Determinants of Ruminant Meat Demand among Different Income Groups in Maiduguri, Borno State Nigeria

B. M. Yakaka, A. C. Iheanacho, A. C., K. Babagana

Department of Agricultural Economics Extension, P.M. B 1069, Maiduguri, Borno State Nigeria.

Abstract

This study analyzed the determinant of meat demand among income groups, using multiple regression. Data for the study were obtained from 180 respondents, selected in six (6) wards through stratified random sampling, representing the three income groups, namely low, middle and high earning ≤ N15000, N15, 001-N30, 000 and ≥ N30, 001 respectively. Further more, 30 households each were purposively selected from the six (6) areas making a total of 180 households for the study. This study was restricted to ruminant meat products (cattle, goat and sheep) demand among households in Maiduguri Urban area and covered the period of May-June, 2010. The findings showed that 89.02% of the households were male headed, with 38 years as the mean age, while 77% had one form of formal education or another. The mean household size was eight, while the mean monthly income was N23,843. The multiple regression results revelled that gender was insignificant determinant of expenditure on ruminant for all the income groups, and was negatively related to high income group. However, the coefficients of gender were positive for low and middle income groups. Household size and income had positive coefficients and were significant at 1% level for all the income groups. Age had positive coefficients for all the income groups and was significant at 1% for middle income group. On the contrary it was not significant for low and high income. Educational level of the respondents had positive coefficients for all income groups and was significant at 1% level for low and middle income groups but was insignificant for high income group. The study recommended policies to improve improved income redistribution and the enhancement of the purchasing power of the poor.

Key words

Determinants, ruminant meat demand, income groups.

Introduction

Meat has always stayed as a rich source of food in terms of taste, nutrients and also medicinally at times. The advantages of having meat are helpful to younger people in the process of growth and they reach the elder ones as well. The invaluable source of food, has been serving the people from times immemorial. The alarming sources of the health, nutrients etc can find answers in meat eating. Out of a large number of health benefits of eating meat, its contribution as a fabulous source of high quality proteins is remarkable and it is to be noted. This cannot be given or substituted by even a single vegetarian food. Meat holds all the required amino acids that the body needs to maintain a balance (Asai, 2007).

The pattern of meat demand has been undergoing dramatic changes over the years worldwide (Eales and Unnevehr, 1988; Molina, 1994). The demand for goat meat outpaces the supply in the United States of America. Producers simply cannot keep up as demand has currently doubled the domestic production (Coffey, 2006). This is thought to be triggered by the influx of new immigrants into the United States of America in recent years. Similarly Abdulai et al (1999) reported that recently demand for meat has increased among urban educated household heads with small family size in India. Contrary to this Malaga, et al (2009), asserted that meat demand has increased among household with large families in Mexico. This is because as the number of members living in the household increased, purchases for all types of meat also increases.

In Africa livestock raising in many areas of sub-Saharan Africa (SSA), is an important economic activity from which food (meat, milk) and non-food commodities (manure, traction, hides and skins, wool etc.) and cash income are derived. Meat is one of the most important livestock products. In 1975, meat accounted for about 47% of the gross

value of total SSA livestock output (Addis Anteneh et al, 1988). In Nigeria, ruminant animals serve as a good source of protein in humans, foreign exchange earning, employment opportunity and contributes to Gross Domestic Product (GDP) of the country (Okoruwa, Chebe and Amaza, 1999).

Borno state is one of the major livestock producers in Northern Nigeria and a producer of about twenty five percent (25%) of the livestock population in Nigeria (Balami, et.al., 1999).Out of the estimated population of 12 to 15 million cattle in Nigeria, the state produced 3.1 million in 1995 (Borno state directorate of statistics, 1998).

Olayemi (1998) revealed that food demand and energy intake in the northern part of Nigeria (Borno state inclusive) revolve largely around cereal group, livestock and fish products. Most households demand more beef, then fish, milk, egg, chicken, mutton and goat's meat. Most households in the higher income group demand mostly chicken, eggs and milk, while the poorer households demand more fish and beef. Despite the high supply of ruminant meat by the state and its importance to humans, it was still reported by Zongoma (2003) that consumption of beef is low in Maiduguri. It is clear that many factors have influenced meat demand pattern such as (gender, age, educational level of household head, household size, income level etc). An understanding of these factors is very important for assessment of the agricultural products market. A lot of research works have been done in the study area on beef expenditure and socio-economic factors affecting beef consumption.

This study was a deviation because it was designed to capture the determinants of ruminant meat demand among different income groups in Maiduguri, Borno state Nigeria. The specific objectives of the study were to:

i.   examine the socio-economic characteristics of the respondents in the study area; and

ii.   determine the effects of the respondents' socio-economic characteristics on ruminant meat products demand.

Materials and Methods

Both Primary and secondary sources were used for the study. The primary data were collected through the use of structured questionnaire. Data were collected on socio-economic characteristics of households such as gender, age, educational level, household size and monthly income. The secondary sources of information used included journal articles, conference proceedings and seminar papers. These were used for the compilation of the work.

Sampling Procedure

The population for the study included all the households in Maiduguri. The study area was stratified according to high, medium and low residential areas. These represent the three income groups of the households. Six (6) wards were purposely selected (Shehuri north and Hausari representing low income group, Federal low-cost of Bolori 1 ward and Dagash quarters of Gamboru ward representing middle income group, while New GRA of Mesandari and Unimaid quarters of Mairi ward represented high income group). The monthly income was grouped into earners of $\leq$ N15000, N15,001- N30,000 and $\geq$ N30,001 respectively. Thirty (30) households each were purposively selected from the areas, making a total of 180 respondents for this study.

Analytical Techniques

The analytical techniques employed for the study include descriptive statistics such as mean, frequency distribution and percentages, to present the socio-economic characteristics of the respondents while multiple regression technique was used to determine the effects of socio-economic characteristics affecting ruminant meat demand. The model is implicitly specified as:

$Y = f(X_1, X_2, X_3, X_4, X_5, U)$,

where,

Y =   Value of meat products demanded by households measured in Naira (N) per month

X1 =   Gender of respondents measured by dummy variable (male = 1, female = 0)

X2 =   Age measured in years

X3 =   Level of education measured in number of years spent in formal school

X4 =   Household size measured in number of people in the house

X5 =   Income level measured in Naira (N)

U =   Error term.

Different four functional forms, namely, linear, semi-log, double-log and exponential were fitted.

Double-log function was chosen as the most fitted for the analysis for all the three income groups, based on the coefficient of determination (R^2) significance and signs of the a priori expectations. The explicit is specified as:

$$\text{Log } Y = a_0 + b_1 \log x_1 + b_2 \log x_2 + b_3 \log x_3 + b_4 \log x_4 + b_5 \log x_5 + e,$$

where,

$Y =$ dependent variable

$a_0 =$ Intercept

$b_i =$ Regression coefficients of the independent variables

X_i at $_i = 1, 2, 3, 4, 5.$

$X_1 =$ Gender of respondents measured by dummy variable (male =1, female =0)

$X_2 =$ Age measured in years

$X_3 =$ Level of education measured in number of years spent in formal school

$X_4 =$ Household size measured in number of people in the house

$X_5 =$ Income level measured in Naira (N)

$e =$ Error term.

Results and Discussion

Socio-economic characteristics of the Respondents

Socio-economic characteristics differ significantly among households and income groups and have strong influence on ruminant meat demand. The socio-economic characteristics studied include gender, age, years spent in formal education; household size and monthly income. The results are presented in table 1.

The findings reveal that a total of 89.2% were male respondents in the three income groups, suggesting male dominance as household heads in the study area. This is not surprising considering the fact that the study area is located in the northern part of the country, where it is viewed as a conservative society, with family structures that are largely patrilineal. More so, the males dominate marketing due to the cultural factor that encourages them to

Socio-economic Variables	Income Groups (%)			Total (%)	Mean
Gender	**Low**	**Middle**	**High**		
Male	30.06	29.48	29.48	89.02	0
Female	2.89	2.89	5.2	10.98	
Age					
18-30	7.51	8.09	4.01	19.61	38
31-43	21.4	17.35	15.61	54.36	
44-56	3.47	5.78	14.45	23.7	
≥ 57	0.58	1.17	0.58	2.33	
Formal Education					
No formal education	7.51	6.94	8.67	23.12	0
Primary education	10.41	11.56	5.2	27.17	
Secondary	8.67	11.56	3.47	23.7	
Tertiary education	5.78	2.31	17.92	26.01	
Family Size					
≤ 6	16.76	17.34	14.45	48.55	8
7-13	13.29	11.56	12.72	37.57	
14-20	0	3.47	5.78	9.25	
≥ 21	2.89	0	1.74	4.63	
Monthly Income					
N5,000- N15,000	34.95	0	0	0	N23, 843
N15,001-N30,000	0	32.54	0	0	
N30,001-N45,000	0	0	12.01		
$\geq$ N45,001			20.51		

Table 1: Socio-economic characteristics of the Respondents (n=180).

go out to purchase materials needs of the family Akinleye (2009).

The results also show that the mean age of the respondents was 38 years. Majority of the respondents 54% were in the age group of 31 to 43 years. A total of 82% of the respondents were in their active age to support demand for ruminant meat in their respective households. This falls within the range of active age identified by FAO (1992). Food intake and expenditure vary with age because of physical activities. This implies that age is directly related to the ability of household head to demand for ruminant meat for the older the household head the higher the possibility of the household to have low access to ruminant meat. Younger-headed households are expected to be more aware of the importance of the ruminant meat as a source of protein in the body due to reading health columns in the news papers, listening to health programmes on radios etc.

Analysis of the educational background reveals that a total of 76.88% had one form of formal education or the other. A similar range was reported by (Adeoye et al., 2010). The educational background of consumers is a very important determinant for ruminant meat demand. High literacy level could impact significant influence and variation on ruminant meat demand among households as well as a guide to the consumer on the nutritional importance or its health consequences.

Household size with the highest frequency was between zero and six persons constituting a total of 49% for the three income groups. Similar range was reported by Lesiba and Robert (2007). This suggests that household size is expected to vary directly with ruminant meat demand. The larger the household size, the more ruminant meat is demanded. Taste and preferences of household members could also determine the quality of meat demand. Thus, demand of different families based on different income groups are likely to vary with taste and other specific characteristics. In addition, married households with children are more likely to purchase meat items than all other households, indicating a greater preference for the family meal-eating occasion (Raghavendra et al., 2009).

From table 1, households earning N5,000- N15,000 monthly constituted the highest (34.95%). The mean monthly income was N23.843. Those earning low income were higher when compared with those in the other income groups, reflecting the generality of wealth inequality in the study area. Income is one of the major determinants of demand and budget share allocation among households. Income is expected to have a positive and significant effect on ruminant meat expenditure. However, the effect of income on meat expenditure decisions is expected to decline over time. This is because the more income increases the more income effect declines in magnitude.

2. Effects of Socio-economic Characteristics on Ruminant Meat Products Demand

Multiple regression technique was also used to determine the socio-economic factors that affect ruminant meat expenditure among the three income groups. Double-log function was chosen as the lead equation because it had the highest value of magnitude (R^2) and conformed to the a priori expectations, for all the three income groups. The coefficients and the significant levels are presented in table 2.

Analyses of the results show that gender of the respondents (X_1) was an insignificant determinant of expenditure on ruminant meat for the three income groups. The coefficient of gender for high income group was negative. This suggests that ruminant meat expenditure by male household head was less when compared with other income groups. It also means that the higher the income of the household head in this group the less he expends on ruminant meat. The reason for this could be because as income increases, the income effects declines in magnitude considering the fact that the income in this group is high. It is also not necessary for the household head in this group to increase demand for ruminant meat when income increases, he could switch to other healthier substitute goods or save the money for future purposes. On the other hand, the coefficients for the low and middle income groups were positively related to expenditure on ruminant meat items. This implies that the male household heads in these income groups expend more on ruminant meat. This also means the higher the income level of the household head the more his expenditure on ruminant meat demand. This is still attributed to the fact that ruminant meat is a normal good which means its demand increases with increase in income and if the household head has constant flow of income, it could encourage him to increase his expenditure on ruminant meat.

The coefficients of age (X_2) for low and high income groups were insignificant, while it was significant at 1% for middle income group. On the other hand, positive relationship existed between age and expenditure on ruminant meat for all the three income groups. The positive relationship implies

Variables	Coefficients	Std. Err.	T-value	P-value
Low Income Group				
Constant	5.402596	0.7381425	7.32	0.000*
Gender	0.00226	0.0303646	0.07	0.941[NS]
Age	0.0142609	0.0150642	0.95	0.351 [NS]
Education	0.1121605	0.0213709	5.25	0.000*
Household size	0.2629077	0.0878595	2.99	0.005*
Household Income	1.204605	0.2658198	4.53	0.000*
R²				**0.87**
Middle Income Group				
Constant	1.141156	0.4157775	2.74	0.007
Gender	0.0185755	0.0145515	1.28	0.205 [NS]
Age	0.0723262	0.0132219	5.47	0.000*
Education	0.0713327	0.0070999	10.05	0.000*
Household size	0.0364076	0.0120139	3.03	0.003*
Household Income	0.4030929	0.0461745	8.73	0.000*
R²				**0.96**
High Income Group				
Constant	9.267709	0.5479867	16.91	0.000*
Gender	-0.0462203	0.04507	-1.03	0.315 [NS]
Age	0.0669441	0.0930184	0.72	0.478 [NS]
Education	0.0766754	0.060189	1.27	0.214 [NS]
Household size	0.0483136	0.0154305	3.13	0.004*
Household Income	0.2510018	0.0635965	3.95	0.000*
R²				**0.96**

* = Significant at 1%; NS = Not significant at the specified level

Source: Regression Extract, 2010

Table 2: Regression estimates of Socio-economic Factors affecting Ruminant Meat Demand.

that as age increases ruminant meat expenditure increases too. The reason for this could be due to the fact that most (17.35) which is equivalent to 53.57% of the respondents in the middle income group were between the age group of 31 to 40 years as seen from Table 1. Hence, they could support expenditure on ruminant meat. This means that for the household heads to be economically in-active it would take a very long time and if the household heads in this group have constant flow of income and are well informed about the importance of ruminant meat to health they would expend more on it. However, support for ruminant meat demand decreases with increase in age, when the consumers are no longer in their active productive age. The insignificance of the coefficient could be attributed to the fact that low income group expend less giving their income level, while the high income group expend less or small fraction of their income when compared with their total monthly earnings.

The results reveal that educational level (X_3) was a good determinant of expenditure on ruminant meat for low and middle income groups at 1% level, but contrary for high income group. Positive relationship, however, existed between literacy level and expenditure on ruminant meat for all the three income groups. This means that as the level of education of the consumer increases, expenditure on ruminant meat also increases. Ceteris paribus, a literate consumer would likely be conscious of the nutritional importance of ruminant meat hence, demands more. The insignificance means educational level was not a determinant of expenditure for high income group. From table I, it can be seen that about 17.92% which is equivalent to 50.82% of the respondents in this group had tertiary education, this could mean there are health conscious and have negative perception of the consequences of ruminant meat. Hence, less was expended on ruminant meat.

Analyses of the results show that resident household size (X_4), for all the income groups were

positively related to expenditure on ruminant meat and significant at 1% level. This implies that the more the resident household size of the consumer, the more likely his expenditure on ruminant meat would increase. All things being equal, household size varies directly with expenditure on ruminant meat. A household with many residents would probably expend more on ruminant meat, leading to a positive relationship. From table 1, it can be seen that about 48.55% of the respondents had family size between six (6) and below, an addition of one or more persons could not affect them, with or without increase in income or fall in prices of ruminant meat in question. In addition, ruminant meat is an important source of protein and when compared with chicken it is a bit cheaper in terms of per Naira price and more in terms of quantity, it's demand would add to the body nutrients. Therefore, a family with educated household head would demand for ruminant meat in other to benefit from such nutritional importance. Also taste and preferences of household members could determine the type of meat to be demanded.

Household income (X_5) was positively related to expenditure on ruminant meat at 1% level for all the three income groups. This implies that the higher the income level, the higher the expenditure on ruminant meat. Ceteris paribus, income is one of the major determinants of budget share allocation among households. Ruminant meat is a normal good; therefore, the positivity of the coefficients means consumers will increase their expenditure on ruminant meat so long as incomes increase. The coefficient of income for low income group was the highest followed by middle then high income group. This is attributed to the fact that ruminant meat is a luxury good which is a bit costly, however, low income group allocated greater fraction of their income on ruminant meat demand, hence a greater portion of their income is taken by it's demand. For middle income households there income is a bit reasonable, therefore, the fraction of their income dedicated was not as high as that of low income group. However, high income group allocated small fraction of their income when compared with their actual monthly earnings, hence the coefficient for this income group was low. The decline in the high income group suggests that there is a limit to the amount of extra money consumers spend on food (ruminant meat inclusive), when their incomes increase, they are to budget some portion of their income for other necessities of life including savings.

Conclusion and Recommendations

It is evident from the results of the study that socio-economic characteristics vary differently among income groups and have strong influence on variation of ruminant meat demand. The results indicate that low income group is characterized by household heads (56.4%) that are between the age group of 18-43 years. Also with majority (87.7%) having either no formal education or only primary certificate and a Family size of six and below constituting about (50.88%). The middle income group is characterized by household heads that are between the age group of 18-43 years , which constitute 78.57% with majority (57.15%) having either no formal education or only primary certificate and have a Family size of six and below constituting about (52.6%). However, the high income group is characterized by large families of seven and above, mostly literate (60.66%) having either secondary or tertiary certificates with the majority in the age of 18-43years.

On the effects of socio-economic characteristics on meat expenditure, the results reveal that about 87%, 96% and 96% variations for the three income groups respectively have been explained by the independent variables. Household size and income level had positive relationship for all the income groups. However, the results indicated that the respondents in the higher income group were majority literate and very conscious of the negative consequences of ruminant meat demand. With regards to income distribution the study revealed that there is wealth inequality in the study area.

Government should design efficient strategies of enhancing the low income group through taxes and so on. This could increase ruminant meat demand, due to improved income redistribution. Non governmental organizations and cooperative societies should also enhance the purchasing power of the poor; this could increase their demand for ruminant meat. This could be done through skills acquisition programmes.

Household size is positively related to expenditure on ruminant meat, this means demand for ruminant meat will increase with increase in income government should subsidized animal feeds to the farmers and more easy access to credit. This will encourage the livestock farmers to increase supply, subsequently it will result to fall in retail prices and in turn lead to equilibrium of demand and supply for ruminant meat products in question in the market.

Corresponding author:
Yakaka Bukar Maina,
Department of Agrisultural Economics Extension, P. M. B. 1069, Maiduguri, Borno State, Nigeria
Phone: +2348031197055
Email: yakakabkm@gmail.com

References

[1]   Abdulai, A., Devendra, K., Ashok, K. S. Household Food Demand Analysis in India. Journal of Agricultural Economics, 1999. Vol. 50, No.2, 316-327.

[2]   Addis, A., Andford, S., Berhanu, A. Policy, Finance and Technology in Livestock Development in Sub-saharan Africa. Some Critical Issues. International Livestock Centre for Africa (ILCA), Addis Ababa, Ethiopia. ILCA Bulletin, 1998, 31:2-13.

[3]   Adeoye, I.B., Olufunmi, O.O., Idris, B. A., Okafor, B.N., Ajetunmobi, T. Consumers'Preference for Common Exotic Vegetables in Oyo and Kano State,Continental Journal of Agricultural Science, 2010, 4: 60 – 65.

[4]   Akinleye, S. O. Food Demand in Northern Nigeria: Implications for Food Policy.Journal of Social Science, 2009 18(3): 209-215.

[5]   Asai, T. Food & Drink |www.goatdealer.com/Goats_For_Sale_Links.html. Retrieved on 2nd July, 2012

[6]   Baba, A. B. Analysis of Urban Household Food Demand in Borno State Nigeria. Unpublished M.Sc Dissertation, Department of Agricultural Economics and Extension, University of Maiduguri, Borno State, Nigeria, 2007, 1-63.

[7]   Balami, D. H., Bumba, U. M., Akorede, U. E. A. The Dynamics of Maiduguri Livestock (Meat) Market Network System (1991-1997). Sahel Analyst. Journal of Faculty of Social and Management Sciences, University of Maiduguri, 1999, Vol. 4, No. 1 & 2, 82-98.

[8]   Coffey, L. Meat Goats Sustainable Production. ATTRA. http://www.attra.org/ attra-pub/meatgoat. html. Retrieved February 5, 2009.

[9]   Eales, J. S., Unnevehr, J. U. Demand for Beef and Chicken Products: Seperatability and Structural Change. American Journal of Agricultural Economics, 1988, 70 (2):521-532.

[10]   FAO (Food and Agriculture Organization of the United Nation) Agricultural Production Year-Book, 1992, Rome Italy.

[11]   Lesiba, B., Robert, M. Analysis of Household Demand for Food in South Africa: Model Selection, Expenditure Endogeneity, and the Influence of Socio Demographic Effects paper presented at the African Econometrics Society Annual Conference, Cape Town, South Africa, 2007, July. 4-6.

[12]   Malaga, J., Pan, S., Duch-Carvallo, T. Did Mexican Meat Demand Change under   N A F T A ? Contributed Paper prepared for presentation at the International Association of Agricultural Economists Conference, Beijing, China, 2009, August 16-22.

[13]   Molina, J. A. Food Demand in Spain: An Application of the Almost Ideal Demand System Analysis. Journal of Agricultural Economics, 1994, 45 (2), 252-258.

[14]   Okoruwa, V. O., Chebe, E. N., Amaza, P. S. Demand Function for Ruminant meat in Nigeria. Proceedings of the 2nd and 4th Annual Conference of Animal Science Association of Nigeria, September 1999. 14-16, IITA Conference Center, Ibadan, 260-262.

[15]   Olayemi, J.K. Food Security in Nigeria. Research Report 1998, No 2. Developmental Policy Centre, Ibadan, Nigeria.

[16]   Raghavendra, S. B., Mahajanashetti, N., Karnool, N., Kulkarni, V. S., Basavra, J. Meat Demand Consumption Pattern and Its Preference in Dharwad District: A Socio- economic Analysis. Karnataka Journal AGRIC.SCI, 2009 22 (2): 353-358.

[17]   Zongoma, B. A. Determinants of Beef Consumption Among Households in Maiduguri, Borno State of Nigeria, Unpublished M.Sc. Dissertation, Department of Economics and Extension, University of Maiduguri, Borno State, Nigeria 2003, 56.