COMPARATIVE ANALYSIS OF PROFITABILITY OF SELECTED BEEF PRODUCTS PROCESSING IN KANO STATE, NIGERIA

BY

MSHELIA, DAVID ALI
(SPS/12/MEX/00004)

A DISERTATION SUBMITTED TO THE DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION, FACULTY OF AGRICULTURE, BAYERO UNIVERSITY, KANO IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE (M.SC) IN AGRICULTURAL ECONOMICS

January, 2017

DECLARATION

I hereby declare that this work is the product of my own research efforts, undertaken under the supervision of Dr. (Mrs) Amina Mustapha and Professor Aminu Suleiman, and has not been presented and will not be presented elsewhere for the award of a degree in Master of Science. References made to published Literature have been duly acknowledged

…….

Signature and Date

MSHELIA, DAVID ALI

(SPS/12/MEX/00008)

CERTIFICATION

This is to certify that the research work for this thesis and the subsequent preparation of this thesis by MSHELIA, DAVID ALI, SPS/12/MEX/00004 were carried out under our supervision

……	…….
Dr. (Mrs) Amina Mustapha (Supervisor)	Date
……	……
Prof. A Suleiman (Internal Examiner)	Date
……	……
Prof. A. B. Mohammed (Head of Department)	Date

APPROVAL PAGE

This is to certify that the research work titled "Comparative Analysis of selected Beef products Profitability in Kano Metropolis, Kano state Nigeria." Undertaken by MSHELIA, DAVID ALI (SPS/12/MEX/00004) has been examined and approved for the award of MASTERS OF SCIENCE in Agricultural Economics in the Department of Agricultural economics and Extension, Faculty of Agriculture, Bayero University, Kano.

……..	……
Prof. Z. Abdulsalam (External Examiner)	Date
…….....	……
Dr. Amina Mustapha (Supervisor)	Date
……..	……
Prof. A Suleiman (Internal Examiner)	Date
…….	……
Prof. A. B. Mohammed (Head of Department)	Date
……	.. ……
Dr. A. Mustapha (SPS Representative)	Date

ACKNOWLEDGEMENTS

To God is the glory for the gift of life and the opportunity to undergo this academic carrier and for the successful completion of the program. I wish to acknowledge the following individuals who helped in bringing this research work to success. Firstly, to my Supervisors Dr.(Mrs) Amina Mustapha and Prof. Aminu Suleiman for their tireless effort through guidance, critical comments which lead to the success of this research work. I wish to also express my gratitude to my lovely wife Blessing David and children; Emmanuella, Hillary, Queen Esther, Anita and Hannah for their understanding in the course of my studies. My appreciation to Dr Ahmed A Njidda, Dr. Dauda B. Bawa, Dr. Hassan Sule, Mr Hassan Sule Bwala , Mr Bala Y. Ngadda, Mr Abdullahi Saidu Idris (TRCN State Coordinator Kano) and all the Lecturers in the Department of Agricultural Economics and Extension Bayero, University Kano for their input and encouragement in the cause of my studies. I also acknowledge Mr Abdullahi Maigarabi, extension agents and the studio center staff for their efforts towards the successful collection of data which was tedious. My special gratitude to Mr. Halliru Muhammad for sparing his tight schedule to see that the data was thoroughly analyzed as well his input during the analysis. I am also thankful to my course mates Yerima Mamman, Abdulganiyu Rufai, Abbas Gambo Magam, Hamza Asani, Usman Abdulhamid, Yahaya, Hafsat Usman and Chioma Chikwuka Ego. God bless you all.

DEDICATION

I dedicate this research work in memory of my late beloved parents; Ali A. Gasheru and Mary Ali Mshelia who trained me but could not wait to reap the fruit of their labour. May their gentle souls rest in perfect peace

TABLE OF CONTENT

Content

Page No

LIST OF TABLES

Table
Page No

ABSTRACT

The study focused on comparative analysis of Profitability of Selected beef products processing specifically *kilishi*, *tsire* and *balangu* in Kano metropolis, where five metropolitan local government areas were purposively selected which includes Dala, Gwale, Kano municipal, Nassarawa and Tarauni. One hundred and forty two (142) respondents were used for the analysis. The analytical tools employed include descriptive statistics, net marketing margin analysis and stochastic frontier cost function. The findings revealed that the three categories of processors have similar socio-economic characteristics especially gender, marital status, major sources of income, educational status, and years of experience. The result from the stochastic frontier analysis revealed that the inefficiency parameters are not significant for the three categories of beef products processing; that means there is no relationship between the parameters and quantities *of kilishi, tsire* and *balangu* output. The stochastic cost function revealed that the gamma parameters(ϒ) for *kilishi, tsire* and *balangu* were 75%, 99% and 100% respectively this implies that 75%, 99% and 100% of variations in *kilishi, tssire* and *balangu* cost of processing in the study area was due to differences in technical effiencies. The estimated sigma- square parameters were 56%, 58% and 15% for kilishi, tsire and balangu respectively; implying the goodness of fit of the model. The average cost and returns analysis revealed that the Net incomes generated per production cycle were ₦33,504.94, ₦19,107.53 and ₦14,290.68 for *kilishi, tsire* and *balangu* respectively. The analysis of the market arrangement revealed that the processors of these products are also the marketers; except for *kilishi* where by 75% of the processors retail their processed products and 25%, processed for dealers. Also the analysis revealed that there is no formal arrangement between the processors and buyers of these products. The constraints associated with the processing are high cost of beef, inadequate access to capital for expansion, double taxation, and inadequate information on new processing technology.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the study

Agriculture constitutes a significant sector of Nigeria's economy. Agricultural sector contributed 24.18% to the Gross Domestic Product (GDP) of the Nigeria economy in the second quarter of the year 2015 (CBN, 2015). The primary aim of agriculture is the provision of food for the population. It is the main source of raw material for industrial use, source of income, poverty reduction and source of foreign exchange (NISER, 2000). Until 1970, agricultural exports were the main source of foreign exchange earnings (Amaza and Olayemi, 2002). Jama'are (2002) reported that despite the discovery of oil in the early 1970's, the agricultural sector is still the most important sector of the national economy in-terms of rural employment, provision of food and export earnings. Nigerian Livestock industry is smaller and slow growing relative to the population relaying on it for beef (Agboola and Balcilar 2012), (Babatunde and Qaim, 2010). In 2010, the grazing live stock accounted for 108.6 million of total live stock production, (Earth Policy Institute, 2012). Poultry, pig, sheep, goat and cattle are the main live stock of marketing importance. The live stock industry is the major source of protein for the large population, contributing 5 – 6% of the country's total gross domestic product (GDP) and 15 – 20 % of the agricultural GDP (Mshelbwala, 2013), therefore, the increasing social economic conditions of the consumers in the developing countries can be assessed from changes in their consumption pattern, (FAO, 2013). Among those agricultural products that contributed in providing food, income and employment generation in Nigeria specifically is the processed beef products such as (*Kilishi, Tsire* and *Balangu*), which has gained popularity as fast food for majority of the

busy working class. Despite the popularity gained by these products as fast foods, the production technology remained undeveloped; and has been relegated to the roadside vendors with limited capital for expansion, inefficient traditional production methods and unhygienic production condition. Also, inadequate information exists on the costs and returns items of its production and factors affecting revenue generation from the enterprise. The death of knowledge impedes the formulation of meaningful policies and programmes for *suya* production development. It also hinders potential *suya* producers from investing in the business. It is against this backdrop that this study was designed to carry out a comparative analysis of the profitability of the three major beef products processing in Kano Metropolis. Therefore in this context of research, each product name as (*kilishi, tsire* and *balangu*) will be used since we are carrying out a comparative study. When a boneless meat of beef, mutton or goat meat seasoned with powdered groundnut cake, spices, vegetable oil, salt and other flavours is sun/heat–dried and cooked by roasting around a low-burning or glowing smokeless fire is called *kilish*i. It is a ready-to-eat nutrient dense product that is light weight and low moisture content. When the boneless slice of meat seasoned with spices and cooked by roasting is staked onto a wooden stick, it is called *tsire*. When the meat is sliced into larger pieces, seasoned and slowly cooked by roasting without being staked onto a stick, it is referred to as *balangu. Tsire* and *balangu* possess a very short shelf-life because they are intermediate moisture meat products and do not receive further treatment to enhance their shelf-life.

1.2 Problem Statement

Urban consumers are increasingly geared towards processed foods. Igene (1982) reported that rapid urbanization has continued to raise incomes in developing nations and led to

changes in the nature of demand for food with giving emphasis on convenience foods such as *suya*. Some important processed beef are *kilishi, tsire* and *balangu*. Despite the growing popularity and demand of beef products caused by urbanization which creates preference for fast and easy to prepare food items; the processing of these products *kilishi, tsire* and *balangu* is still rudimentary. Marketing arrangement of the products is not properly organized into groups or cooperatives. Individual processors have different methods of processing and un-standardized units of measure. The absence of standardization leads to variation in quality and value of the products across the markets. There are also poor and unhygienic processing outlets (shops, selling spots). The methods of processing have remained predominantly traditional. Processors use local tools and methods to process beef into *kilishi, tsire* and *balangu*. Value addition is highly needed in bringing the products to the consumer in the form they need it. According to Alinor, (2002), increase in market value also increases the income of the processors and marketers. Comparative studies on Suya production have been carried out, but none looked at *kilishi, tsire* and *balangu* as entities with their corresponding inputs requirement for processing in order to determine their profitability. Information on costs and returns associated with marketing and factors affecting revenue generation from the enterprises is inadequate. The fore-going therefore has revealed that the potentials of the enterprises are not fully exploited by the processors. There is therefore a gap that needs to be bridged in the processing of beef products. This therefore seeks to provide answers to the following research questions:

1. What is the socio - economic characteristics of beef products processors?
2. Is there any relationship between the Socio-economic characteristics of the processors and the quantity of products processed?

3. Is the processing of beef products profitable?
4. What are the factors influencing revenue generation in beef products processing?
5. What is the marketing arrangement of these beef products?
6. What are the constraints associated with beef products processing?

1.3 Objectives of the Study

The Broad objective of the research is comparative analysis of profitability of selected beef products processing in Kano Metropolis. The specific objectives are to;

1. describe the socioeconomic characteristics of the processors
2. determine the relationship between the socio-economic characteristics of the processors and the quantity of beef products handled
1. estimate the cost and returns of the selected beef products processing
2. determine the factors influencing revenue generation in beef products processing
3. describe the marketing arrangement of the selected beef products and to;
4. describe the constraints associated with the selected beef products processing.

1.4 Justification of the Study

Odunsi *et al,* (2005) defined meat as the edible flesh of those animals which are acceptable for consumption by man. The one obtained from cattle is called beef. It is a major source of animal protein to an average Nigerian family. The need for protein in the diet of human beings cannot be underestimated as different categories of individuals need protein for growth, development, and sustenance, regeneration of ageing and building of worn out tissues as well for maintenance. The increased demand for beef products influenced by Urbanizations and change in diet leading to backward and forward linkages creates job opportunities which help to alleviate unemployment problems. The study will bring out the

potentials of beef products enterprise as an important venture that may provide Nigerian populace with employment and income generation specifically. An adequate information necessary to fully exploit the potentials in beef products processing if properly identified, will make the industry attractive for would be investors.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 History of Food Processing

Food processing is the transformation of raw ingredients, by physical or chemical means into food, or of food into other forms. Food processing combines raw food ingredients to produce marketable food products that can be easily prepared and served by the consumer. Food processing typically involves activities such as mincing and macerating, liquefaction, emulsification, and cooking such as boiling, broiling, frying, or grilling; pickling, pasteurization, and many other kinds of preservation; and canning or other packaging. Primary-processing such as dicing or slicing, freezing or drying when leading to secondary products is also included (Anonymous, 2015; Common Methods of Processing and Preserving Food). Modern food processing technology developed in the 19th and 20th centuries was developed in a large part to serve military needs. In 1809 Nicolas Appert invented a hermetic bottling technique that would preserve food for French troops which ultimately contributed to the development of tinning, and subsequently canning by Peter Durand in 1810. Although initially expensive and somewhat hazardous due to the lead used in cans, canned goods would later become a staple around the world. Pasteurization, discovered by Louis Pasteur in 1864, improved the quality of preserved foods and introduced the wine, beer, and milk preservation. In the 20th century, World War II, the space race and the rising consumer society in developed countries (including the United States) contributed to the growth of food processing with such advances as spray drying, juice concentrates, freeze drying and the introduction of artificial sweeteners, colouring agents, and such preservatives as sodium benzoate. In the late 20th century, products such as

dried instant soups, reconstituted fruits and juices, and self cooking meals such as MRE food ration were developed. In Western Europe and North America, the second half of the 20th century witnessed a rise in the pursuit of convenience. Food processing companies marketed their products especially towards middle-class working wives and mothers. Frozen foods (often credited to Clarence Birdseye) found their success in sales of juice concentrates. Processors utilized the perceived value of time to appeal to the postwar population, and this same appeal contributes to the success of convenience foods today (Levenstein, 2003)

2.2 History of Beef Processing

Meat preservation was the primary reason processed meat was developed centuries ago. Extended shelf life is still a major asset processed meat. Such products are popular now because they fit into today's busy lifestyle. They are easy to prepare, with little waste and provide controlled portion sizes. Processed meat is also flavorful and provides variety to the diet. Historical evidence suggests that sausage was made and eaten by the Babylonians some 3500 years ago, and the ancient Chinese also made sausage. The earliest recorded reference to sausage was in Homer's Odyssey, written in the ninth century B.C. Sausage making gained popularity during the Roman and Christian eras, and by the Middle Ages was popular throughout Europe. Local climate and availability of raw materials had a great deal to do with the type of products that were produced. Processed meat products have been favorite foods of U.S. citizens since Colonial times. In 1987, over 17.1 billion pounds of processed meat products, cold cuts, sausages, bacon and hams were produced in the U.S. In that same year approximately 2100 federally inspected processors produced 5.1 billion pounds of sausage (American Meat Science Association, 2016).

2.3 Concept of Food Processing

Processing is defined by Olukosi *et al*. (2002) as the conversion of a commodity from its raw state to a form more acceptable to the buyers or to the next stage in the distribution chain. It thus implies that processing is a transformation process which farm products undergo before it gets to and / or becomes acceptable or useful to the final consumer or in the next stage in marketing. Food processing starts with the harvest of raw agricultural produce, procurement of foods of marine origin or slaughter of animals and it finishes when the processed food are consumed Ikekoronye, (1999), to Srilankshmi, (2002), processing includes all the things that get food ready for cooking and serving. The various processes in processing are mixing, blending, binding beating and whipping, folding, mashing roasting and stuffing. Processing is a component of the physical functions of marketing functions (Olukosi *et al,* 2005). It is a form changing activity Adekaye, (1998). It may be necessary to increase the value of some products, like turning cassava into gari, palm fruit into palm oil, fresh meat into various form to increase their shelf - life especially agricultural produce that are highly perishable. Processing can also be defined as changes that brought about in any food material at home or at industrial level to improve its palatability, nutritive value acceptability, shelf-life or sanitary conditions with the general objective of protecting and preserving food which starts from harvest of the raw product to food consumed (Mohammed, 2007). The two main processing in Nigeria are industrial and artisanal processing technology, the industrial processing is the mechanical change of product from its raw stage to finished stage for consumption by maintaining quality and quantity of the product, while the artisanal are traditional processing of food to more acceptable form (Mohammed, 2007). Industrial process is a systematic series of mechanical or chemical

operations that produce or manufacture something. Industrial processes are procedures involving chemical, physical, electrical or mechanical steps to aid in the manufacturing of an item or items, usually carried out on a very large scale. Industrial processes are the key components of heavy industry (Wikipedia, 2015). Artisanal processing refers to making a value – added product from a raw agricultural material production process characterized by minimal automation, little division of labor and a small number of highly skilled craftsmen as opposed to a larger, less trained traditional workforce. Participants in an artisan process may be self employed, or employed by a smaller- scale business, as opposed industrial.

2.3.1 Meat Processing Technology

According to FAO, (2007), Meat processing technologies include on the one hand purely technical Processes such as

 Cutting, chopping, comminuting

 Mixing, tumbling

 Stuffing/filling of semi-fabricated meat mixes into casings,

Synthetic films cans etc.

 Heat treatment

On the other hand, chemical or biochemical processes, which often go together with the technical processes, are also parts of meat processing technology such as

 Salting and curing

 Utilization of spices and additives

 Smoking

 Fermentation and drying

These processes are described hereunder

2.3.2 Principles of Meat Processing Technology

1. Cutting (reducing meat particle size)

There are five methods of mechanical meat cutting for which specialized machinery is used:

Mincing (grinding) of lean and fatty animal tissues

Larger pieces of soft edible animal tissues can be reduced in size by passing them through meat grinders. Some specially designed grinders can also cut frozen meat, others are equipped with devices to separate "hard" tissues such as tendons and bone particles from the "soft" tissues (minced muscle meat particles).

Chopping animal tissues in bowl cutter (discontinuous process)

Bowl cutters are used to chop and mix fresh or frozen lean meat, fat (and/or edible offal, if required) together with water (often used in form of ice), functional ingredients (salt, curing agents, additives) and extenders (fillers and/or binders)

Chopping animal tissues in emulsifying machines (continuous process)

The animal tissues to be emulsified must be pre-mixed with all other raw materials, functional ingredients and seasonings and pre-cut using grinders or bowl cutters. Thereafter they are passed through emulsifiers (also called colloid mills) in order to achieve the desired build-up of a very finely chopped or emulsified meat mix.

Frozen meat cutting

Boneless frozen meat blocks can be cut in slices, cubes or flakes by frozen meat cutters or flakers. The frozen meat particles (2-10 cm) can be directly chopped in bowl cutters without previous thawing thus avoiding drip losses, bacterial growth and discoloration which would happen during thawing. For small operations the manual cutting of frozen meat using cleavers or axes is also possible.

Cutting of fatty tissues

Back fat is cut in cubes of 2-4 cm on specialized machines to facilitate the subsequent chopping in cutters/emulsifiers. In small-scale operations this process can be done manually.

2. Salting / curing

Salting – Salt (sodium chloride NaCl) adds to the taste of the final product. The content of salt in sausages, hams, corned beef and similar products is normally 1.5-3%. Solely common salt is used if the cooked products shall have a greyish or greyish-brown colour as for example steaks, meat balls or "white" sausages.

Chemical aspects of salting

The water holding capacity of meat can be increased with the addition of salt up to a concentration of about 5% in lean meat and then decreases constantly. At a concentration of about 11% in the meat, the water binding capacity is back to the same level as in fresh unsalted meat. Sodium chloride has only a very low capacity to destroy microorganisms, thus almost no bacteriological effect. Its preserving power is attributed to the capability to bind water and to deprive the meat of moisture. The water loosely bound to the protein molecules as well as "free" water will be attracted by the sodium and chloride ions causing a reduction of the water activity (aw) of the product. This means that less water will be available and the environment will be less favourable for the growth of microorganisms. Bacteria do not grow at a water activity below 0.91, which corresponds to a solution of 15g NaCl/100 ml water or about 15% salt in the product. This explains how salt has its preservative effect. Such salt concentrations (up to 15%) are too high for palatable food. However, for the preservation of natural casings this method is very useful. Heat treatment of meat salted with NaCl results in conversion of the red meat pigment myoglobin (Fe+2) to

the brown metmyoglobin (Fe+3). The colour ofsuch meat turns brown to grey. Besides adding to flavour and taste, salt also is an important functional ingredient in the meat industry, which assists in the extraction of soluble muscle proteins. This property is used for water binding and texture formation in certain meat products. The preservation effect, which is microbial inhibition and extension of the shelf-life of meat products by salt in its concentrations used for food (on average 1.5-3% salt), is low. Meat processors should not rely too much on this effect unless it is combined with other preservation methods such as reduction of moisture or heat treatment.

Curing – Consumers associate the majority of processed meat products like hams, bacon, and most sausages with an attractive pink or red colour after heat treatment. However experience shows that meat or meat mixes, after kitchen-style cooking or frying, turn brownish-grey or grey. In order to achieve the desired red or pink colour, meat or meat mixes are salted with common salt (sodium chloride NaCl), which contains a small quantity of the curing agent sodium nitrite (NaNO2**).** Sodium nitrite has the ability to react with the red meat pigment to form the heat stable red curing colour. Only very small amounts of the nitrite are needed for this purpose. Nitrite can be safely used in tiny concentrations for food preservation and colouring purposes. Traces of nitrite are not poisonous. In addition to the reddening effect, they have a number of additional beneficial impacts so that the meat industries widely depend on this substance. Levels of 150 mg/kg in the meat product, which is 0.015%, are normally sufficient. To reduce the risk of overdosing of nitrite salt, a safe approach is to make nitrite available only in a homogeneous mixture with common salt generally in the proportion 0.5% nitrite and the balance of sodium Chloride (99.5%**)** This mixture is called nitrite curing salt**.** At a common dosage level of 1.5-3% added to the meat

product, the desired salty flavour is achieved and at the same time the small amount of nitrite needed for the curing reaction is also provided. Due to the sensory limits of salt addition (salt contents of 4% are normally not exceeded), the amounts of nitrite are kept low accordingly.

Chemical and toxicological aspects of curing

In meat or meat mixes to be cured the nitrite curing salt must be evenly distributed. During mixing the nitrite is brought in close contact with the muscle tissue and its red meat pigment, the myoglobin. Due to the acidification in meat after slaughter, the pH of such meat or meat mixes is always below 7, which means slightly acidic. The acidity may be enhanced through curing accelerators such as ascorbic acid or erythorbate. Nitrite ($NaNO_2$), or rather nitrogen oxide, NO, which is formed from nitrite in an acid environment, combines with myoglobin to form nitrosomyoglobin, a bright red compound. The nitrosomyoglobin is heat stable i.e. when the meat is heat treated the bright red colour remains. The addition of nitrite curing salt in quantities of approximately 2%, which is the usual salt level, generates nitrite content in the meat products of approximately 150ppm (parts per million or 150 mg/kg). This nitrite content is not toxic for consumers. Upon reaction of the nitrite with the myoglobin (which is the genuine curing reaction), there will be on average a residual level of nitrite of 50-100ppm remaining in the product. In any case the amount of residual nitrite in the finished product should not exceed 125ppm. The maximum ingoing amount for processed meat products is normally up to 200mg/kg of product (Codex Alimentarius, 1991). Apart from its poisoning potential (which is unlikely when using nitrite curing salt), there is a debate concerning the possible health hazards of nitrite curing as under certain conditions nitrite can form nitrosamines, some of which can be carcinogenic in the long term. However,

nitrosamines can only be found in strongly cooked or fried meat products which were previously cured with nitrite. Fresh meat for cooking and fresh burgers or sausages for frying do usually not contain nitrite but salt only. Hence the risk of formation of nitrosamines does not exist in such products. One product, where such conditions may be met, is bacon. Keeping the residual nitrite content low in bacon minimizes the risk of formation of nitrosamines.

A great deal of research has been done with regard to the utilization of nitrite and it can be said that nitrite in meat products is safe if basic rules are adhered to. Nitrite is now recognized a substance with multifunctional beneficial properties in meat processing:

 the primary purpose of nitrite is to create a heat resistant red colour in a chemical reaction which makes cured meat products attractive for consumers with the reddish pigment.

 Nitrite has a certain inhibitory effect on the growth of bacteria. This effect is particularly pronounced in canned meat products which are usually stored without refrigeration, where small numbers of heat resistant bacteria may have survived but their growth is inhibited by the presence of nitrite.

 Nitrite has the potential of attributing a specific desirable curing flavour to cured products.

 In the presence of nitrite fats are stabilized and rancidity in meat products retarded i.e., an antioxidant effect. Many attempts have been made to replace nitrite by other substances, which would bring about the same beneficial effects as listed above. Up to now no alternative substance has been found. As the above desirable effects are achieved with extremely low levels of nitrite, the substance can be considered safe from the health point of view. Currently the known advantages of nitrite outweigh the known risks.

Curing of chopped/comminuted meat mixtures; Curing is applied for most chopped meat mixtures or sausage mixes for which a reddish colour is desired. The curing agent nitrite is added in dry form as nitrite curing salt. The reaction of nitrite with the red meat pigment starts immediately. Due to homogenous blending the meat pigments have instant contact with the nitrite. Higher temperatures during processing, e.g. "reddening" of raw-cooked type sausages at 50^{o}C or scalding/cooking of other products at 70-80oC, accelerate the process.

2.3.3 General Benefits of Agricultural products processing

Food processing helps in converting agricultural products into forms more suitable or desirable for human consumption and to extract commodities that are not readily available in food as are harvested (Johnes, 1992), it also makes food safer by removing, or killing inhibiting pathogenic micro organisms and also to inactivate toxic factors like in the case of yam flour, (Agegeye and Ditto, 1985). According to (Ikekoronye, 1999), food processing can bring a wide range of benefit to enterprising people in developing countries like Nigeria with a high population growth rate in the following ways.

i) Extending the storage time, remove undesirable raw food constituents and change the color, flavor, taste and texture to make the food more attractive and palatable.

ii) Allowing improved use and control of local resources and skills.

iii) Helping to create employment for poor people, in particular the rural areas.

iv) T he potential for adding value and entrepreneurs income earning ability.

v) Improving small scale products and entrepreneurs income earning ability.

2.3.4 Specific Benefits of Beef Processing

Meat consumption in developing countries has been continuously increasing from a modest average annual per capita consumption of 10kg in the 1960s to 26 kg in 2000 and will reach 37 kg around the year2030 according to FAO projections, (FAO, 2007). This forecast suggests that in a few decades, developing countries' consumption of meat will move towards that of developed countries where meat consumption remains stagnant at a high level. The rising demand for meat in developing countries is mainly a consequence of the fast progression of urbanization and the tendency among city dwellers to spend more on food than the lower income earning rural population. Given this fact, it is interesting that urban diets are, on average, still lower in calories than diets in rural areas. This can be explained by the eating habits urban consumers adopt. If it is affordable to them, urban dwellers will spend more on the higher cost but lower calorie protein foods of animal origin, such as meat, milk, eggs and fish rather than on staple foods of plant origin. In general, however, as soon as consumers' incomes allow, there is a general trend towards incorporating more animal protein, in particular meat, in the daily diet. Thus, there are economic, dietary and sensory aspects that make meat processing one of the most valuable mechanisms for adequately supplying animal protein to human populations, as the following explains:

(i) All edible livestock parts that are suitable for processing into meat products are optimally used. In addition to muscle trimmings, connective tissue, organs and blood, this includes casings of animal origin that are used as sausage containers.

(ii) Lean meat is one of the most valuable but also most costly foods and may not regularly be affordable to certain population segments. The blending of meat with

cheaper plant products through manufacturing can create low-cost products that allow more consumers access to animal protein products. In particular, the neediest, children and young women from low-income groups, can benefit from products with reduced but still valuable animal protein content that supply essential amino acids and also provide vitamins and minerals, in particular iron (FAO, 2007)

(iii) Unlike fresh meat, many processed meat products can be made shelf-stable, which means that they can be kept without refrigeration either as (1) Canned heat sterilized products, or (2) fermented and slightly dried products or (3) products where the low level of product moisture and other preserving effects inhibit bacterial growth. Such Shelf-stable meat products can conveniently be stored and transported without refrigeration and can serve as the animal protein

(iv) Supply in areas that have no cold chain provision.

(v) Meat processing "adds value" to products. Value-added meat products display specific flavor, taste, colour or texture components, which are different from fresh meat. Such treatments do not make products necessarily cheaper; on the contrary in many cases they become even more expensive than lean meat. But they offer diversity to the meat food sector, providing the combined effect of nutritious food and food with excellent taste.

2.4 Empirical Review of Beef Products Processing

Suya is a Hausa word for roasted beef products. It is a popular traditional spicy ready-to-eat meat product made from beef, mutton and chevon, (chicken and fish are also now being used). Igene and Mohammed (1983) and Omojola (2008) observed that in *suya* production, a boneless meat of beef, mutton or goat meat seasoned with powdered groundnut cake, spices,

vegetable oil, salt and other flavours is cooked by roasting around a low-burning or glowing smokeless fire. According to Igene (2008) and Iliyasu *et al*. (2013), there are three types of *suya* namely, *tsire*, *balangu* and *Kilishi*. When the boneless slice of meat seasoned with spices and cooked by roasting is staked onto a wooden stick, it is called *tsire*. When the meat is sliced into larger pieces, seasoned and slowly cooked by roasting without being staked onto a stick, it is referred to as *balangu. Tsire* and *balangu* possess a very short shelf-life because they are intermediate moisture meat products and do not receive further treatment to enhance their shelf-life. Their bacterial contamination is high, with varying degrees (Igene, 2008, and Enem and Onyekwodim, 2009). *Kilishi* is a sun/heat–dried roasted meat product (Ahmadu, 2006, Ahmadu *et, al*., 2008a and Ahmadu *et, al*., 2008b). It is a ready-to-eat nutrient dense product that is light weight, low moisture content and very stable to microbial and chemical deterioration when properly packaged (Igene, 1988 and Badau *et al*., 1997). *Suya* is a generic name for the *kilishi, tsire* and *balangu* which are ready-to-eat spicy and roasted meat product. In the past, *suya* was mainly consumed only among the Hausas of northern Nigeria and other African countries where it is believed to have originated (Igene and Mohammed, 1983). But today, it has gone beyond the borders of the Hausa communities and has become a delicacy that cuts across different ethnic groups, religion, and sex, social and economic class. It has made its way into the elite circles where it is served in parties and clubs.

It has also become widely known to be popular evening snack sold by roadside vendors and restaurants. Inyang *et, al*. (2004) confirmed this when they asserted that *suya* production has boomed as it is consumed throughout Nigeria and its consumption has extended to other countries. Virtually, all the major streets in Nigeria have *suya* stands and *suya* vendors have

become very prominent with their grill stands. They become busy with their production and sales business from midday up until late night (Edema *et al*., 2008). It is anticipated that demand for food of animal origin in developing countries will double by the year 2020, thereby creating markets for these animal products (Juma *et al*., 2005). Meat industry development is an integral part of the strategy for the advancement of the entire livestock value chain development with a strong degree of integration of the producers and the consumers. Many countries have different consumption pattern; and livestock production system which impacted on the products delivered to the market.

The demand for meat across countries and regions has been studied and found to be rapidly increasing with a 2030 projection of per capita consumption of 36.7kg of meat per year for developing countries (FAO, 2003). This increase however, varies across the Sub – Saharan Africa, Asia, Latin America and the Caribbean, it could be as low as 13kg for Sub Saharan Africa, 11.7kg for South Asia, and as high as 58.5kg for East Asia, 76.6kg for Latin America and the Caribbean by 2030 (FAO, 2003). This exponential increase in demand for meat products has implication for production both in quantity and quality of live stock produced and subsequent meat products to be obtained from them in Eastern and Central Africa. (ECA) For example, there is growing demand for quality meat products and it is driving opportunities for value addition, (Kurjila, Birurji, Makokha, Musahara, Otika, Adissu and Omore, 2011) in a study conducted by Iliyasu, *et, al.,* (2008) in Maiduguri metropolitan on the profitability of three methods of suya production. The findings of the study indicate that the three major types of *Suya* in the study area were *Tsire*, *Balangu* and *Kilishi*. Estimated gross margin per kilogram of meat used in preparation of *Kilishi, Balangu* and *Tsire* were N150, N 32 and N 114, respectively. The returns to labour were ₦3.13,

₦1.95, ₦2.2 for *Kilishi, Balangu* and *Tsire* producers, respectively. The returns to other variable costs were 29 kobo for *Kilishi* and *Tsire* producers and 1 kobo for *Balangu* producers. The benefit-cost ratios were estimated as ₦1.27:1, ₦1.25:1 and ₦1.1:1 for *Kilishi, Tsire* and *Balangu* production and marketing enterprises, respectively. The marketing margins for *Kilishi, Tsire* and *Balangu* were estimated as 37.45%, 43.39% and 21.56%, respectively. Analysis of the market structures shows that all the *Suya* types were differentiated and market knowledge imperfect. The Gini coefficients for *Tsire* and *Balangu Suya* types were similar (0.5), with many producers and buyers and relatively free entry into the market, depicting monopolistic competitive structure. In addition to differentiated products and imperfect market knowledge, *Kilishi* market had a Gini Coefficient of 0.2, few producers and buyers with restricted freedom of entry, typical of oligopolistic competition. There is absence of scale economics in the three types of *Suya*. In a related study conducted by (Ahmadu and Ibrahim, 2013) in Benin City on determinants of revenue in suya production, the results showed that the costs of meat, charcoal and labour were the significant determinants of revenue in suya production. Costs of meat and charcoal positively influenced the revenue while labour cost correlated negatively with it. Cost of meat as the major cost component in Suya production. The combined effect of the independent variables explained about 63% of the variation in the revenue (R^2 = 0.6289). This variation was significant and the model used was of good fit as indicated by the value of F-statistic (11.8628). The daily generated revenue of ₦25,840.00 in preparing 18.74kg of beef into suya. This confirms the assertion of Igene, (2008) that Suya industry in Nigeria is small scale and traditionally produced. Also, Ladan, Y. Muazu, (2016) conducted a research on the economic analysis of Roasted meat (Suya) in Bauchi metropolitan. The result

revealed that processing was male dominated 96%, and a gross margin of ₦3210.00 per 10kg of beef processed to Suya. The Gini coefficient value of 0.71 which was high indicates high level of inequality in the market, an indication of a perfect market structure.

2.5 The Concept of Marketing

The word market has many connotations. NetMBA, (2010) defined market as the group of consumers or organizations that is interested in the product, has the resources to purchase the product, and is permitted by law and other regulations to acquire the product. A market is also thought of as a set up where two or more parties engage in exchange of goods, services and information (Management Study Guide, 2013). It is also viewed as a meeting point of buyers and sellers, a place where sellers and buyers meet and exchange takes place, an area for which there is a demand for goods, an area for which price determining forces demand and supply operates. Richardson (1986) provides a fairly broad and widely accepted definition of marketing. Where he defined marketing as all activities from the farm gate to the final consumer. Kotler (2003), also defines marketing as a social and managerial process by which individuals and groups obtain what they need through creating and exchanging products and values with others.

Before now, trade by barter was the only system of marketing but due to its disadvantages such as the necessity for double coincidence of wants, lack of unit of measurement, difficulty of holding large stock of commodities in storage for future exchange , the use of money as the medium for exchange evolved. Modern market however evolved from series of exchange system. People were concerned with production for consumption and inter-household exchange which was primarily subsistence in nature, providing little or no room for specialization. As a result of specialization of production in the economy, marketing

come to exist. However, the use of money as a medium for exchange marked the beginning of the development of an efficient marketing system, hence provides avenue for consumers to enjoy what they cannot provide (Olukosi, 2005)

2.5.1 Agricultural Product Marketing

This can be defined as a series of services involved in moving a product from the point of production to the point of consumption. Olukosi *et al*., (2009) view agricultural marketing from both micro and macro view points, from the macro view point agricultural marketing examines the total system of economic activities concerned with the flow of agricultural products from producers to final consumers, the kinds of institutions and the price making mechanism that guide those flows, the interactions among consumers, agribusiness firms, farmers and even government that determine the levels of expenditure, and sharing of those expenditures as income to market participants. Asogwu and Okweche (2012) thought of agricultural marketing as a process of satisfying human needs by bringing products to people in the proper form and at a proper time and place. Marketing has economic value because it gives form, time, place, utility to products and services. The marketing of agricultural products begins at the farm when the farmer harvests his products. The product when it is harvested cannot usually go directly to the consumers. Firstly, it is likely to be located some distance from the place of consumption in regular and continuous manner throughout the year. Secondly, storage is required to adjust supply to meet demand. Thirdly, a product when it has been harvested is rarely in a form acceptable to consumers. Therefore, it must be sorted, cleared and processed in various ways and must be presented to the consumer in convenient quality and quantities for sale. Finally the farmer expects payment when his produce leaves his possession, and hence some financial arrangements must be

made to cover all the various stages until the retailer sells the products to the final consumer. Akande, (1993) observed that, in Nigeria the agricultural marketing process takes place primarily at the farm gate or in periodic rural markets where prices are determined through haggling. Mendoza, (1995) also defined agricultural marketing as a system because marketing usually comprises several interrelated structures along the production, distribution and consumption units underpinning the economic process. According to Casavant *et, al.* (1999), agricultural marketing encompasses all of the business activities performed in directing flow of goods and services from the producers to the consumers. These activities are usually classified into six stages, these are: production, assembly, processing, wholesaling, retailing and consumption.

2.5.2 Meat Marketing

Marketing is all activities involving that are responsible in production, processing and distribution of goods and services in an attempt to provide utilities to the ultimate consumer (Olukosi, 2005), meat is like any other firm or industrial product identified by these activities. However, it is defined by food standard code of Australia as "The whole part of the carcass of any Buffalo, Camel, Cattle, Deer, Goat, Hare, Pig, Rabbit, or Sheep slaughtered other than in a wild state with exception of Kangaroo (FSAN Z,2002). Generally, meat is an excellent source of high biological value protein as well as vitamins. It is of two categories, i.e red or white meats. Red meat is characterized by high myoglobin while white is not, for example, poultry meat (Srilakshin, 2002). In Ausralia, red meat is industrially referred to as meat from Cattle, Sheep and Goat. Meat from Cattle is referred to as beef, while that of sheep and goat are called Mutton and Chevron respectively. Furthermore, raw meat or muscle contains 20-25g protein/100g. Cooked red meat contains

28/36g protein/100g, because the water content decreases as the nutrient becomes more concentrated during cooking. A protein content of meat is highly digestible and is the primary sources of all essential amino acid required for human body (FSANZ, 2002)

2.5.3 Marketing Margin

Exchange activities add value to products in marketing system and also generate income foe sellers, not all of these incomes are profit. A big marketing margin may infact result in a little profit, or even a loss for the seller. That depends on marketing costs as well as the selling and buying prices (Gilberto, 1995). High marketing margin reflects the return that is above average, or an increased price that is higher than that settled by the demand and supply forces of marketing services. At the same time, marketing margin is not always earned by middle men. Notwithstanding, different observers do confuse between marketing margin with a trade margin or profit. As a result Gilbarto (1995) defined marketing margin as a measure of shares of final selling price captured by a particular agent in the marketing chain. Alternatively, marketing margin is seen at the price of a collection of marketing services which is the outcome of demand and supply for the services (Tormek and Robinson, 1981) Prices are drive demand and supply are the determinant to that price and their causes charges in margin too. Marketing margin could be both in absolute and relative forms. T he absolute forms shows the difference between the price paid by consumer and that obtained by producer. While, the relative form is expressed in percentage terms and dependent on relative price levels according to (Timmer*, et,al*. 1983) . However, marketing margin of agricultural products are not uniform, they differ from product to product due to marketing services required. Some products require high cost of processing, storage, transportation and above all are not produced all year round.

2.6 Theoretical Frame Work on Tools of Analysis

2.6.1 Profitability Measurement: According to Canadian Agric-food Policy Institute (2013) farm profitability and performance can be measured using the following techniques:

(i) Gross margin and Gross margin efficiency

(ii) Operating profit Margin

(iii) Net Income

(iv) Operating expense ratio

(v) Return on equity

This agrees with Business Resources (2013) which identified three measures of profitability as follows:

(i) Gross Margin

(ii) Operating profit

(iii) Net profit

Also Olukosi and Erhabor (1988) have postulated the use of Gross Margin (GM) Analysis as a tool of measuring the profitability of farm enterprise, the tool use to estimate the cost and returns base on total cost and total revenue with the assumption that fixed cost in small scale farming are negligible. The difference between the total revenue and total cost is the Gross Margin (GM).

Gross Margin is mathematically expressed as: GM = TR – TVC

According to Chandra (2002), profitability can be defined as the ability to make profit from all the business activities of an organization, company, firm, or an enterprise. It shows how efficiently the management can make profit by using all the resources available in the

market.This is in agreement with the definition offered by Pandey (2002) who viewed profitability as the 'the ability of a given investment to earn a return from its use. However, James and Wachowicz (2003) observed that; the term 'Profitability' is not synonymous to the term 'Efficiency'. Profitability is an index of efficiency; and is regarded as a measure of efficiency and management guide to greater efficiency. Though, profitability is an important yardstick for measuring the efficiency, the extent of profitability cannot be taken as a final proof of efficiency. Sometimes satisfactory profits can mark inefficiency and conversely, a proper degree of efficiency can be accompanied by an absence of profit. The net profit figure simply reveals a satisfactory balance between the values receive and value given. The change in operational efficiency is merely one of the factors on which profitability of an enterprise largely depends. Moreover, there are many other factors besides efficiency, which affect the profitability.

2.6.2 Stochastic Production Frontier Analysis:

The stochastic Frontier Function

This production function was proposed independently by Aigner *et al.,* (1977) and Meeusen and Van den Broeck (1977). The stochastic frontier function was used to achieve objective 4 and 5. The frontier production differs from production function in the sense that the disturbance term has two components; one to account for technical inefficiency and the other to permit random events due to measurement error (Tran *et al.,* 1993). Jirgi *et al*., (2010) also adopted this technique in estimating the technical and allocative efficiencies of millet/cowpea intercropping in Niger State, Nigeria.

It is mathematically written as;

$Y_i = f(xi; \beta)\, e^{\varepsilon}$ ……..(4)

Where,

Y= the quantity of the original output, which is measured in kilogram (*kilishi, tsire* and *balangu*)

X_i …….Xn = costs of various inputs

β= a vector of parameters and

u= error term, where u is a stochastic disturbance term consisting of two independent elements μ and v.

$Y_i = f(xi; \beta) \exp(\mu+v)$ (implicit)……...(5)

The Empirical Stochastic Frontier Production Function

According to Kopp and Smith (1980), functional forms have a limited effect on empirical efficiency measurement. Double log forms have been used in many empirical studies, particularly in those relating to developing countries agricultural production (Battese, 1992). Other functional forms used in other studies include; exponential, semi-log, and double-log forms. The double log functional form was selected for this study because it meets the requirement of being self-dual, allowing an examination of economic efficiency. In this study, the following Double log functional form was selected.

$\text{Ln } y_i = \beta_0 + B_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + V_i - U_i$

(explicit) ……...(6)

Where,

Y_i = Output of beef products *(kilishi, tsire* and *balangu*) (kg)

X_i, s = costs of various inputs

V_i = Random noise

U_i= Technical inefficiency effect which is assumed to be independent of V_i

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Area

This study was conducted in Kano Metropolis, Kano state Nigeria. The state is situated in the Sudan Savannah agro- ecological zone of North Western Nigeria, between latitude 13ºN and 11°30'N and Longitude 8°30'E(Kano.gov.ng, 2007). It is made up of forty four Local government areas, eight of which are located in the metropolitan area, which includes:

Dala, Fagge, Gwale, Kumbotso, Kano Municipal, Nassarawa, Tarauni, and Ungogo. Kano state is bordered to the West and Northwest by Kastina state; to the east of Northeast Jigawa state; to the south by Bauchi state; and to the south west by Kaduna state (KNSG, 2006). The 2006, population census put the state estimated population at 9,383,683, with an annual growth rate of 3.3%. Given this growth rate, it is projected that by 2016 Kano state population would be 12,480,299. The Hausa and Fulani are the major tribes with almost all the Nigeria's minority tribes present and are engaged in one form of business, public service or trade. Other nationals are also found in Kano. The predominant occupation of the inhabitants is trading, commerce, civil service but only a few of those in the urban areas are engaged in farming activities. As a result of flourishing marketing activities Kano is called the center of Commerce and the nerve of the Northern states. People from all walks of life come to Kano to do one form of business or the other to earn a living. Kano state is also known for the production of livestock like cattle, sheep and goat, etc in both small and large scale. Crops like millet, sorghum, soybean, groundnut, pepper, onions and melon etc are also grown. In Kano, there are rural and urban markets where commodities are assembled. Urban markets operate on daily basis, but rural markets operate periodically, the processing and

marketing of beef products is also carried out in most streets of the metropolitan Kano. Due to the large population and many income generation activities, it implies that people will be very busy and require fast foods which will lead to greater market for beef products.

3.2 Data Collection

Primary data using structured questionnaire supplemented with oral interview schedule were used to collect the data with the help of experienced extension workers. The data collected includes socio-economic characteristics of the processors, cost and returns in beef products processing and processing constraints associated with beef products.

3.3 Sampling Procedure and Sample Size

Multi-stage sampling procedure was used in sampling the respondents. Stage one involves the purposive selection of five (5) Local Government Areas within the state due to high concentration of processors of beef products. These are Dala, Gwale, Kano Municipal, Nassarawa, and Tarauni. Processors and marketers of *tsire* and *balangu* were drawn from all the Local government areas, while respondents for *kilishi* processing were only drawn from Dala and Kano Municipal because of their high concentration in these areas. Stage two involved identification, preparation of sampling frame and selection of respondents. Proportionate sampling was used to select 30 % each for *kilishi, tsire* and *balangu* processors. This gives a total of 150 respondents. The analysis was made based on 142 completed and returned questionnaire; 47, 49 and 46 for *kilishi, tsire* and *balangu* respectively. Table 1 showing the estimated population and sample size of the beef products processors from the selected Local governments

Table 1: Showing Population and Sample frame of beef products processors from the selected Local governments.

LGAS	Estimated Population			30% sample		
	Kilishi	*Tsire*	*Balangu*	*kilishi*	*Tsire*	*Balangu*
Dala	75	33	40	22	11	12
Gwale	-	24	22	-	7	7
Nasaarawa	-	36	30	-	11	9
KMC	94	44	33	28	10	10
Tarauni	-	39	40	-	11	12
Total	167	171	165	50	50	50

Source: Field survey 2015,

3.4 Data Analysis

Descriptive statistics such as mean and frequency distribution was used to achieve objective i, v and vi, Stochastic frontier cost function analysis was used to achieve objectives ii and iv, Net Marketing Margin was used to achieve objective iii.

3.4.1 Descriptive Statistics

Arithmatic mean: It is obtained from the summation of set of scores divided by the number of observations, denoted mathematically as:

$X = \sum xi / N = \sum(X_1 + X_2 + X_3 ..... + Xn) / N$ .....(1)

Where X = Arithmatic mean

$\sum$ = summation notation

Xi = individual observation

I = 1,2,3,4,..... n

Percentage: This is obtained by dividing the total population by the number of observation and multiplying by 100.

$(\%) = X/N \times 100$ .....(2)

Thus, % = percentage

X individual observation

N = total obseration

3.4.2 Stochastic Frontier Function (SFF)

The stochastic frontier production functions proposed by Battese andCoelli, (1993) using Cobband- Douglass function used by Aboki, (2013) and Iwala, (2006) were employed in estimating the Technical efficiency in production.

The implicit form of the stocastic frontier production model is specified as follows.

$Y_{ij} = ß_0 + ß_1 \ln X_{1i} + ß_2 \ln X_{2i} + ß_3 \ln X3i + ß_4 \ln X_{4i} + ß_5 \ln X_{5i} + \nu_{ij} - U_{ij}$ ..... (1)

Where:

Y_1 = Quantity of beef processed (*kilishi, tsire, and balangu*) respectively.

X_1 = Cost of spices (₦)

X_2 = Cost of G/nut oil (₦)

X_3 = Cost of charcoal (₦)

X_4 = Cost of transportation (₦)

X_5 = Cost of labour ₦ (₦)

X_6 = Cost of packaging (₦)

X_7 = Cost of G/nut paste (₦) and

X_8 = Cost of G/nut cake (₦)

Vi = are assumed to be independent and identically distributed (iid) $N(0,\delta v^2)$ random errors independently distributed of the Ui's which are non negative rando variables associated with technical inefficiency of production.

U_i = are error terms assumed to be independently distributed such that U_i is obtained by truncations (at zero) of the $N(\mu,\delta^2)$ distribution.

$ß_0$ = constant term to be estimated

$ß_1$ - $ß_4$ = vectors of unknown parameters to be estimated

i = 1,2,3.....N

Technical efficiency (TE) will be determine by finding the ratio of the observed output (Y_i) with the frontier output (Y_{i*}) given the available technology, that is Y_i / Y_i*

i.e $TE = ß_0 + ß_1X_1 + V – U/ ß_0 + ß_1X_1 + V$

$TE = exop(- U) = e^{-u}$ ..... (2)

So that ; $0 \leq TE \leq 1$

3.4.3 Net Marketing Margin: This will be used to achieve objective iii. This is the difference between the price a buyer pays for a good or services and the price at which he sells that good or service. In general it is equal to the cost of providing the marketing services needed in a relatively competitive market. When the marketing entity can infuence prices, the marketing margin may exceed the cost of the marketing services (Inuwa *et al*, 2011)

NMM = TR - TC

Where, NMM = Net marketing margin for the selected beef products (₦/kg)

TR = total revenue for selling beef products in (₦/kg)

TMC = total cost of beef products processing / marketing (₦/kg)

Where, TMC = ($C_1+C_2+C_3+$.....Cn)

Where, C_1 = cost of beef in(₦/kg)

C_2 = cost of Fire wood (₦)

C_3 = cost of Labour (₦)

C_4 = cost of G / nut oil (₦)

C_5 = cost of Spices (₦)

3.4.4 Marketing services: This is the services needed to make the out put of an enterprice available to consumers in a form they prefer. This might include processing, packaging and transportation etc.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

This chapter covers the presentation and discussion of results so that inferences could be drawn. Most importantly answers to the research questions are addressed

4.1 Socioeconomic Characteristics of Beef Products Processors

Socio economic characteristics are important human attributes that assist them in getting clear understanding of their behavior as well providing a hint towards explaining their disposition that could help improve their productivity (Ayindele *et,al.* 2007). Emerging evidence nowadays as documented by Fabusoro (2000) and Haruna (2006) indicated that an improvement in productivity is influenced by some of these socio economic variables. These socio economic characteristics studied includes gender, marital status, educational status, sources of income, and membership of cooperative as shown in Table 2. In beef products processing, the processors are the marketers of the products especially *tsire* and *balangu*. Some *kilishi* processors do process and retail themselves, while some process and sell for dealers.

Table 2: Socio Economic Characteristics of beef processors

Characteristics	*Kilishi* (n=47)		*Balangu* (n=46)		*Tsire* (n=49)	
	F	%	F	%	F	%
Gender						
Male	47	100	46	100	49	100
Marital status						
Married	42	89.4	43	93.5	45	91.8
Single	5	10.6	3	6.5	4	8.2
Educational status						
Never attended school	1	2.1	3	6.5	1	2.0
Primary education	18	38.3	12	26.1	16	32.7
Secondary education	13	27.7	4	8.7	8	16.3
Qur'anic education	15	31.9	27	58.7	24	49.0
Major Source of income						
Beef processing	47	100	46	100	49	100
Cooperative membership						
Non members	47	100	46	100	49	100

Source: Field survey 2015 Note: F = Frequency and % = Percentage

4.1.1 Gender of Beef Processors

FAO, (1997) defined Gender as the relations between men and women both perceptual and material. It is a central organizing principle of societies and often governs the process of production and reproduction consumption and distribution. The result in Table 2 reveals that 100% of the respondents for *kilishi, balangu* and *tsire* were all men. This could be attributed to customs and religions which plays greater role in the livelihood of the people in the study area where only men are known to slaughter and sell animals. Males as heads of the family participate in outdoor activities and especially certain activities are exclusively done by men.

Men are naturally stronger than women and can bear more stressful jobs and are labour efficient in maximizing productivity (Akerele and Ambali, 2012).

4.1.2 Marital Status of Beef Processors

Marital status described individuals as married, single, widowed and divorced people in a community (Okafor and Andrew, 1994); the marital status of a person is expected to determine the degree of responsibility of that person in the society and the manner in which he or she will allocate scarce resources at his or her disposal (Mafimisebi *et,al*., 2013). In marketing studies, distribution of respondents by marital status is very important as it gives an idea of a marketing participant's extent of devotion to the marketing process and the likely effect of this on proceeds from the business. The results revealed that 89.4%, 93.5% and 91.8% of the respondents were all married men for *kilishi, balangu* and *tsire* respectively, where 10.5%, 6.5% and 8.2% of the respondents for *kilishi, balangu* and *tsire* respectively were not married. This implies that married individuals may have more helping hands (Zekeri, 2013). This shows that importance is attached to marriage in the study area because of culture, norms and values; they attached preference and respect to married individuals. This is in agreement with the findings of Ahmad, (2003) which says “different ethno- religious groups continue to attach prestige to marriage as an indicator of social responsibility, trust and achievement.

4.1.3 Western Educational Status of Beef Processors

Education as defined by Trichopoulou, *et.al.,* (2002) as “the wealth of knowledge acquired by an individual after studying a particular subject matter or experience life lessons that provides an understanding of a particular thing. Education is an instrument of shaping life and making essence of living meaningful. The analysis of level of western education

attained by the respondents revealed that 66%, 34.8% and 49% of the *kilishi*, *balangu* and *tsire* respondents have formal education and 31.9%, 58.7% and 49% of the *kilishi balangu* and *tsire* respondents have qur'anic education while only 2.1%, 6.5% and 2.0% of the *kilishi, balangu* and *tsire* respondents respectively never had any form of education. Because of low level of western education, processors may not be able to adequately use innovations for improvement in their businesses. This agrees with Ya'ishe *et,al.* (2009).

4.1.4 Source of Income of Beef Processors

In rural Africa and Nigeria in particular, livelihood strategies usually involve mixture of activities including farm and off farm (IFAD, 2009). In the case of beef products processing the results in Table 3 revealed that all the respondents for *kilishi, tsire* and *balangu* respectively have only one source of income 100% processing of beef products which cannot be combine efficiently with other activities. This is because they are engaged from morning till late in the night in buying, preparations processing and selling of these products.

4.1.5 Cooperative Membership of Beef Processors

Association is formed when individuals recognizing a common desirable needs among themselves come together to achieve a common goal. (Olukosi, 2007). Analysis in Table 2 revealed that all the respondents for *kilishi, balangu* and *tsire* do not form or belong to an association; this could be due to their level of education, which is low. Majority had no western education to allow them see the gains in being a member of cooperative association. Most formal financial institutions prefer dealing with people that are organized for proper and easy management. This therefore means that to be able to access loan, processors must come together to form cooperative.

Table 3: Age, Household Size and Processing Experience of the Respondents

Variables	*Kilishi* (n=47)				*Balangu* (n=46)				*Tsire* (n=49)			
	Min	Max	Mean	S.E	Min	Max	Mean	S.E	Min	Max	Mean	S.E
Age (Years)	25	65	43	1.42	25	63	44	1.23	28	58	44	1.11
Household size(No)	1	23	8	0.78	2	16	10	0.53	2	17	7	0.54
Experience (Years)	5	45	2	1.43	5	45	3	1.46	5	38	2	1.30

Source: Field survey 2015

4.1.6 Age of Beef Processors

Age refers to the number of years a person has lived. It indicated the years of the respondent from birth to the time of the study. The results in Table 3 revealed that the maximum age were 65, 63 and 58years respectively with mean ages of 43, 44 and 43years for *kilishi, balangu* and *tsire* respectively. This implies that majority of the processors falls within their active age which may lead to sustainability in production. According to Khan (1991) age of an individual make him mentally mature and able to take rational decision. This is also in conformity with FAO, (2001) that ages (15-64) are the economically productive age within a population.

4.1.7 Household Size of Beef Processors

Household size as defined by National Population Commission (NPC, 2006) is a group of people living under the same roof or in the same house. They share same source of food and think of themselves as a unit. The results in Table 5 revealed that the maximum household size is 23, 16 and 17 persons and with the mean household size for *kilishi, balangu* and *tsire* of 8, 10 and 7 persons respectively. This shows that the beef products processors had the responsibility of feeding their dependent which could increase household expenses but on the other hand could provide enough labour to increase productivity (Yaro *et, al.* 2012).

4.1.8 Experience of Beef Processors

Experience is the period spent by someone in a business. Experience is very vital in a business according to Darkyond, (2010). Experience plays a very important role in every human endeavor. It is the basis of skills acquisition and success in business (Mafimisebi and Okunmadewa, 2006). Where experience is low or lacking, the likely outcomes have been shown to be low productivity and income for farmers and agro-allied workers (Mafimisebi *et, al.,* 2012). It is generally believed that the more the experience of a market participant, the greater is the efficiency of that individual. Considering the years of experience of the beef products processors in the study area as in Table 3, the result shows that the maximum experience is 45, 45 and 38years for *kilishi balangu* and *tsire* processors respectively. However, experience enable someone have managerial skills in improving their business as supported by Ani (1998), Iheanacho (2000) who indicated that farming experience affects their managerial know-how and decision making to a large extent.

Table 4: Processing and Marketing Information for Beef Products by Respondents

Variables(Beef products)	**Respondents**					
	***Kilishi* (n=47)**		***Balangu* (n=46)**		***Tsire* (n=49)**	
	Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**
Source of capital						
Personal savings	42	89.4	36	78.3	40	81.6
Friends and Relatives	5	10.6	5	10.9	8	16.3
Informal lenders	0	0	5	10.9	1	2.0
Ownership status						
Partnership	4	8.5	3	6.5	1	2.0
Sole ownership	43	91.5	43	93.5	48	98.0
Method of sourcing beef						
Buy beef from others	44	93.6	43	93.5	48	98.0
Buy animal and slaughter	3	6.4	3	6.5	1	2.0
Buyers of beef products						
Retailers	20	42.6	0	0	0	0
Consumers	27	57.4	46	100	49	100
Place of selling products						
Processing area	26	55.3	29	63.0	37	75.5
Markets	17	36.2	17	37.0	12	24.5
Home	4	8.5	0	0	0	0
Processing method						
Traditional	47	100	28	60.9	37	75.5
Improved	0	0	18	39.1	12	24.5
Type of packaging						
Paper only	9	19.1	1	2.2	0	0
Paper and polythene	38	80.9	37	80.4	39	79.6
Foil paper and polythene	0	0	8	17.4	10	20.4

Source: Field survey 2015

The results in Table 4 revealed that 89.4%, 78.3% and 81.6% of the respondents for *kilishi, balangu* and *tsire* respectively had their capital sourced from personal savings, while 10.6%, 10.9% and 16.6% of the respondents for *kilishi, balangu* and *tsire* respectively get their capital source from friends and relatives where as 10.9% and 2.0% of the respondents for *balangu* and *tsire* respectively obtained their capital from informal lenders. None of the respondents obtained their capital from formal money lenders. The result in Table 4 revealed

that 91.5%, 93.5% and 98% of the respondents for *kilishi, balangu* and *tsire* processors respectively are sole owners of their businesses where as only 8.5%, 6.5% and 2% of the respondents for *kilishi balangu* and *tsire* respectively have partnership business. Results in Table 4 revealed that 93.6%, 93.5% and 98%of the respondents for *kilishi, balangu* and *tsire* respectively buy their beef from others, while only 6.4%, 6.5% and 2% the respondents for *kilishi, balangu* and *tsire* respectively buys animals and slaughter. Results in Table 4 revealed that 42.6% of the buyers of *kilishi* are retailers while 57.4% of buyers are consumers. Results in Table 4 also revealed that the buyers of *balangu* and *tsire* are 100% consumers of the products. The place of selling the processed products is also indicated in Table 4 which revealed that 55.3%, 63.0% and 75.5% of the respondents for *kilishi, balangu* and tsire respectively sell their products in their various processing areas; on the other hand 36.3%, 37.0% and 24.5% of the respondents for *kilishi, balangu* and *tsire* respectively sell their products in the market. The result also showed that only 8.5% of the respondents for *kilishi* sell their products at home

4.2 Relationship between Socio-economic characteristics of the Processors and the Quantity of beef processed.

In order to determine the relationship between the quantities of beef products processed and the socio-economic characteristics of the processors; stochastic frontier function analysis was used. Three models were developed, each for different beef product (*kilishi, tsire and balangu*).

Table 5: Showing relationship between socio-economic characteristics and Quantity of *kilishi* output.

Variables		coefficient	standard-error	t-ratio
Constant	δ0	-412	745	-0.553
Age of processor	δ 1	-110	108	-1.020
Household size	δ 2	-2.78	180	-0.015
Educational status	δ 3	594	821	0.723
Processing experience	δ 4	229	148	1.550

Source: Field survey 2015

Table 5 depicting the result of the relationship between the socio economic characteristics of the processors and the quantity of *kilishi* handled. The result revealed that none of the socio economic characteristics is significant in *kilishi* processing; but the coefficient of the estimates for education and processing experience are positive.

Table 6: Showing relationship between socio-economic characteristics and Quantity of *tsire* output.

Variables	Parameters	Coefficient	Standard error	T- values
Constant	δ0	-0.449	0.999	-0.000
Age of processor	δ 1	-0.195	0.999	-0.019
Household size	δ 2	-0.362	0.999	-0.004
Educational status	δ 3	-0.155	0.999	-0.002
Processing experience	δ 4	-0.961	0.999	-0.009

Source: Field survey 2015

The result of the analysis between the socio economic characteristics of the processors and quantities of *tsire* processed is depicted in Table 6. The result revealed that the coefficients of all the socio economic variables are negative and not significant.

Table 7: Showing relationship between socio-economic characteristics and quantity of *balangu* processed.

Variables		coefficient	standard-error	t-ratio
Constant	δ 0	-3.540	1.000	-0.000
Age of processor	δ 1	6.050	1.000	-0.000
Household size	δ 2	6.460	1.000	0.000
Educational status	δ 3	-3.290	1.000	-0.000
Processing experience	δ 4	1.430	1.000	1.43E-04

Source: Field survey 2015

Table 7 depicting the result of the relationship between the socio economic characteristics of the processors and the quantity of *kilishi* handled. The result revealed that none of the socio economic characteristics is significant in *kilishi* processing; but the coefficient of the estimates for education and processing experience are positive.

4.3 Average Costs and Returns Analysis for *kilishi, tsire and balangu* Processing

Cost in marketing are the actual expenses incurred in the performance of processing functions as commodity moves from the production units to the ultimate consumer (Olukosi, 2005). As some businesses differs in nature of operations likewise their incurred expenses differs a great deal. Profitability of beef products processing is determined by subtracting the total cost of processing and marketing services from the total revenue generated from the sale of these products. Costs and returns associated with the selected beef products (*kilishi*, *tsire* and *balangu*) processing is presented in the Table 8.

Table 8: Average Cost and Returns Analysis for the Quantity of *kilishi, tsire* and *balangu* Processed per Production Cycle

Variables	*Kilishi* (n=47)		*Tsire* (n=49)		*Balangu* (n=46)	
	Cost (₦/kg)	%TVC	Cost (₦/kg)	%TVC	Cost (₦/kg)	%TVC
Variable cost						
Beef	31663.62	86.73	30974.49	88.12	33175	89.11
Fuel wood/Charcoal	589.36	1.61	494.90	1.41	623.91	1.68
Spices	590.43	1.62	463.27	1.32	603.26	1.62
Vegetables	0	0	353.06	1.00	465.22	1.25
Groundnut Oil	551.06	1.51	570.82	1.62	563.04	1.51
G/nut cake/Paste	1353.19	3.71	656.12	1.87	0	0
Packaging	344.68	0.94	331.63	0.94	352.17	0.95
Transportation	400.00	1.10	350.00	1.00	408.70	1.10
Labour	1014.89	2.78	957.14	2.72	1036.96	2.79
TVC	**36507.23**	**100.00**	**35151.43**	**100.00**	**37228.26**	**100.00**
Fixed cost						
TFC(depreciated)	**3,655.92**	**100.00**	**3,994.10**	**100.00**	**3,857.48**	**100.00**
Total cost (TC)	**40,163.15**		**39,145.53**		**41,222.36**	
Revenue						
Total output(kg)	36.83		36.41		39.65	
Unit price (₦ / kg)	2000		1600		1400	
Total revenue (₦)	73,668.09		58,253.06		55,513.04	
Net Income (₦)	33,504.94		19,107.53		14,290,68	
RNI (₦)	**1.83**		**1.48**		**1.35**	

Source: Field survey 2015

Table 8 presents the cost and returns analysis for the selected beef products processing. The variable costs components in the analysis includes beef, fuel wood/charcoal, spices, vegetables, groundnut oil, ground nut cake/paste, packaging, transportation and labour. The fixed costs are metal oven, mud oven, water basin, table/chairs, axe, knife and metal stick/wooden stick) .The differences in the variable inputs are, in *kilishi* and *tsire* both uses ground nut cake while in *balangu* there is no ground nut cake. Vegetables are used in *tsire* and *balangu* processing but not used in *kilishi.* The result shows that beef accounted for greater percentage of the variable cost for *kilishi, tsire* and *balangu* which is 86.72% 88.12%

and 89.11% respectively while the other variable inputs only accounted for 11.2%, 11.88% and 10.89% for *kilishi, tsire* and *balangu* respectively. The average total costs of processing 36.83kg, 36.41kg and 39.65kg of *kilishi tsire* and *balangu* were ₦40,165.15, ₦39,145.53 and ₦41,222.36 respectively. The average prices per kilogram of processed beef were ₦2000, ₦1600 and ₦1400 for *kilishi, tsire* and *balangu* respectively; whereas the total average revenues generated were ₦73,668.09, ₦58,253.06 and ₦55,513.04 for *kilishi, tsire* and *balangu* for 36.83kg, 36.41kg and 39.63kg of beef respectively. The net incomes for the three enterprises were ₦33,504.94 ₦19,107.53 and ₦14,290.68 respectively. This indicated that the marketing of *kilishi, tsire* and *balangu* in the study area were profitable; which agrees with the findings of Iliyasu, *et al*. (2008) in a study conducted in Maiduguri metropolis on the profitability of *kilishi*, *tsire* and *balangu* and Mamza et, al., (2014) In a study on Competitiveness of beef processing in Borno State, Nigeria. *kilishi, tsire* and *balangu* were found to be profitable. When comparing their profitability; *kilishi* has the highest profit margin (₦33,504.94) followed by *tsire* (₦19,107.53) and *balangu* (₦14,290.68) the result also revealed that for every naira invested in the processing of *kilishi*, *tsire* and *balangu* in the study area, the sum of ₦1.83, ₦1.48 and ₦1.35 respectively were returned per naira invested. This concur with the findings of Iliyasu *et, al*., (2008) Iliyasu, *et. al.*, (2013) and Ahmadu *et, al.,* (2013)

4.4 Stochastic Frontier Cost Function

However, the cost function is the same with that of the production function, but for cost function Ui defines how far a firm operate above the cost frontier. Also,Schmid and Lovell note that the log-likelyhood functions for cost function is the same as that of production frontier except for a few sign changes (Frontier 4.1)

Table 9: Estimation of stochastic frontier cost function for *kilishi* production

Variables	Parameters	Coefficients	Standard error	T- values
Constant	β0	9.62E+02	1.18E+03	8.17E-01
Charcoal	β 1	1.20E+01	6.29E+00	1.9069853*
Spices	β 2	2.84E-01	6.54E-01	4.34E-01
G/nut paste	β 3	0.00+00	1.56E+00	-0.760
G/nut oil	β 4	3.70E+00	1.65E+00	2.2401997**
Packaging	β 5	-9.72E-01	1.28E+00	-0.760
Transport	β 6	1.02E+01	4.05E+00	2.5203535**
Labour	β 7	5.82E+00	1.62E+00	3.6044181***
Constant	δ 0	-412+06	7.45E+00	-0.553
Inefficiency Model				
Age of processor	δ1	-110+01	1.08+00	-1.020
Household size	δ 2	-2.78+02	1.80E+02	-0.015
Educational status	δ 3	5.94E+02	8.21E+02	7.23E-01
Processing experience	δ4	2.29E+02	1.48E+02	1.55E+00
	Sigma	5.61E+06	1.05E+00	5344829.2***
	Gama (ϒ)	7.58E-01	1.34E-01	5.6669848***
	Likely hood			
	LR test	5.23E+00		

$\delta^2=\delta v^2 + \delta^2 u$, $\Upsilon = \delta^2 u / \delta^2$

Significance levels: *** =1%, ** = 5%, * = 10%

The maximum likelihood estimates (MLE) of the stochastic frontier trans–log cost function for *kilishi* processors in Kano Metropolis is depicted in Table 9. The variables included in the analysis are charcoal, spices, groundnut oil, packaging transportation and labour. The estimated coefficients of the charcoal, groundnut oil, transportation and labour are all positive and significant at 1%, 5%, 5% and 10% levels respectively. Spices and groundnut paste have positive coefficients but not significant. The charcoal, groundnut oil, transportation and labour costs have direct and positive relationship with total cost of *kilish*i production implying that they are the important components that determine the cost of *kilishi* processing. The estimated gamma(ϒ) parameter for stochastic frontier cost function was 75% positive and significant at 1% level, indicating that 75% of the total variability in *kilishi* output is unexplained by the costs function but due to inefficiencies. The estimated sigma

square (δ^2) is positive and significant at 10% level. The estimated coefficient was 56%, this shows the goodness of fit and correctness of the distributional form assumed for composite error in the model. The results also revealed that the log-likelihood ratio was 5.230, representing the value that maximizes the joint densities in the estimated model.

Table 10: Estimation of stochastic frontier cost function for *tsire* production

Variables	Parameters	Coefficient	Standard error	T- values
Constant	β0	0.471E+04	0.999E+00	O.471E+04
Firewood	β 1	-0.125E+02	0.987E+00	-0.127E+02
Spices	β 2	0.485E+01	0.859E+00	0.565E+01***
Vegetable	β 3	0.850E+01	0.989E+00	0.859E+01***
G/nut cake	β 4	0.408E-02	0.993E+00	0.410E-02
G/nut oil	5 β	0.214E+00	0.926E+00	0.231E+01**
Packaging	6 β	-0.715E+01	0.942E+00	-0.758E+01***
Transport	β 7	-0.115E+02	0.992E+00	-0.116E+02
Labour	β 8	0.250E+02	0.984E+00	0.254E+02***
Constant	δ0	-0.449E-03	0.999E+00	-0.449E-03
Inefficiency Model				
Age of processor	δ 1	-0.195E-01	0.999E+00	-0.195E-01
Household size	δ 2	-0.362E-02	0.999E+00	-0.362E-02
Educational status	δ 3	-0.154E-02	0.999E+00	-0.154E-02
Processing experience	δ 4	-0.961E-02	0.999E+00	-0.961E-02
	Sigma(δ^2)	0.577E+08	0.1000+01	0.577E+08***
	Gama (ϒ)	0.999E+00	0.972E-05	0.102E+06***
	Llikely-hood	-0.468E+03		
	LR test	0.322E+02		

Source: Field survey 2015

$\delta^2=\delta v^2 + \delta^2 u$, $\Upsilon = \delta^2 u / \delta^2$

Significance levels: *** =1%, ** = 5%, * = 10%

The maximum likelihood estimate of the stochastic frontier cost function for *tsire* processing in Kano Metropolis is presented Table 10. The variables included in the analysis are firewood, spices, vegetables, ground nut cake, ground nut oil, packaging, transportation and labour. The estimated coefficients of the cost function parameters for spices, vegetables, ground nut oil, packaging and labour are all positive and significant at 1%, 1%, 5%, 1% and 1% probability levels respectively; this implies a positive and direct relationship with total cost of *tsire* processing this also shows that they are the important components that determine the cost of *tsire* processing. The estimated gamma(ϒ) parameter for stochastic frontier cost function was 99%, positive and significant at 1% level, indicating that 99% of the total variability in *tsire* output is unexplained by the costs function but due to inefficiencies. The estimated sigma square (δ^2) was positive and significant at 1% level. The

estimated coefficient was 57%, this shows the goodness of fit and correctness of the distributional form assumed for composite error in the model. The results also revealed that the log-likelihood ratio was 32.28 representing the value that maximizes the joint densities in the estimated model.

Table 11: Estimation of stochastic frontier cost function for *balangu* production

Variables	Parameters	Coefficient	Standard error	T - Value
Constant	beta 0	-1.89E+03	1.00E+00	-1.89E+03
Firewood	beta 1	-1.04E+00	1.00E+00	-1.04E+00
Spices	beta 2	1.45E+00	1.00E+00	1.45E+00
Vegetable	beta 3	2.04E+00	1.00E+00	2.04E+00**
G/nut oil	beta 4	9.37E+00	1.00E+00	9.37E+00***
Packaging	beta 5	1.49E+01	1.00E+00	1.49E+01***
Transport	beta 6	-5.78E+00	1.00E+00	-5.78E+00
Labour	beta 7	-3.81E+00	1.00E+00	-3.81E+00
Inefficiency Model				
Constant	delta 0	-3.54E-06	1.00E+00	-3.54E-06
Age of processors	delta 1	6.05E-05	1.00E+00	6.05E-05
Household size	delta 2	6.46E-05	1.00E+00	6.46E-05
Educational status	delta 3	-3.29E-05	1.00E+00	-3.29E-05
Processing experience	delta 4	1.43E-04	1.00E+00	1.43E-04
	sigma-squared(δ^2)	1.45E+07	1.00E+00	1.45E+07***
	gamma	1.00E+00	3.67E-03	2.72E+02***
	Log-likelihood function	-4.11E+02		
	LR test	2.44E+01		

Source: Field survey 2015
$\delta^2=\delta v^2 + \delta^2 u$, $\Upsilon = \delta^2 u / \delta^2$
Significance levels: *** =1%, ** = 5%, * = 10%

The maximum likelihood estimate of the stochastic frontier cost function for *balangu* processing in Kano Metropolis is presented Table 11. The variables included in the analysis are firewood, spices, vegetables, ground nut oil, packaging, transportation and labour. The estimated coefficients of the cost function parameters for vegetables, ground nut oil, and packaging are all positive and significant at 5%, 1% and1%, probability levels respectively; this implies a positive and direct relationship with total cost of *tsire* processing this also

shows that they are the important components that determine the cost of *tsire* processing. The estimated gamma(ϒ) parameter for stochastic frontier cost function was 100%, positive and significant at 1% level, indicating that 100% of the total variability in *tsire* output is unexplained by the costs function but due to inefficiencies. The estimated sigma square (δ^2) was positive and significant at 1% level. The estimated coefficient was 14%, this shows the goodness of fit and correctness of the distributional form assumed for composite error in the model. The results also revealed that the log-likelihood ratio was 24.4 representing the value that maximizes the joint densities in the estimated model.

4.5 Marketing Arrangement of the Beef Products (*kilishi, tsire* and *balangu*),

In the marketing of processed beef products (*kilishi*, *tsire* and *balangu*), the marketing arrangement is not formal because the processors of these products are also the marketers except in the case of *kilishi* whereby some of the processors have dealers that buy from them. These dealers buy in bulk and sell in Eastern and Western parts of Nigeria with very few of them exporting to neighboring countries like Tchad, Niger, Cameroun etc. This is made possible because *kilishi* has a longer shelf life due to very low moisture content. When properly packaged can take up to six (6) months. In the case of *tsire* and *balangu* there are no dealers. The marketing is done between the processors and the consumers, although some are hired by people that have ceremonies to specially process for them.

Table 2: Showing the processing and marketing arrangement of (*kilishi,tsire and balangu*)

Marketing arrangement	Respondents					
	kilishi	%	*tsire*	%	*balangu*	%
Retailing by processors	35	74.5	49	100	46	100
Whole sale by processors	12	25.5	0	0	0	0
	47		49		46	

Field survey 2015

Analysis in Table 8 revealed that 74.5% of the *kilishi* processors retail their products, while 25.5% shows that they process and sale whole sellers who take these product to other parts of Nigeria to sell, especially West, South east and South and neighboring countries like Niger, Benin Republic and Cameroun. Analysis in Table 12 also revealed that all the processors of tsire and *balangu*, retail their products by themselves as it is difficult to transport roasted meat to distant places due to the perishable nature of meat with high moisture content.

4.6 Major Constraints Militating against Beef Products Processing

The processing of agricultural products in developing countries like Nigeria is associated with numerous constraints (Olukosi *et al,* 2007). Despite all the contributions derived from beef products processing like fast foods for very busy working class, employment generation, meeting the nutrients requirements in various forms etc. The enterprise is still faced with numerous challenges as could be seen in Table 13 to 15.

Table 13: **Constraints militating against *kilishi* processing**

Constraints	***Kilishi* (n=47)**		
	F	**%**	**Rank**
Inadequate capital	42	89.4	1st
High cost of beef	41	87.2	2nd
Double taxation	40	85.1	3rd
Inadequate standard unit of measurement	38	80.9	4th
Inadequate processing method	33	70.2	5th
inadequate marketing strategy	29	61.7	6th

Source: Field survey 2015

The results in table 13 revealed that; inadequate capital was rated the first constraints militating against *kilishi* processing in the study area with 89.4 %. This is due to the inability of the processors to form a cooperative association that would enable them access loan from formal financial institutions to support their processing activities. The result also revealed that; High cost of beef accounted for the second major constraint militating against *kilishi* processing in the study area which accounted for 87.2 %. This could not be far from the fact that majority of the processors buy beef individually instead of coming together to buy cow and slaughter at a lesser cost. The results also indicated that double taxation was rated the third major constraint militating against *kilishi* processing with 85.1 %. This double taxation by both state and local governments adds to their cost of processing and reducing their returns. The result in table 13 also revealed that inadequate standard unit of measurement; inadequate processing method and inadequate marketing strategies are some also constraints militating against *kilishi* processing in the study area with 80.9%, 70.2% and 61.7% respectiv

Table 14: **Constraints militating against *tsire* processing**

Constraints	***Tsire* (n=49)**		
	F	**%**	**Rank**
Inadequate capital	40	81.6	1st
High cost of beef	38	77.6	2nd
Double taxation	34	69.4	3rd
Inadequate standard unit of measurement	33	65.3	4th
Inadequate processing method	27	55.1	5th
inadequate marketing strategy	20	40.8	6th

Source: Field survey 2015

The results in table 14 revealed that; inadequate capital was rated the first constraints militating against *tsire* processing in the study area with 81.6 %. This is due to the inability of the processors to form a cooperative association that would enable them access loan from formal financial institutions to support their processing activities. The result also revealed that; High cost of beef accounted for the second major constraint militating against tsire processing in the study area which accounted for 77.6 %. This could not be far from the fact that majority of the processors buy beef individually instead of coming together to buy cow and slaughter at a lesser cost. The results also indicated that double taxation was rated the third major constraint militating against *tsire* processing with 69.4 %. This double taxation by both state and local governments adds to their cost of processing and reducing their returns. The result in table 14 also revealed that inadequate standard unit of measurement; inadequate processing method and inadequate marketing strategies are also constraints militating against tsire processing in the study area with 65.3%, 55.1% and 40.8% respectively.

Table 15: **Constraints militating against *balangu* processing**

Constraints	***Balangu* (n=46)**		
	F	**%**	**Rank**
Inadequate capital	45	97.8	1st
High cost of beef	40	87.0	2nd
Double taxation	37	80.4	4th
Inadequate standard unit of measurement	39	84.8	3rd
Inadequate processing method	25	54.3	6th
inadequate marketing strategy	22	47.8	7th

Source: Field survey 2015

The results in table 15 revealed that; inadequate capital was rated the first constraints militating against *balangu* processing in the study area with 97.8%. This is due to the inability of the processors to form a cooperative association that would enable them access loan from formal financial institutions to support their processing activities. The result also revealed that; High cost of beef accounted for the second major constraint militating against *balangu* processing in the study area which accounted for 87.0 %. This could not be far from the fact that majority of the processors buy beef individually instead of coming together to buy cow and slaughter at a lesser cost. The results also indicated that double taxation was rated the third major constraint militating against *balangu* processing with 84.8 %. This double taxation by both state and local governments adds to their cost of processing and reducing their returns. The result in table 15 also revealed that inadequate standard unit of measurement; inadequate processing method and inadequate marketing strategies are also constraints militating against *balangu* processing in the study area with 80.4%, 54.3% and 47.8% respectively.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The study compared the profitability of processing *kilishi, tsire* and *balangu* in the Kano metropolis, Kano, Nigeria. Five out of the eight metropolitan local government areas were purposefully selected for this study; they are Dala, Gwale, and Kano municipal, Nassarawa and Tarauni local government areas. Primary data were collected using structured questionnaire and supported with verbal interview. The study was based on the 142 successfully completed and returned questionnaire. The analytical tools employed include descriptive statistics, stochastic frontier cost function and Net Marketing margin analysis. The result shows that the three categories of processors have similar socio-economic characteristics especially gender, marital status, major sources of income, educational status, and years of experience. The returns per naira invested were ₦1.83, ₦1.48 and ₦1.35 for *kilishi, tsire* and *balangu* respectively; this shows the profitability level. The result revealed that none of the socio economic characteristics has significant relationship with quantity of *kilishi*, *tsire* and *balangu* output. The estimated gamma(ϒ) parameter for stochastic frontier cost function was 75% positive and significant at 1% level, indicating that 75% of the total variability in *kilishi* output is unexplained by the costs function but due to inefficiencies. The estimated sigma square (δ^2) is positive and significant at 10% level. The estimated coefficient was 56%, this shows the goodness of fit and correctness of the distributional form assumed for composite error in the model. The estimated gamma(ϒ) parameter for stochastic frontier cost function was 99%, positive and significant at 1% level, indicating that 99% of the total variability in *tsire* output is unexplained by the costs function but due to inefficiencies. The estimated sigma square (δ^2) was positive and significant at 1% level.

The estimated coefficient was 57%, this shows the goodness of fit and correctness of the distributional form assumed for composite error in the model. The estimated gamma(ϒ) parameter for stochastic frontier cost function was 100%, positive and significant at 1% level, indicating that 100% of the total variability in *tsire* output is unexplained by the costs function but due to inefficiencies. The estimated sigma square (δ^2) was positive and significant at 1% level. The estimated coefficient was 14%, this shows the goodness of fit and correctness of the distributional form assumed for composite error in the model. The major constraints encountered are high cost of beef, inadequate access to capital for expansion, double taxation, and inadequate information on new processing technology.

5.2 Conclusions

Based on the findings of this study, it could be concluded that processing of *kilishi, tsire* and *balangu* are profitable and viable for income generation, job creation and sources of livelihood among the processors. This could be seen from the cost and returns analysis for the various beef products with *kilishi* having the highest net income followed by *tsire* while *balangu* has the least net income. These will give would be investors opportunity to make choice where best to invest in as could be seen from the returns per naira invested were ₦1.83, ₦1.48 and ₦1.35 for *kilishi, tsire* and *balangu* respectively. It is also concluded that charcoal, groundnut oil, transportation and labour were the major cost components in *kilishi* processing. In *tsire* processing; spices, vegetables, ground nut oil, packaging and labour were the major cost components that determine the cost of *tsire* processing in the study area. In *balangu* processing; the major cost components were vegetables, ground nut oil and packaging. Despite the profitability of these beef products enterprises, the processors are

faced with some constrains that militate against expansion and efficient performance in their business.

5.3 RECOMMENDATIONS

Based on the research findings, the following recommendations are suggested:

1. The processors should form cooperative in order to be able to buy beef in bulk at a reduced costs thereby increasing their profit level as well enjoy the economies of scale.
2. The processors should form and strengthen their association for extensive information sharing and in-lending between members,
3. Government and other lending agencies should assist the processors with accessible and affordable soft loans with low interest in order to reduce the problems of inadequate capital for expansion.
4. Double taxation should be stopped by the government at all levels.
5. Effective formulation and implementation of policy to enforce the use of standard measure in all ramifications of the beef products business would increase profitability level, hence increasing returns to every naira invested.
6. Government should encourage researchers to develop cheap labour and energy saving devices which will reduce the cost of operation for maximum profit to be obtained by the processors.

REFFERENCES

Aboki, E.,Jongur. A.A., Onuand., J.I. and Umaru, I.I, (2013). Analysis of Technical, Economic and Allocative Efficiencies of Cassava Production in Taraba State. Nigeria *Journal of Agriculture and Vetrinary Science (IOS-JAVS)*. Vol.5(3) Pp19-26

Adegeye, A J and Dittor, S R (1985).The economics of production and marketing of sugar cane products in Nigeria: A case study of Nigeria sugar company (NIUCO) Bachita. An unpublished B.Sc Agric project of the Department of Agric Economics and Rural Sociology, Ahmadu Bello University, Zaria Nigeria Pp105

Adekanye, T.O. (1988): Readings in Agricultural marketing. Longman, Ikeja Nigeria

Agboola. M.O. Balcilar.,(2012) Impact of food security on Urban poverty: A case study of Lagos State, Nigeria. Procedia – Social and Behavioral Sciences, 65, 1225 – 1229.

Ahmad, B (2003): Economic analysis of fertilizer used in maize production in the northern Guinea Savanna of Nigeria: An (unpublished) Ph.d Thesis of the Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University Zaria. Pp 4–5

Ahmadu, J. 2006. Resource use efficiency in traditional and modern *Kilishi* production in Nigeria. An M.sc thesis, Department of Agricultural Economics and Extension Services, Faculty of Agriculture, University of Benin, Benin City, Nigeria

Ahmadu, *et al*.,(2013) Determinants of Revenue in Suya production in Benin City. Edo State Nigeria

Ahmadu, J., Alufohai, G. O., Erhabor, P. O. and Igene, J. O. 2008a. Profitability of Kilishi production under traditional and modern technologies in Nigeria. *Journal of sustainable Tropical Agricultural Research* 28:14 – 21

Aigner, Denis, Knox Lovell, C. A. and Sshmidt Peter, (1976) Formulation and estimation of stochastic frontier production model: *Journal of Econometrics*. North Holland Publishing Company. 6 (1977) Pp 21-37

Ahmadu, J., Erhabor, P. O., Orewa, S. I. and Igene, J. O. 2008b. Resource use efficiency in traditional kilishi production in Bauchi and Kaduna state of Nigeria. *Journal of Agricultural Research and Policies* 3 (2): 59 – 64.

Akande, O. (1993). The Marketing Board System. Proceedings of an international Conference: 'The Nigerian Institute of Social and Economics Research. NISER Press Ibadan, Nigeria Pp127-134

Akerele, E.O and Ambali, O.I (2012): Consumption and savings pattern among rural farming households in Abeakuta north Local Government Area of Ogun State. *Journal of Agriculture and Veterinary Sciences*.

Alinor, A. N.(2002), "Economic study of cassava processing in Nsukka agricultural Zone of Enugu State" Unpublished M.Sc Thesis, Department of Agricultural Economics, University of Nigeria, Nsukka

Anonymous, (2015) Common methods of processing and preserving foodhttp://www.streetdirectory.com/food_editorials/meals/food/common_methods_of_processing_and_preserving_food.html accessed on 28/10/ 2016

Ani, A .O. (1988) Assessment of Farmers extension education needs in Yobe State, Nigeria Cited in Ani A, O Ogunika and S. S Ifah (2004) Relationship between socio economic characteristics of rural women farmers and their adoption of farm technologies in South Ebonyi, Ebonyi State, Nigeria. International journal of Agriculture and Biology 6(5) 802-805

Amaza, P.S. and Olayemi,O. (2002).Analysis of Technical Efficiency in Food Crop Production in Gombe State of Nigeria: *Applied Economics*.Vol.9 No.13 Pp.146-152

American Meat Science Association, (2016) American Meat Science Association. 1 E Main St Ste 200 | Champaign, IL USA 61820 | 1 800 517 AMSA • 1 217 356 5370

Ayinde, I.A, Okunenye, P.A Momoh S and Aroolaran, A.B (2007): Socio Economic factors affecting insecticide use in cowpea production in Kano State. In; Haruna, U. Jibril, S.A. Mancha, Y.P and Nasiru (M eds),, C consolidation of growth and development for Agricultural sector. *Proceedings of the 9th annual conference of the Nigerian Association of Agricultural Economists (Vol.2) 5th – 8th November 2007, held at Abubakar Tafawa Balewa University Bauchi, Nigeria. Pp 449*

Asogwu, B.C and Okweche, V.A (2012): Marketing of Agricultural Produce Among **Rural Farm Households in Nigeria:** ***International Journal of Business and Social Sciences,*** **3(13): 27-38**

Baba, M. Bello N and Aminu A. (2008) Analysis of Socio-economic benefits of Chicken dressing business in three urban metropolis of Kano, Nigeria. *In: Proceedings of 33rd annual conference, Nigerian society of Animal production: Olabisi, Onabanjo University, Ogun State, Nigeria.* Bacteriological quality of smoked meat product (suya): *Nig. Food. J.* 23: 239-242

Babatunde, R.O., and Qaim, M. (2010) Impact of off- farm income on food security and nutrition in Nigeria. Food policy, 35(4), 303 - 311

Badau, M. H. Igene, J. O. Collison, E. K. and Nkama, I. (1997). Studies on production, physio-chemical and sensory properties of a standard *Kilishi* ingredient mix powder. *International Journal of Food science and Nutrition* 4: 165 – 168

Bressler, R.G. and R.A King (1970), **Markets, Prices and Inter- Regional Trade**; N.Y. USA; John Wiley and Sons.

Business Resources,(2013). How to Analyze Profitability; http://zionbusiness **resourcescenter.com.[Accessed on 23/06/2013].**

C B N, (2011), Monetary Policy Circular, Central Bank of Nigeria (CBN)

Chandra, P. (2002**). Financial Management: Theory and Practice**. Tata McGraw Hill **Publishing company Limited New Delhi, India.**

Clavance, H. (1979). *Economic Development: An Introduction*, Macmillan, London Pp. 321-322 Ceriani, L. and Verme, P. J Econ inequal (2012) |"Variability and Mutability"

Darkyong, T.G. (2010).The performance of sweet orange marketing in Kano metropolis: An (unpublished project) Development of Agricultural Economics and Extension, Bayero University Kano Pp 18 – 24

Erath policy Institute, (2012) Live stock and Human population in Nigeria, Retrieved from www.earth-policy.org/datacenter/xls/book_fpe_cls_17_al.xlsx

Edema, M.O., Osho, A.T and Diala. C.I., (2008). Evaluation of microbial hazards associated with the processing of *Suya* (a grilled meat product). *Scientific Research and Essay* 3 (12): 621.

Ekine D.I, Albert C.O. and Peregba T.A., (2012): Expenditure Pattern for Beef Consumption in Selected Households in Southern Nigeria: Developing Country Studies. ISSN 2224-607X (Paper) ISSN 2225-0565 (Online) Vol 2, No.7, 2012.

Enem, S. I. and Onyekwodin, E. O. (2009): Evaluation of bacterial contamination of *Suya* at Nsukka, Enugu State, Nigeria. *Animal production Research Advances*. Accessed: 23rd July, 2013 at: www.ajol.info/index.php/apra/article/view/49795

Fabusoro, S.(2000) Adoption of improved varieties of cassava production by farmers in Osun State , Nigeria. *The Ogun journal of Agricultural Science s Vol.4 Pp40 – 48*

FAO, (1997). **Small Scale Irrigation for Arid Zones**: Principles and Practice. Mac Millian Publishers; Rome, Italy.

FAO,(2001). Food and Agricultural Organization, Production Year Book: FAOSTAT. Vol.49, No130, Pp39 – 41

FAO, (2003). Diet nutrition and the prevention of chronic diseases. Retrieved from http /www.fao.org/docrep/005/ac9eo5, htm / Top of page.

FAO, (2007) Meat processing Technology for Small – to medium Producers: Gunter Heinz and Peter Hautzinger**.** Bangkok, 2007. Food Processing Lesson Plan *Johns Hopkins Bloomberg School of Public Health*. April 7, 2015

FAO,(2013).Meatquality.Retrievedfromhttp/www.fao.org/ag/againfo/themes/en/meatquality_meat.html

FSANZ (2002) *Food standard of Australia,* (New Zealand, Australia)

Gambo B.G, Raufu, I.A and Ambali A.G, (2010) Residents in Borno State and their meat Preference among Ruminant species: *African Journal of General Agriculture Vol. 6, No. 2, June 30, 2010 printed in Nigeria*

Gilberto, M.(1995). "A Primer on Marketing Channel and Margin" In: **Prices, Products and People**: Analyzing Agricultural Marketing in Developing Countries: Lynne Publishers Boulder-London.

Haruna , T. (2006) Comparative study of consumer purchase attitude of local and foreign Rice. Abia state, Nigeria*. Proceedings of 42nd annual conference of Agricultural Society of Nigeria*. Pp764 – 767

IFAD, (2009) Enabling poor people to overcome poverty in Nigeria [Online], 2009, http: //www.ruralpovertyportal.org

Igene, J. O. (2008). **Traditional African Meat Products for Food Security and Agro-industrialization**: Development Challenges, Lambert academic publishing Germany. PP.1 – 210

Igene, J. O and Mohammed, I. D (1983): Consumers' attitude towards *suya*, an indigenous meat product. *Annals of Borno* 1:169

Igene, J. O (1982) Upgrading Suya, is Technology the Answer? *West African farming and food Processing Jan/Feb No.27*

Igene, J. O. (1988), Lipids, fatty acid composition and storages stability of Kilishi, a sun-dried beef product. *Tropical science:* 28:153 – 161.

Iheanacho, A. C (2000) Economics of millet production under different cropping system in Borno State, Nigeria. Cited in Ani, A.O.O. Ounika and SS Ifah (2004): Relationship between Socio – economic characteristics of Rural women farmers and their adoption of farm technologies in Southern Ebonyi State, Nigeri*a: International journal of Agriculture and Biology. 6(5) 802 – 805*

Ikekoronye, A.I. (1999): Manual in Small Scale Food processing: A guide to opportunities in small scale food processing. Fijac Academic press (FAP) Nsukka, Nigeria Pp111

Iliyasu A, Iheanacho AC and Mshelia SI (2008): Profitability Analysis of Three Methods of Suya Production and Marketing in Maiduguri metropolitan Council, Borno State, Nigeria. *Nigerian Journal of Basic and Applied Sciences vol. 16 No. 2 December 2008. 57 - 262*.

Inyang, C. U., Igyor, M. A. and Uma, E. N. (2004): Bacterial quality of a smoked meat product (*Suya*). *Nigeria Food Journal 23: 239 – 242*

Inuwa *et, al* (2011).Profitability analysis of Rice processing and marketing in Kano state, Nigeria *Journal of Basic and Applied Science, 2011, 19(2) 293 – 298.*

Jama'are, A.S. (2000):"Mechanization for Sustainable Agricultural Production in the 21st Century". Paper presented at the 33rd Annual Conference of Agricultural Society of Nigeria, Badeggi Niger State.

James, C.V. and Wachowicz, J.M. (2005): *Fundamentals of Financial Management* Pearson Education Pte.Ltd. New Delhi, India

Jones, J. M (1992): Food safety. Eagan press, Minnesota USA

Juma, G.P. Drucker, A.G, Baltenweck .I and Ngigi,M. (2005). Consumption of, and willingness to pay for indigenous small ruminants' meat in Marsabit, Kenya: A paper presented in a Workshop on the Activities of ILRI-BMZHohenheim-Göttingen Collaborative Project on Improving the Livelihoods of Poor Livestock Keepers in Africa through Community-Based Management of Indigenous Farm Animal Genetic Resources. 27th, September 2005 at Agricultural Research Centre (ARC), Egerton University, Njoro, Kenya. Pg24.

KNSG, (2004) Official Diary, Directorate of Information, Kano Nigeria Pp 2 – 7

Khan, M and D Villanueva, (1991) Macroeconomics policies and Long – term Growth. "AERC Special Paper" 13th May, Pp 39

Kotler, P. (2003): *Marketing Management*. Eleventh Edition, Pearson Education, Inc. USA.

Kurjila,L. Birurgi, R. Makokha, S. Musahara, H. Otia, L. Adissu, A. and Omore, A. (2011) Quality and safety of small scale beef productsin East and Central Africa. Association For Strengthening Agricultural Research in Easternand Central Africa, Entebe, Uganda. *http://hdl.handle.net/10568/7083*.

Ladan,Y.M, (2016) Economic Analysis of Roasted Beef (Suya) marketing in Bauchi metropolitan of Bauchi state. *Journal of Economics and Sustainable Development* vol.7, No 9, 2016

Levenstein, H. (2003). Paradox of Plenty University of California Press, Pp 106-107.

Mafimisebi, T.E., Mafimisebi, O.E. and Ikuemonisan, E.S (2013): The Informal Market for Medicinal Herbs and Herbal Medicine as a Supplementary Income Source for Women in Ondo State, Nigeria In: Hosamani, P.A.and Sandeep kumar, K. (Eds). Miracles of Ethno-Botany: Socio-economic Aspects, Bio Science Prakashan Publishers,Dharwad,Karnataka, India, ISBN 978-81-928756-0-6, pp. 83-113.Nigerian National Livestock Project Division (1992):NLPD Survey in Kaduna, Nigeria, Vol.58 Page 175and 177

Mendoza, G. (1995). A *Primer on marketing channels and margins, Prices, Products and People: Analyzing Agricultural Markets in Developing countries*. Lynne Racanner Publishers, Boulder, London

Mohammed. A. B, (2007) Economic analysis of cowpea grain (Vigna Unguiculata) Processing and utilization in Nigeria (Unpublished) Ph.D Thesis Agricultural economics and extension programme. School of Agricultre and Agricultural Tecgnology, Abubakar Tafawa Balewa University Bauchi, Nigeria

.

Mshelbwala, G.M, (2013) National Live stock policy focal point presentation, Nigeria. Paper presented at side meeting of NLPFPS on VET-G. programme engagement, targeting and capacity facilitation, Abidjan, Cote D' ivoire).

Nayak, (2013) Determinants and pattern of savings behavior in rural households of western Odisha: Thesis of Masters Degree in development study Department of humanities and social sciences, National institution of technology Roukela India.

NISER, (2000), Annual Survey of Crop Production Conditions in Nigeria a Publication of NISER annual monitoring Research Project (NAMRP), Ibadan Nigeria.

NetMBA, (2010). Centre for Management and Business Administration. **http://www.NetMBA.com. [Accessed on 23/06/2013]**

N P C, (2006) National population commission: Nigerian population census record book

Odunsi A.A Toogun V.A and Oladunjoye IO,(2005). **Introduction to Animal Products Processing**. Olusoyi Press Limited. 8- 11.

Ogunsola O. O and Omojola A.B, (2008) Qualitative evaluation of *Kilishi* prepared from beef and Pork. *African Journal of Biotechnology* Vol. 7 (11), pp. 1753-1758, 3 June, 2008

Olukosi, J .O. and Erhabor, P.O. (1988) "Introduction to Farm Management: Principles and Aplications."AGITAB Publishers Ltd. Zaria, Nigeria.

Olukosi, J.O. Isitor, S.U, and Moses O.O (2005): Introduction to Agricultural Marketing and prices: Principles and Application, 3rd Edition: Living book Series, G. U. Publishers Abuja, Nigeria..

Olukosi,J.O. Isitor, S.U and Ode,M. (2009). *Introduction to Agricultural Marketing and Prices: Principles and Application.*4th Edition. GU Publications, Abuja, Nlgeria

Okafor, F.C and Andrew, G.O (1994); Rural systems and land resources evaluation for Africa. Cited in Musa, J. (2008); Economic appraisal of Jibia Irrigation project and feasibility of farmers' financial participation in its operation and maintenance. M.Sc dissertation (unpublished): Department of Agricultural Economics and Extension. Faculty of Agriculture: Usmanu Danfodiyo University, Sokoto State, Nigeria

Okereke, O and Anthonio, Q, B. O., (1988): The Structural Characteristics of the Market for grains in Eastern Nigeria. in Readings in Agricultural Marketing, Adekanye, T. O. (ed), Longman, Ibadan, Nigeria: 1 16-124

Okuneye,O. (2001). Rising Cost of Food Prices and Food Insecurity in Nigeria and its Implications for Poverty Reduction.*CBN Economic and financial Review* Vol.35 No.14: 88-110

Pardey,I.M. (2002); *Financial Management*. Vikers Publishing House Pvt Ltd. New Delhi, India. PP.77

Richardson, B. (1986): Some Current Issues in the Marketing of Agricultural Products; *Australian journal of Agricultural Economics. Vol.30 No.3 Melbourne,*

Srilakshimi, B.L (2002): Food Science New age International (p) Limited New Delhi, India. Pp375.

Timmer, C.P., Falcon,W.P and Peason,S.R (1983), ***Food policy Analysis*** Baltimore, MD, USA: The John Hopkins University Press.

Tomek, W.G and Robinson, K.L (1981) **Agricultural products prices 2nd** Edition, Ithaca New York USA: University press.

Trichopoulou, A. Naska, A. and Costacou, T. (2002); Disparities in food habits across Europe; proceedings of the Nutrition Society 61: 553 – 558

Ugwumba C.O.A. and Effiong JAL (2013); Analysis of Household Demand for Beef in Owerri Metropolis of Imo State, Nigeria*. J. Chem. Bio. Phy. Sci. Sec. B*, 2013, Vol.3, No.2, 1201-1205

Yaro, A.M, I .S. Ismail, A. U. Shuaibu S. Y Ahmad and I.S Ibrahim (2012) Economic Analysis of local chicken production in Kumbotso Local Government Area of Kano State, Nigeria; *Proceedings of the 46th Annual conference agricultural society of Nigeria; Bayero University, Kano. Pp 150-154*

Ya'ishe, M.Alice, J. Putai and A.M Petu –Ibikunle (2009): An economic analysis of cow pea production among women farmers in Askira / Uba Local Government Area, Borno

State. African journal of general agriculture; Vol. 6 No1 retrieved from www.asopah.org on 5th august 2012.

Zekeri, M.(2013) "Economics of Small Holder Sheep Production among Women in Gwarzo, Tofa and Gabasawa, Local Government Areas of Kano State, Nigeria." An Unpublished M.Sc Thesis, Department of Agric Economics and Extension, Bayero University, Kano

Appendix

DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION
FACULTY OF AGRICULTURE
BAYERO UNIVERSITY, KANO

Dear Respondent,

I am a Post Graduate Student of the above Faculty and Department of Bayero University, Kano. I am carrying out a research on Topic titled **"**Comparative Analysis of some selected Beef Products Processing/Marketing in Kano Metropolis". You have been chosen as one of the respondents in this research. Please kindly read through and respond to the items in the questionnaire below. Please note that this questionnaire is strictly for research purpose and therefore all the information you will give will be treated confidentially.

Mshelia, David Ali
(SPS/12/MEX/00004) OCTOBER 2015

SECTION A: SOCIO-ECONOMIC CHARACTERISTICS OF THE RESPONDENTS

1. Name (Optional)……

2. Local Government……

3. Ward/ location of business…….

4. Age (years)…….

5. Gender……

6. Marital status

a. Married [ ]

b. Single [ ]

c. Divorced [ ]

d. Widow [ ]

7. Household size……

8. Educational level

a. Primary [ ]

b. Secondary [ ]

c. Tertiary [ ]

d. Qur'anic [ ]

e. Others

(specify)……

9. Is beef product processing your major source of income?

a. Yes [ ] b. No [ ]

10. If No, what is your major source of income?

a. Arable farming [ ] b. Trading [ ] c. Processing other goods [ ]

d. Civil service [ ] e. Others (specify…….

11. What type of beef product do you process / market?

a. Balangu [ ]

b. Tsire [ ]

c. Kilishi [ ]

12. Years of experience in the business (years).....

13. Are you a member of a cooperative association? a. Yes [ ] b. No [ ]

14. If yes, what is the name of the cooperative association……

15. If yes, what are the socio economic functions of the association?

……

……

……

……

16. How did you get into the business?

a. Inheritance [ ]

b. Neighboring influence [ ]

c. Peers influence [ ]

d. Apprenticeship [ ]

e. Others

specify**……..**

SECTION B: BEEF PRODUCTS PROCESSING/MARKETING INFORMATION

17. Source of capital?

a. Personal savings [ ]

b. Informal money lenders [ ]

c. Formal institutions [ ]

d. Friends and Relatives [ ]

e. Others (specify)……

18. Ownership status of the business

a. Partnership [ ]

b. Sole [ ]

c. Cooperatives [ ]

d. Others (specify)……

19. Method of sourcing beef

a. Buy beef from others [ ]

b. Buy animal and slaughter [ ]

c. Others (Specify)……

20. If purchased from others, who are your suppliers?

a. Whole sellers [ ]

b. Retailers [ ]

c. Others (specify)……..

21. If purchase and Slaughter animals, what are the sources?

a. Self reared animals [ ]

b. Whole sale market [ ]

c. Retail market [ ]

d. Others (specify)……

22. How do you receive information on beef processing? .....

……

……...

……

23. Who are your buyers?

a. Wholesalers [ ] c. Consumers [ ]

b. Retailers [ ] d. Others (specify)……

24. What is the marketing arrangement?

a. Formal [ ]

b. Not forma. [ ]

c. Others (specify)……

25. Where do you sell your product?

a. Processing area [ ] c. Home [ ]

b. Markets [ ]

d. Others (specify) ……

26. What Processing method do you use?

a. Traditional method [ ] b. Improved Processing method [ ]

27. What type of packaging do you use?

a. Paper only [ ] d. Foil and Nylon [ ]

b. paper and Nylon [ ]

c. Foil paper only [ ]

e. Others (specify) ……

28. Do you sell the quantity processed? a. Yes [ ] b. No [ ]

29. If No, how do you preserve the surplus?

a. Refrigeration [ ] b. Cold room [ ] c. Others (specified)……....

SECTION C: INFORMATION ON COST AND RETURN FOR BEEF PRODUCTS PROCESSING/MARKETING

30. Give the following information about fixed assets accordingly.

Variables	**Number**	**Purchase value(₦)**	**Total**	**Life span (yrs)**
Knife				
Axe				
Table				
Water basin				
Measure				
Metal Oven				
Block/Mud Oven				
Metal Stick				
Wooden Stick				
Others (specify)				

31. Give the cost of processing/marketing services

Processing/Marketing services	**Quantity(Unit of measure)**	**Unit price (₦)**	**Total amount (₦)**
Fire wood(Charcoal)			
Spices Maggi Hot pepper Salt			
Vegetable Onion Tomato Sweet Pepper Cabbage			
G/nut cake *(kulikuli)* G/nut oil			
Packaging (paper/polybag)			
Transportation			
Others (specify)			

32. Complete the table below regarding labour use in beef processing/marketing

No. of Labourers	Activity done	No. of Hours	Amount Per Day(₦)

33. What is the quantity of beef processed? ……

34. What is the price per unit measure? Specify the unit……..
……

35. How many days do you process in a week?
a. Daily [ ]
b. Every other day [ ]
c. Weekly [ ]
d. Others (specify) [ ]

36. Do you process throughout the year? a. Yes [ ] b. No [ ]

37. If Yes, in what period do you process? ……..

38. Is there any peak or off peak period of processing? a. Yes [ ] b. No [ ]

39. If yes, what is the
i. peak period……
ii. Off peak period……

40. What might be the reason for the seasonality? ……
…….....
……

SECTION D: CONSTRAINTS ASSOCIATED WITH BEEF PRODUCTS PROCESSING/ MARKETING

41. What are the processing and marketing constraints?

S/n	Processing constraints	Marketing constraints
1		
2		
3		
4		
5		
6		
7		