Analysis of Household Demand for Meat, in Southwest, Nigeria

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ANALYSIS OF HOUSEHOLD DEMAND FOR MEAT, IN SOUTHWEST, NIGERIA

Strictly as per the compliance and regulations of:

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The findings showed that beef (43.7%) was mostly preferred in the study area, income levels of respondents and taste influenced the type of meat preferred. The budget share of beef decreased with an increase in the price of chicken and vice versa, but increased with an increase in its price, the budget share of chevon , chicken and mutton increased with an increase in their own prices respectively. The budget share of pork increased with an increase in the price of mutton but it decreased with an increase in its own price.. Also one percent change in prices of beef,chevon and chicken would result in - 0.827, - 0.527 and - 0.721 reduction in the quantity demanded respectively. Mutton and pork were confirmed to be luxury goods while chicken, beef and chevon were normal goods for households in southwest, Nigeria. Price intervention programmes should be introduced in order to stabilize the fluctuation in meat prices.

Keywords : *Meat, household demand, pork, mutton, beef, chevon, chicken, elasticity, price, Southwest, Nigeria*

I. Introduction

Before the 1970's oil boom, agricultural exports were the backbone of the Nigerian economy with livestock products accounting for a significant share of exports. During this period, the country had a well-developed domestic agricultural market. However, despite this sound potential for growth in the domestic market, Nigeria is currently witnessing a drastic decline in agricultural production, especially in livestock and meat sectors of the industry. This decline in agricultural production coincides with the nation's oil boom.

Furthermore, Nigeria has enjoyed yearly economic growth (GDP) of 10.8 percent in real terms between 1980 and 1987 as a result of export earnings from petroleum. Real per capita income rose at 60 percent per year during this period. However, the decline in the world oil prices experienced in 1987, combined with the reduction in world market prices of agricultural products in 1995 brought an end to country's economics growth and real per capita income. Between 1989 and 1997 real per capita income dropped at a rate of 7.8 percent per year (Ademosun, 2000).

During this period, the federal government of Nigeria maintained a trade policy dominated by quantitative restrictions and price controls on food items. In January 1990, a tax was imposed on meat imports, ostensibly to raise government revenues and stimulate domestic meat production. The abrupt drop in meat imports, coupled with inadequate domestic supply pushed up price of meat and thus depressed domestic demand. For example, per capita meat consumption that had risen from 12.05 kg in 1981 to 13.8 kg in 1986 dropped to 11.6 kg in 1992. Also meat prices rose by 70 percent from 1987 to 1999, resulting in a decline in Nigerian per capita meat consumption from 10.5kilograms of meat per year in 1987 to 9.4 kilograms per year in 1999 (Osho and Asghar, 2004).

Although the federal government of Nigeria has designed various programs to help stabilize meat prices and consumption, the country is still experiencing meat shortage and price fluctuations till date (Osho and Asghar, 2004)

Meat demand in most African countries its very low at a level of 25g and the demand is even lower especially in the southern and eastern parts of Nigeria where production of animal protein has not been high enough to meet the demand of rapid growth population (Obi, 2000). Ademosun (2000) puts Nigerian's total meat production at 810,000 tonnes for a population of about 110 million resulting in a meat production index of 22g per caput per day. Regmi. (2007) noted the unprecedented population growth that has occurred in the last half of the century has created an additional demand for meat and general food in developing countries.

Household demand for meat products such as beef, mutton, pork, chevon and chicken are faced with problems which is mostly due to market prices, consumers taste, credit availability and consumers wealth. This problem leads to unbalance diet because meat contributes essentially to human's diet Aromolaran (2004) and the consequence of this poor nutritional status is infection which will eventually result in weakness, lethargy, absenteeism, poor productivity and stress (Jamison and Leslie 2001).

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a) Approaches To Estimating Demand Equations

In estimating the demand relationships the formulation of a model expressing these relationship between consumption and the relevant explanatory variables. Various estimation functions have been developed and applied over the years. In their review of such models, Sadoulet and de January (1995).indicated that three demand system have received considerable attention because of their relative empirical expediency. These are the linear expenditure system (LES) developed by Stone (1954), the almost ideal demand system.(AIDS) developed by Deaton and Muellbauer (1980) and the combination of these two system into a generalized Almost Ideal Demand system(GAIDS proposed by Billion (1990). Another variant of the AIDS model is the Quadratic almost ideal demand system (QUAIDS) derived by Bank et al, (1997). Implications for each of these specifications have been well reviewed in the literature on demand analysis.(Wohlegenant, 1984).in this paper the LA/AIDS model is used to estimate the elasticities of demand for meat and meat products such as beef, mutton, and chevon, and chicken, eggs, fish and milk. because of its flexibility as a complete system this model has been used for similar studies in West Africa (Savadogo and Brandt,1988), India (Abdulai and Jain, 2000), Greece (Karagiannis et al, 2000), Morocco (Mdafri and Borsen, 1993) and the United States of America (Helen and Pompelli, 1998).

II. Empirical Studies

Aromolaran ,(2004) studied intra household redistribution of income and calories consumption in south western Nigeria. His study investigates how per capita calorie in low income households of rural south western Nigeria responds to changes in total household income and women's share of household income. Two major questions were addressed in this study. First, is calories-income elasticity large enough to justify the use of income increases as a food/nutrition policy strategy for increasing calorie intake among low income household? Second, what is the potential effect of intra – household redistribution of income from men to women on per capital calorie consumption? The results show that calorie income elasticity is small and close to zero implying that income policies may not be the most effective way to achieve substantial improvements in calorie consumption. Moreover, increases in women's share of household income are likely to result in marginal declines in per capital food calorie intake: this implies that income redistribution from men to women would not increase per capita food energy intake in these households.

Bereket (2003), studied intra-household distribution of expenditure in rural Ethiopia. This study examined the combined effects of changes in prices, income and demographic composition on young and adult, males and female household members. The recently developed Quadratic Almost Ideal Demand System (QUAIDS) was used since a demand system provides a unified framework for analyzing the combined effects in a systematic approach. The 'outlay equivalent method' which was used with single demand equation in previous studies, was married to the demand system literature. Panel/longitudinal data are used: helping to control for household level heterogeneity. Underlying preference structures for classifying goods into different groups was also examined by conducting alternative tests of separabilitity in preferences. The empirical results show that Ethiopians rural respond to price, income and demographic changes in a more complicated manner than usually assumed, demographic groups absorbing most of the impact differ for different types of changes. Furthermore, changes in household income affected male member (men and boys) more than female members. On the other hand, changes in prices affected women and boys more than men and girls. Also, adjustment in household expenditure due to demographic changes imply that boys were favoured relative to girls. However, the overall position of boys and girls in the household depends not only on the 'outlay equivalent ratios', but also on the effect of changes in household incomes and prices as determined by budget and price elasticities. These findings show that household distribute risks among different demographic groups rather than only one group absorbing all shocks. The findings indicated that studies that focus solely at 'out lay equivalent ratio' are incomplete.

Taljaard et al., (2003), used the Linear Approximate of Almost Ideal Demand System (LA/AIDS) model to estimate the demand for meat in South Africa. The LA/AIDS was first employ to analyze the demand relations for meat which comprises of beef, chicken, pork and mutton from 1970-2000. Two test for weak separability including an F and likely hood ratio version, failed to reject the null hypothesis of weak separability, confirming that four meat products are separable, and should be modeled together. Hausman exogeneity test show that, the expensive term in the South African meat demand model, is exogenous. As a result, a Restricted Seemingly Unrelated Regression (RSUR) was used to estimate the model, where after the estimated parameters were used to estimate compensated, uncompensated and expenditure elasticities.

Hughes et al., (2000), argued that for a shift: the focus for modeling production from traditional assumption of profit maximization and cost minimization to mere general assumption of managerial utility maximization that can incorporate risk incentives into the analysis of production and recover value-maximizing technologies. They show how this shift can be implemented using the Almost Ideal Demand System

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(AIDS): and the more general way of measuring efficiency that can incorporate a concern for the market of firms assets equity and identify value maximizing firms were suggested. This shift bridges the gap between the risk incentives literature in banking that ignores the microeconomics of production and the production literature that ignores the relationship between production decisions and risk Many authors had used the Almost Ideal Demand System (AIDS) model to determine household demand pattern. Oyekale, (2000), studied the food demand among Nigerian household. Since food calorie has been found to have a strong empirical linkage with both human health productivity: they therefore, determine the probable influence of price and income changes on the availability of nutrient to the Nigerian household. Their findings show that guinea corn is the food that would have the greatest implication for the nutrient status of low income status: while millet, guinea corn and maize and rice, beans and maize respectively are the major food items for the household whose heads earn average and high income. Moreover, Adejobi (2004) studied the demand structure of rural household food pattern in relationship with poverty. In his study, the analysis of food demand revealed that 72.0% of household expenditure was on food; out of this, 56.0% was cereals, while 22.0%, 7.0%, 5.0%, 5.0%, 4.0% and 1.0% respectively was on animal protein, fruits, vegetables, legumes, roots and tubers, fats and oils other food items.

III. Justification for The Study

Meat is a nutritious food containing quantities of essential amino acids in forms of protein, It contains B group vitamins (especially niacin and riboflavin), iron phosphorus, ash and calcium. Adeshinwa et al., (1999) observed that the Food and Agricultural Organization (FAO) recommended that an average of 200g animal protein is required per day for healthy living in the developing countries. (Obi, 2000), explained that global demand for meat production will increase by 58% between 1995 and 2020 and that the consumption of meat will increase tremendously by 2020.

Proteins are the major structural components of all cells of the body and amino acids are the building blocks of human proteins. Protein can function as enzymes, membrane transporters and hormones. As far as the human body is concerned there are two types of amino acids .There are essential and non essential amino acid. The former cannot be produced by the body while the latter can be produced out of other biochemical products in the body. The only means of obtaining essential amino acid is through feeding (Bopape and Myers, 2007).

Protein contains approximately 22 amino acids, eight of which are essential. The sulphur containing amino acids: methionine, cysteine and cystine are particularly important for the health of the brain and nervous system. Protein constitute about 90% of dry weight of food, 80% of enzymes, hormones and antibodies of which meat is a major source (Oloyede, 2005). Proteins form the foundation for muscles, skin, bone, heart and billions of biochemical activities. When we fail to consume adequate amounts of protein, it result in growth retardation with the body being prone to infections and poor wound healing.

Man obtains his necessary proteins from either animals or vegetables. Meat from cattle, goat, sheep, pig and poultry are the main sources of daily per capita consumption of animal proteins. According to Britton (2003) the main difference between animal and plant protein is that animal products contain different ratios of amino acids and higher concentrations of proteins than most plant products. Hence in a strictly vegetarian diet, it is important to mix and match different plants to get the variety of protein and amino acids needed in the body as opposed to plant proteins in which one or more of these essential amino acids are lacking (Oloyede, 2005). Omotosho (2004) estimated that the daily minimum protein required of an adult in Nigeria should be between 65 and 85g per person and that 35g of this minimum requirement should be obtained from animal products.

A review of the data of food supplies available for consumption in different countries shows that the per caput proteins intakes in developing countries, Nigeria inclusive is comparatively low. Not only is the total protein deficient but the quality of dietary protein available is inferior to that consumed in developed countries FAO/WHO (2001).

a) Nutritional Value Of Meat

Meat, and other animal foods such as milk, can make a valuable contribution to the diets in developing countries. It has less nutritional importance in industrialized countries where a wide variety of foods of all kinds is available. Many diets in developing countries are based on cereals or root crops and are relatively bulky, especially where fats are in short supply, and this can limit the total energy intake. This is especially true of infants after weaning and young children. The importance of meat in the diet is as a concentrated source of protein which is not only of high biological value but its amino acid composition complements that of cereal and other vegetable proteins. It is also a good source of iron and zinc and several B vitamins, and liver is a very rich source of vitamin A (Somaiya, 1982).

Demand for meat and meat products has been assessed as an aggregate subset of the food category analyzed as one or two products separately from the general meat category in different countries. Abdulai and Jain (1999) made projections estimates for food and non-food commodities in Indonesia and

desegregated data on the meat category(e.g. meat, poultry) as a subset of food categories.

Goat meat, also known as chevon (Northern Europe) Cappreto (Australia and Southern Europe) or Cabrito (Hispanic).has been around since the advent of civilization. It is the rising star in the red meat proteins as a result of its lower total fat, unsaturated fat, calories and cholesterol than traditional meats. It retains a sweet flavour which is reminiscent to mutton with similar protein content.

Chicken meat is derived from poultry and it is reputed to be one of the safest meats available, as it is least associated with any side effects of consumption. Many scientific studies have been conducted on chicken to assess its healthy properties and most of the research have found very positive side effects of the meat on human health. It is a very good source of lean high quality protein. Protein is an essential nutrient for growth and development and also plays important role in assisting overweight and obese people in losing weight fast. It is a good source of phosphorus ,which is a very essential mineral for the body .phosphorus maintains the health of teeth bones and also healthy functioning of the kidneys ,liver, and the central nervous system (Luz, 2009).

Although the most liking feature of meat consumption in many African society is the overwhelming importance of meat which contributes over 70% of betal protein intake Today, the increasing human population in the face of inelastic production strategies appear to have widened the demand supply gap and accentuates society of meat products. Regmi. (2007) supported this view and noted that the unprecedented growth that has occurred in the last half of the century has created an additional demand for meat and general food in developing countries.

Production capacity of beef and other meat products has failed to match with the human population growth and distribution of livestock in Nigeria is inadequate. Composite transportation cost incurred coupled with remote distance between major meat producing areas and consuming urban centres together make the value of wholesome beef, mutton, pork, chicken and chevon often unavailable (Mdafri and Borsen,1993). Early empirical studies on meat production and consumption focused on single meat product analysis with little or no work done on effect of socio-economic variables on demand and effect of prices on expenditures.

This study was conducted to add to the existing literature by comparing how the changes in income and price affect the demand for meat products. The following are the objectives of the study;
1) Ascertain household preferential characteristics for meat product in the study area.
2) Analyse household expenditure on meat products in the study area.

3) Estimate its own price, cross price and expenditure elasticity of demand for meat in the study area.

IV. Methodology and Data

This study investigated household demand for meat in Oyo, Osun and Ondo States of Nigeria. The systematic sampling technique was used to select two hundred and forty household (n = 240) respondents from the study area; eighty respondents (80) from each state and data were collected through well structured questionnaire. Analysis was done using Descriptive Statistics and Almost Ideal Demand System (AIDS) Model.

a) Linear approximate of almost ideal demand system model

Theoretical model of demand are single and system of demand equations. Systems of demand include models such as; Translog model, Rotterdam model, Linear Expenditure System (LES) model, Armington model and Almost Ideal Demand System (AIDS) model (Giancarlo et al, 1994). The main difference between single equation model and AIDS is that the latter employs budget share as dependent variable: while the single equation make use of quantity consumed as dependent variable.

AIDS was used in this study because of its desirable properties relatives to the other models (Deaton and Muellbauer, 1980b). The functional form is general allowing variable to be either substitute or complement. AIDS flexibility allows it to encompass broad ranges of behavior and it avoids nonlinear estimation. It's flexibility permit wide range of variable to be included in the household demand modeling. It is consistent with the theory of demand, additivity, substitution, homogeneity and the postulate that household maximize utility (minimize cost) in their consumption decision making process. Since Deaton and Muellbauer (1980b) proposed AIDS model, it has been widely applied in many empirical studies for consumer behavior for both cross sectional and time series data.

The Linear Approximate AIDS (LA/AIDS) of Deaton and Muellbauer (1980b), that uses Stone (expenditure) share weighted price instead of the nonlinear general price index of full AIDS model is used to estimate the demand system.

The price and expenditure elasticities were derived from parameter estimates of the model using the following formulae:

Own-price elasticity: $\quad = \quad -1 + \dfrac{\alpha i1}{wi} - Bi$

Where, $\alpha i1$= Expenditure coefficient of the ith commodity

wi = Geometric mean of the budget share (dependent variable)

wj = Geometric mean of price of each of the other meat types

Bi = Coefficient of household expenditure.

Cross-price elasticities: $= (\alpha ij /wi) - Bi (wj /wi)$

Where αij = Expenditure coefficient of ijth commodity

wi = Geometric mean of the budget share (dependent variable)

wj= Geometric mean of price of each of the other meat types

Bi = Coefficient of household expenditure.

The price and expenditure elasticities were derived from parameter estimates of the model using the following formulae:

Expenditure elasticity: $1 + \dfrac{Bi}{Wi}$

Where , Bi= Coefficient of household expenditure.
wj= Geometric mean of price of each of the other meat types .

V. RESULTS AND DISCUSSION

The findings showed in Table 1 that beef was most preferred meat type; about 17.2%, 16.4% and 9.4% of the respondents in Oyo, Osun and Ondo respectively revealed that beef was preferred. The sampled households in these selected states also emphasized that taste of the meat (65.0%), price (47.9%) and their income level (41.4%) were the major reasons for their choice of preference.

Table 1 : Distribution of Respondents According to the Preferred Meat

Variable	OYO (%)	OSUN(%)	ONDO(%)	POOLED(%)
Preferred Meat				
Beef	17.5	16.4	9.6	43.5
Chevon	6.3	9.1	5.4	20.8
Pork	2.9	3.0	2.5	8.5
Mutton	0.8	1.7	1.7	4.2
Chicken	8.6	9.6	5.0	23.2
TOTAL				100.00
*Factor Responsible for the Preference				
Income	18.5	12.5	10.4	41.4
Taste	20.0	25.0	25.0	65.0
Price	17.5	14.6	15.8	47.9
Proximity to market	9.6	10.4	6.3	26.3
Health reasons	18.5	9.2	5.0	32.7
Religion	10.4	13.3	9.6	33.3
Other	4.2	2.1	2.5	8.8

Source: Field Survey,2010.
* Multiple Responses

a) *Estimation of Own price, Cross price And Expenditure Elasticity*

The AIDS model was derived by Deaton and Muellbauer (1980) from an expenditure or cost function and its not based on an explicit consumer utility function. Using this model the demand equation for meat is without imposition of any restriction. . From the table 2 test of homogeneity was carried out and the result of the test showed that in meat demand homogeneity condition was significantly violated. Table 2 showed that the Durbin-Watson statistics was within plausible region. The result revealed that as the budget share of beef decreased with an increase in the price of chicken, also the budget share of beef increased with an increase in its price. The budget share of chevon increased with an increase in its price. The budget share of pork increased with an increase in the price of mutton but it decreased with an increase in its own price. For mutton, the budget share increased with an increase in price of pork and also increase with its own price. Lastly the chicken's budget share decreased with an increase in the price of beef but increased with an increase in its own price.

Table 2 : Model Estimate And Test Of Homogenity For Household Demand For Meat

Commodity	Const	Beef	Chevon	Pork	Mutton	Chicken	Expenditure	R^2	Durbin Watson
Beef	0.136 (1.253)	0.038 (2.398)**	-0.012 (-0.876)	0.010 (0.403)	0.003 (0.106)	-0.023 (- 1.74)***	0.00026 (4.639)	70.0	1.899
Chevon	0.086 (0.354)	-0.002 (-0.352)	0.036 (5.818)*	0.006 (0.351)	0.012 (0.799)	-0.002 (-0.482)	-0.000023 (-2.134)	66.3	2.081
Pork	0.001 (0.094)	-0.001 (-0.657)	0.0004 (0.296)	0.038 (-13.329)*	0.006 (1.756)***	0.0005 (0.361)	-0.00076 (-3.176)	69.7	2.113
Mutton	-0.002 (-0.811)	0.00013 (0.286)	0.00016 (0.368)	0.002 (2.714)*	0.044 (41.475)***	0.00028 (0.694)	-0.00019 (-5.159)	95.6	1.973
Chicken	0.777 (1.538)	-0.142 (- 1.940)***	-0.004 (-0.712)	0.013 (1.080)	0.007 (0.450)	0.039 (6.359)*	-0.00044 (-2.235)	54.5	1.949

*Source : Field survey, 2010. ***= 10% significance, **=5% significance, *=1% significance. Values in bracket are t-ratios*

The estimated own price, cross price and expenditure elasticity were presented in table 3. The diagonal values represented own-price elasticity. The negative values of own price elasticity coefficients for the estimated variables are consistent with economic theory of demand (Luz et al., 2009). The coefficients revealed that meat are price inelastic This suggests that households are very sensitive to change in prices of various some meat type. For instance, one percent change in prices beef, chevon and chicken would result in - 0.827, - 0.527 and - 0.721 reduction in the quantity demanded respectively. Cross price elasticites revealed that the various meat types were substitutes for the other. The elastic curves also implied that mutton and pork were luxury goods while chicken, beef and chevon were normal goods for households in southwest, Nigeria. With the exception of pork and mutton, price elasticities of other meat type exhibit the expected signs and magnitudes. This indicates that the demand for meat is price inelastic in the study area.

Table 3 : Own Price, Cross Price and Expenditure Elasticity for Meat in Southwest, Nigeria

Price Ela	Beef	Chevon	Pork	Mutton	Chicken
Beef	**-0.827**	-0.050	0.050	0.013	-0.104
Chevon	-0.026	**-0.527**	0.078	0.157	-0.026
Pork	-0.055	0.022	**1.111**	0.333	0.027
Mutton	0.011	0.014	0.181	**3.000**	0.025
Chicken	-1.014	-0.028	0.092	0.050	**-0.721**
Expenditure elasticity	1.00	1.00	0.99	0.99	0.99

Source: Data Analysis,2010.

VI. CONCLUSION

Demand for meat in southwest Nigeria is relatively high. The empirical results of this study suggested several points of interest for researchers , policy makers , planners and traders with involvement in Nigeria livestock production and marketing . Firstly, it was revealed that most respondents preferred beef more than any other meats. Secondly The expenditure elasticity implied that mutton and pork were luxury goods, while beef chicken and chevon were normal goods for households in southwest, Nigeria.

It is therefore recommended that government price intervention programme should be introduced in order to stabilize the fluctuation in meat prices. There should also be policy measures that will ensure increase in purchasing power of people's income which will invariably contribute positively to the improvement of nutritional status of the people.

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