,038 people in 2013 from the 2006 population of 732,696 people at an annual growth rate of 3.2 % (NPC, 2006). The projection stopped at 2013 considering peoples migration due to insurgency. The climate is hot with temperatures ranging between 35^oC and 40^oC for a greater part of the year. It has a short rainfall period of three months that lasts from July to September with an average of 647 mm per annum (Lake Chad Research Institute, 2007).

Maiduguri Metropolis, which is also referred to Maiduguri Urban, comprised Maiduguri Metropolitan Council (MMC), Jere Local Government Area (LGA), some parts of Konduga LGA and to a lesser extent parts of Mafa LGA (Kawka, 2002). Major occupations of the people include civil service, trading as well as farming. Major crops cultivated include maize, millet, groundnut, cowpea and vegetables. Livestock reared include cattle, sheep, goat and poultry. The main products traded in Maiduguri include grains, hides and skins and gum arabic. Maiduguri is one of the largest sources of cattle in Nigeria as a large number of cattle coming from the neighbouring countries (Chad, Cameroon and Niger Republic) get into the country through Maiduguri.

Maiduguri is the custodian of a large livestock market, K*asuwan Shanu*, which serves as producing, trading as well as transit centre for livestock especially cattle (Bila and Bulama, 2007). Most of the cattle consumed in Nigeria are traded through the market.With about 2,000,000 heads of cattle in Borno and millions of sheep and goats; this has stimulated trade in livestock as well as the establishment of a modern abattoir in Maiduguri, capable of handling 400 cattle a day (Mayomi and Mohammed, 2014). Cattle enterprise provides employment for a large number of people as producers/ fatteners, traders, brokers/dealers and processors both within and outside the market.

Sampling Techniques

Simple random sampling and Stratified random sampling techniques were used to select the research subjects. Lists of producers (fatteners), marketers and processors from their associations were used as sampling frames where 20% were proportionately selected from each. From the sampling frames, 41 fatteners, 60 traders and 23 retailers of cattle products were randomly selected. The selection included fatteners as producers, marketers of live animals as traders and sellers of beef and offal as retailers. The sampling frame of processors was stratified according to products handled and random sampling was used to

select 77 processors comprising 35 *Tsire* makers, 27 *Kilishi* makers and 15 food sellers. A total of 201 respondents were selected for the study. Primary data collected from administered structured questionnaires by trained enumerators were used for this study.

Data Analysis

The analytical tools used in this study include value chain map, which illustrates the path way of products flow from production stage to end markets and presents how the industry functions. Other tools used were frequencies, percentages and marketing efficiency index.

Marketing Efficiency Index (MEI)

Marketing efficiency is the maximisation of the ratio of output to input in marketing. It was computed using the model adapted from Olukosi and Isitor (1990) as follows:

$$M.E.I. = \frac{VA_i}{TMC_i}$$

Where:
M.E.I = Marketing Efficiency Index
VA_i = Value Added or Profit Obtained by i^{th} Actors
TMC_i = Total Marketing Cost for the ith Actors

An actor with MEI less than 1 is inefficient

RESULTS AND DISCUSSION

Roles of Cattle Value Chain Actors

The cattle value chain in the study area consists of several participants but for this study, only the major actors were considered. These include fatteners, traders, retailers and processors. Fig.1 depicts the flow of cattle through the players and their roles in moving the product from production to consumption. The dotted lines linking input suppliers to fatteners and traders show how the fatteners and traders get their inputs, which include veterinary services, feed, feeders, and live cattle. However, the input suppliers were not within the scope of this study.

Fatteners

These are the producers of cattle as far as this study is concerned. Fattening involves all the husbandry practices to fatten an animal. It consists of feeding the animal (to increase live weight), watering, provision of veterinary services and proper housing for the animal. Fatteners therefore provide utility of form in the cattle value chain. In the cattle market in the study area locally known as *Kasuwan Shanu*, the producers have stalls in the market arena where the animals are kept until fattened. The cattle used for fattening are bought from agents or collectors (input suppliers) who buy and assemble cattle from Fulani or Shuwa herdsmen for sale in the market and occasionally from traders. Usually, cattle

selected for fattening are underfed animals of age between 2 to 4 years, lean and healthy capable of responding fast to good quality feeding within the shortest period.

The fatteners assemble animal feed during the period of availability at harvest when prices are low. These feed include roughages (millet, sorghum and maize), cowpea stalks, groundnut haulms, cotton seed and chaff. The fattening programme takes a period of 2-3 months and it is carried out traditionally using primitive stalls, drinkers and feeders usually constructed from half-cut drum as they cannot be easily damaged. The fattener sells the fattened cattle to traders, butchers and consumers as shown in Fig.1.
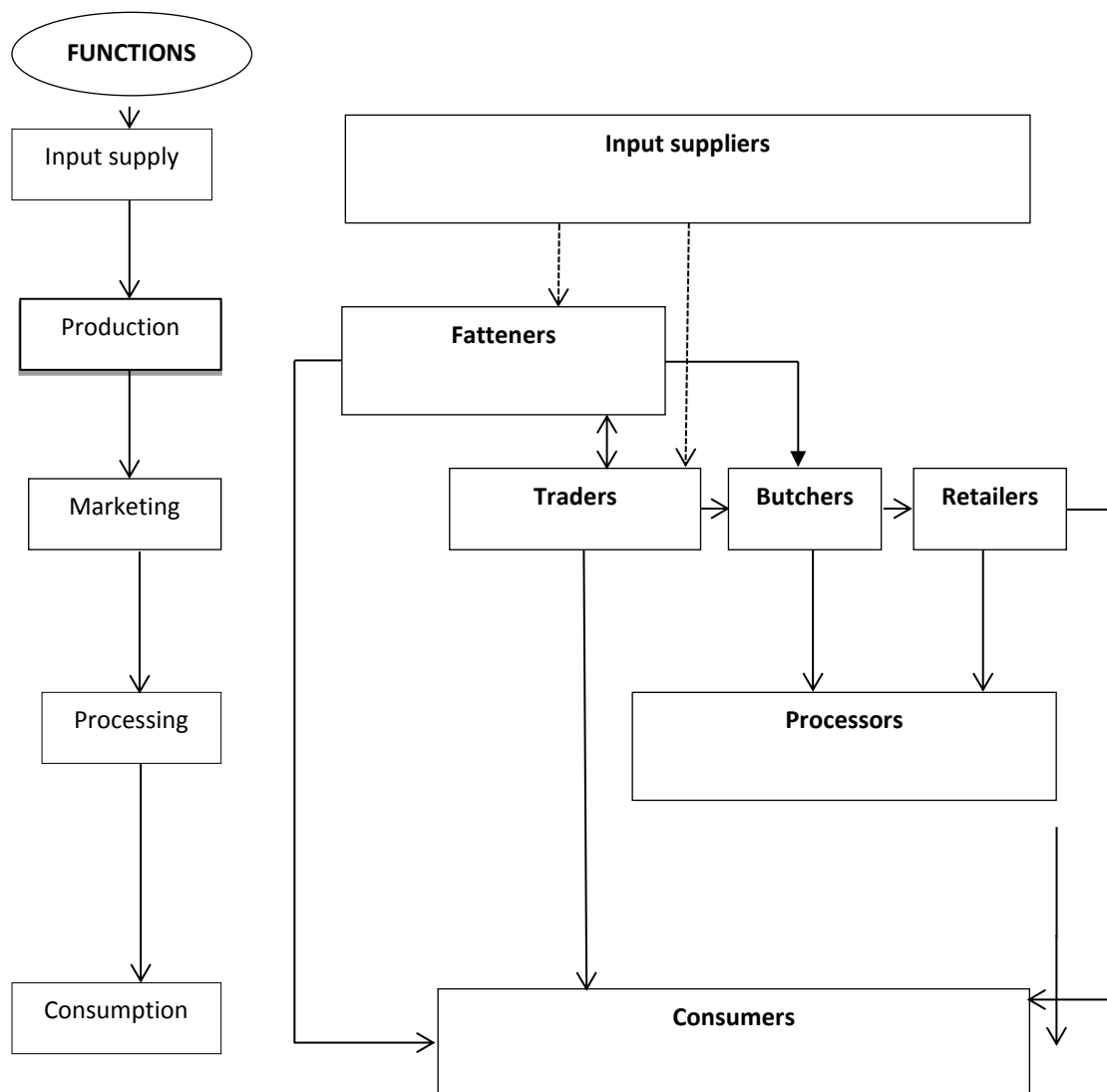

Figure 1: Cattle Flow Chart in Maiduguri Metropolis, Borno State

Traders

The traders are the sellers of cattle. They buy cattle from herdsmen at farm gate or at village markets or from agents and collectors that buy from herdsmen (input suppliers). They also buy from fatteners. The traders are the major players at *Kasuwan Shanu* as they control the market. They command a lot of respect from other agents in the market. Without their approval, no fattener from outside the market or agent could sell cattle in the market. Their cattle are tied to poles in the open and no body from outside the market would sell cattle without tying it to their poles. Depending on his capital, a trader can handle up to 30 heads of cattle at a time. They sell to butchers, other traders that sell in other markets (e.g markets in southern Nigeria and neighbouring states) and to consumers (Fig. 1). Their function in the cattle value chain is the provision of utility of time and place. Thus they ensure that cattle are available at anytime and where it is required.

Retailers

These actors buy directly from the butchers in bulk after slaughter in the abattoirs. A cow/bull is divided into different parts after slaughter namely; head, feet and tail; forelegs and chest; hind legs and back; offal; and skin. Usually, each part is handled by a different retailer who specialises in that trade. The retailers sell directly to consumers or processors in kilograms or in smaller quantities depending on the buyers' choice. The retailers are the closest and most important source of cattle products to consumers. They provide utility of time and place by making their products readily available at the time and place needed. They are found in all communities in the study area mostly by the road side and around market places.

Processors

These actors are the producers and marketers of their products, which include making food in restaurants, *tsire* and *kilishi*. T*sire* is roasted, boneless peppered meat arranged on sticks which is placed around a glowing fire while *kilishi* is thinly sliced, roasted, boneless, peppered meat which is first dried then roasted. The restaurant owners usually prepare stew or traditional soup with beef or peppered soup with offal. The *tsire* and *kilishi* processors buy beef directly from the butchers while the restaurateurs buy from both butchers and retailers. The processors convert raw cattle products into ready to eat products, which they sell directly to consumers (Fig.1). They provide utility of form and time by making their products in a form that the consumers want and at a time so desired. The *tsire* and *kilishi* processors usually operate their businesses by the road sides using traditional methods while the restaurateurs also operate by the road side and in shops.

Linkages in Cattle Value Chain

The cattle value chain actors in Maiduguri have both vertical and horizontal linkages where the relationship is between different actors and within the same actors, respectively. Tables 1, 2 and 3 present summaries of how the actors relate.

Nature of Relationship among Cattle Value Chain Actors

Majority of the participants of the cattle value chain share information and assist one another. From the results, 95.1% of fatteners, 96.7% of traders, 87.0% of retailers and 88.3% of processors share information amongst themselves. Information shared was mostly on price, demand, supply and veterinary services. On assistance, 85.4%, 93.3%, 78.3% and 61.0% of fatteners, traders, retailers and processors, respectively, admitted to assisting one another in one way or the other. Assistance was mostly on loans, pricing and supply of inputs. The high percentage of the actors sharing information and assisting one another implies that impact of extension services may be minimal in the value chain or the actors do not utilise the services of extension agents and prefer to relate with other actors. It also shows that in the cattle value chain the actors depend on one another for the success of their businesses.

Table 1: Distribution of relationship among cattle value chain actors

Value Chain Actors	Information Sharing (%)	Assistance (%)
Fattener	95.1	85.4
Trader	96.7	93.3
Retailer	87.0	78.3
Processor	88.3	61.0

Source: Field Survey, 2015 *Multiple responses exist

Information Sharing among Cattle Value Chain Actors

Table 2 reveals that, majority of the cattle value chain actors (82.9% of fatteners, 93.3% of traders, 87.0% of retailers and 79.2% of processors) shared information on price range. At *Kasuwan Shanu,* the traders usually fix a price for cattle, which they share among themselves, but let the haggling process determine what price they sell but definitely not below the fixed price. Depending on the buyers' bargaining power, cattle could sell for much higher than the fixed price.

Table 2: Type of information shared among cattle value chain actors

Value chain actors	Price (%)	Demand (%)	Supply (%)	Veterinary services (%)
Fattener	82.9	73.2	82.9	87.8
Trader	93.3	80.0	81.7	66.7
Retailer	87.0	78.3	69.6	-
Processor	79.2	58.4	22.1	-

Source: Field Survey, 2015*Multiple responses exist

Majority of fatteners (73.2%), traders (80.0%), retailers (78.3%) and processors (58.4%) shared information on demand for their products. The traders at the market pool their animals together when there is high demand especially from those buying cattle for the south or other markets. Likewise, the fatteners too come together when there is high demand. A buyer may sometimes not even know which trader or fattener has which animal. For the retailers, they even collect beef and offal from one another to sell to consumers and settle themselves later on. The distribution shows 82.9%, 81.7%, 69.6% and 22.1% of

fatteners, traders, retailers and processors, respectively, shared information on supply. Such information includes time and quantity of supply, breeds and price.

Fatteners (87.8%) and traders (66.7%) shared information on veterinary services such as vaccines (time of vaccination and type), drugs (type, how to administer) and common diseases and pests of cattle. There is a government owned veterinary service provider just by the cattle market, however, as explained by the respondents, the services fall short of expectations due to shortages of drugs in the health posts. Thus, there are private veterinary service providers that provide the necessary services. The actors relate well with these service providers and share information amongst one another on such services. Some respondents have reported gaining experience over time hence provide these services amongst themselves. Information on veterinary services was not applicable to retailers and processors as they do not handle live animals hence do not need it. The findings from the study showed that information sharing was very important in the cattle value chain. These actors relied on such information to carry out their activities.

Assistance among Cattle Value Chain Actors

The results from Table 4 show majority of fatteners (73.2%) assist one another in supplying inputs like feeder cattle and feeds while 41.5% and 53.7% reported that they assist one another in giving out credits and pricing of cattle, respectively. For the traders, 86.7% assist one another in supplying inputs such as feeds and cattle, 50.0% provide credits to one another and 63.3% assist one another in pricing of cattle both at buying and selling. Credit was not only in the form of cash, it can be in the form of whole cattle or the by-products. As observed in the study, butchers collect cattle on credit from traders or fatteners and also sell to retailers and processors on credit. The findings revealed that there was a strong bond within the cattle value chain as the actors associated with one another in different ways. This could help them improve on their activities.

Table 3: Distribution of type of assistance among cattle value chain actors

Value chain actors	Credit (%)	Pricing (%)	Supply of inputs (%)
Fattener	41.5	53.7	73.2
Trader	50.0	63.3	86.7
Retailer	26.1	56.5	21.6
Processor	32.5	48.1	58.4

Source: Field Survey, 2015 *Multiple responses exist

A small percentage of retailers and processors than fatteners and traders assist one another especially in credit supply. This may not be unconnected with the fact that, retailers and processors are spread all over the study area unlike the fatteners and traders who carry out their activities around the same place. This allows easy access to one another for any form of assistance.

Marketing Efficiency in Cattle Value Chain

For this study since the actors handled different products (fatteners and traders live cattle, retailers and processors beef and offal), to harmonize the value obtained by the actors, all products handled were converted to kilogram (kg). The amount spent per (kg)

weight of cattle was established by taking average of the number of cattle handled, their corresponding weights and cost of handling. A summary of the marketing efficiency index per kilogram handled is presented in Table 4. A fatteners' cost of purchasing cattle was ₦383.6/kg and price per kg sold was ₦493.5.MEI per kg of cattle was 0.8 indicating that the fattener were inefficient.

Table 4: Marketing efficiency distribution in cattle value chain

Value chain actors	Unit cost (₦)	Added unit cost (₦)	Total unit cost (₦)	Unit price (₦)	Marketing efficiency index
Fattener	383.6	61.5	445.1	493.5	0.8
Trader	307.3	13.7	321.0	450.3	9.4
Retailer	387.5	79.7	467.2	721.4	3.2
Processor	522.3	608.8	1,131.1	2,206.6	1.8

Source: Computed from Field Data, 2015

The traders' cost of purchase was about ₦307.3/kg and sold at ₦450.3/kg. It was expected that the traders' purchasing cost would be higher than that of the fattener considering that the fatteners could sell to the traders. However, the findings revealed that this was not the case as majority of cattle handled by the traders are bought from herdsmen or agents. The trader handles more animals of different sizes, ages and weights than the fattener who handles just a few at a time. The traders' MEI was 9.4 which was efficient. The retailer and processor were also efficient with an MEI of 3.2 and 1.8 respectively. This implies that only the fattener was inefficient in the cattle value chain. Total costs of services of the trader, retailer and processor covered all marketing functions efficiently. The highest MEI of the trader could be explained by the least marketing cost he incurred in the chain. The low revenue obtained by the fattener (the lowest in the chain) explains the inefficiency of the fattener.

CONCLUSION

The study has established that, activities of the actors in the cattle value chain in Maiduguri Metropolis, Borno State are interlinked. The relationship within the chain is cordial as the actors shared information and assisted one another. The results also revealed that only fatteners operated inefficiently in the chain. The study recommends that fatteners can increase efficiency, through the increase in the number of cattle fattened by pulling their resources together to enjoy economies of scale. The use of improved technology should be encouraged in the value chain, so as to ease activities, reduce cost of production and attract employment.

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