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Research Paper

Estimation of beef consumption: An application of econometric model in Wamakko local government area of Sokoto State, Nigeria

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There has been a notable increase in beef consumption in the study area due to increase in per capita income of the consumers and rapid urbanization. The study was designed to use an econometric tool to examine the factors affecting beef consumption in Wamakko local government area of Sokoto State, Nigeria. The sample of 100 respondents was selected randomly. The data collected were analyzed using descriptive and inferential statistics. The results revealed that educational level, occupation, income, and age of the respondents are statistically significance at different levels. Majority of the beef consumers in the study area prefers cattle beef over other meat type perhaps due to their awareness on its health benefits. The study recommends intervention programs by government that would improve the income and purchasing power of the consumers, since income has positive effects on the consumer's expenditure on beef and overall nutrition security.

Keywords: Beef, Consumption, Sokoto State and econometric

INTRODUCTION

Meat is generally regarded as the skeletal muscle from animals, including the connective tissues and fat that are naturally associated with the muscle (Jeremiah, 1978) and may include all the edible parts of an animal (Gambo et al., 2010). According to Udoh and Akintola, (2003) meat is the most important source of animal protein in Nigeria. Beef is widely cherished and consumed by all categories households in Nigeria; therefore, it is devoid of any cultural taboo. It is a source of high quality animal protein (Aduku and Olukosi, 2000; Oloyede, 2005). Some of the major contributions of cattle to the national economy is that, it serves as a source of animal protein and provides a source of income and livelihood for a large number of the Nigerian populace especially in the rural areas. Agaie et al. *(*1997) estimated beef to account for about 52% of the total meat consumed in Sokoto metropolis.

Cattle are the most important livestock species in Nigeria that give high quality and quantity of animal protein. Moreover, protein provided by cattle enjoys wide acceptability among all classes of people in Nigerian societies regardless of their socio-cultural belief. Jabo,(2004) asserted that in spite of the importance of beef to human health, there has been a gradual fall, over time, in the supply of available protein for human consumption in Nigeria. This reduction in supply could be attributed to several limiting factors such as diseases, drought, scarcity and high cost of feeds and low potentials of indigenous breeds. Closely related to this is the low per capita income among Nigerians, which gives rise to poverty. Cattle are produced and market in all parts of Nigeria, with the north dominating all other geo-political zones. This can be partly attributable to favourable climate that encourages their production (Jabo, 2004).

The well-being of the people is directly dependent on the amount of animal protein they consume. FAO (2000) recommends that on the average, the consumption of at least 36 g of animal protein per adult per day for healthy growth and d evelopment, what is obtainable, however, in

most African countries is just 25 g per adult per day, which account for a deficit of 11 g. Economic theory suggests that a rational consumer prefers to buy more of a commodity at a lower price and less when the price is high. Increase in disposable income, change in the price the competing commodity and taste and preferences are other likely factors that might have a considerable influence on the preference and consumption of a particular commodity. Taste, flavour, quality, social, economic factors may tend to dictate preference for a product (Yakubu et al*.,* 2013). Cheeke, (2002) opined that, global demand for meat production would increase by 58% between 1995 and 2020

Sokoto State is one of the major livestock producers in northern Nigeria, the state ranks 2nd in the Nigerian livestock population with an estimated of 3 million cattle, 3 million sheep, 5 million goats, 4,600 camels, 52,000 donkeys, and host of other species of local and exotic poultry species (Mshelbwala, 2013; Mamman, 2000). Many countries have different meat consumption patterns of livestock product and livestock production systems, which affect the products delivered to the market. Taste, nutrition, product safety and prices are among the important determinants in food selection. In developing countries, consumer's culture, traditions, customs, and taboos also play significant roles in the consumption of certain types of meat (Johnson et al., 2011).

The demand for fresh beef is on the increase especially in Sokoto Metropolis partly due to increase in population, incomes, and rapid urbanization. However, despite these overall improvements, per capita beef consumption is still low especially in Sokoto state and Wamakko local government in particular. Despite all the aforementioned factors, coupled with growing interest in cattle production in Wamakko local government area, there is little or no research on the factors affecting fresh beef consumption in the study area. The research work will consider factors affecting fresh beef consumption among household members in Wamakko Local Government.

METHODOLOGY

The study was conducted in Wamakko local government area of Sokoto State. The study area consists of six (6) districts, which are Dundaye, Wamakko, Gumbi, Gumburawa, Wajake and Gidan Buba. Wamakko Local Government area is about 10 Km away from Sokoto city, the State capital. Wamakko local government has an area of 697 km² and a population of 179,619 at the 2006 census. The LGA is one of the densely populated Sokoto Close Settled Zones areas characterized by heavy influx of people because of rural-urban migrations from the neighbouring states and distance regions. The average rainfall is about 550 mm per annum. Relative humidity is between 15-20% during the dry season and up to 70-75% during the rainy season (Arnborg, 1988).

Demographics of Wamakko local government is mainly populated by Hausa people who are mostly farmers and animal rearers. Four districts were purposively selected, based on the intensity of beef marketing activities and high availability of beef for sale. From each districts 25 households were randomly selected through balloting to form 100 sample sizes for the research. Different statistical techniques were employed for data analysis in this study. Descriptive statistic in the form of tables and percentages and inferential statistics in form of multiple regression models were used to analyse objective data collected from an interview schedule.

Model specification

Regression analysis comprises of models which can be used in estimating the relationship between the dependent and independent variables. A multiple regression analysis that includes the use of different functional forms.
The model could be specified as;

$Y=B_0+B_1X_1+B_2X_2+B_3X_3+B_4X_4+……..e$
Y= consumption of beef (kg).
B_0 = Intercept.
B_1-B_4= Parameters to be estimated.
$X_{1=}$ Price of fresh beef (₦/Kg)
X2= Price of mutton (₦/Kg)
X3= Income ₦
X4= Education (years schooling according to 6:3:3:4 system)
X5= Household size (number of individual in the household)
X6= Occupation
X7= Age (in years)
F= functional notation
e= Stochastic error term

RESULTS AND DISCUSSION

Factors influencing beef consumption

Table 1 shows that the coefficient of determination (R^2) to be (0.938). This (R^2) value indicates that the independent variables are responsible for 93.8% of the variation in the dependent variable. This implies that the independent variables included in the model have well explained the variation in the dependent variable, which is beef consumption. The table further revealed that the estimated coefficients with respect to each of the independent variable as well as their corresponding t-values. It shows that educational level; occupation and income are statistically significance at 1% level of significance, while the age is statistically significant at 5% level. However, price of the beef (own price), price of

Table 1. Determinants of beef consumption

Model	Reg. coefficient	Standard error	T-value
Constant	-121.444	8.690	-13.975***
Beef price	-1.162	1.875	-0.620ns
Mutton price	0.436	0.748	0.0583ns
Income	14.281	1.320	10.821***
Educational level	6.508	2.208	-2.954***
Household size	0.036	0.926	0.039ns
Occupation	2.375	0.780	3.046***
Age	-4.880	1.857	-2.628**
			R^2 = 93.8%

Source: Field Survey 2017, *, ** & *** denotes statistically significant at 10%, 5% & 1% respectively.

mutton as well as household size are not significant. The regression coefficient for price of fresh beef (X1) which represents own price even though carrying expected sign theoretically was not significant. This result reveals an inverse relationship between quantity of beef consumed and its price. This implies that increase in own price of fresh beef by ₦1.16 kobo one naira, would result to a decrease in the quantity of fresh beef consumed by 1kg. This is in conformity with the law of demand. This is also in agreement with Udoh and Akintola (2003), who reported that relative change in food price affect the ability of consumers to meet basic nutritional requirements.

The coefficient of mutton price (X2) representing price of substitute is positive 0.436 and statistically not significant. This implies that increase in the price of beef by 0.44 kobo would influence the consumer's decision to switch to mutton as substitute to beef. This shows that beef is elastic with respect to change in the price of mutton. This shows that increase in the price of a commodity leads to an increase in the consumption of its substitute, cross price elasticity of demand is always positive in case of normal good, which is known as demand shifter. Income is one of the major determinants of demand and budget share allocation among households. The result shows that income (X3) had a positive relationship with the quantity of per capita fresh beef consumed, which implies that, one-naira increase in income of the consumer will result to an increase in quantity of fresh beef consumed. That is for every one-naira (₦) increase in the income of the consumer would results to 14.28kg increased in beef consumption. This relationship is statistically significant at 1% level. Income as expected has a positive and statistically significant effect on beef consumption expenditure since it is considered as a normal good.

The educational level (X4) was highly significant at 1% level of significance and the coefficient was positive indicating that literacy level of the respondents influenced the choice of beef as an important source of protein in the area. This implies that increase in the level of years of schooling by one-year level would lead to an increase in quantity of beef consumed by 6.508 kg. This could be because of the high level of awareness of the health benefits of protein by an educated household heads. Increase in the educational level would also increase the income level of the individual concern. Furthermore, educational level positively influences the preference for meat. This is in accordance with Amao et al. (2011) who reported that education empowers people, strengthens their abilities to meet their needs and increase their productivity and potential to improve their quality of life obtained similar results.

The regression coefficient of household size (X5) is positive and significant relationship with beef consumption. This implies that for every unit increase in the household size of the respondents, will lead to an increase in quantity of beef consumed among the respondents by 0.036. This relationship is statistically not significant. The coefficient for (X6) occupation is positive and significant relationship with beef consumption ($P<0.05$). This implies that households with secondary occupation consume more beef than their counterparts, because with occupation household heads could generate more income that would afford them to buy more beef for their household members. The positive sign on the coefficient indicate that the higher the occupational earning of the household head the higher will be the level of fresh beef consumption in study area. The coefficient of Age (X7) is -4.880 and is statistically significant at 5% level of significance. This implies that increase in the age of the respondent by 1 year would lead to decrease in beef consumption by -4.880 kg. This true for the fact that younger people are likely to have more income than their older counterparts are, hence likely to consume more beef.

Consumption of fresh beef at a higher price

Figure 1 presents the distribution of consumers according to their decision to consume fresh beef even when the price continues to increase. It shows that majority of the (57%) of the respondents said they would consume fresh

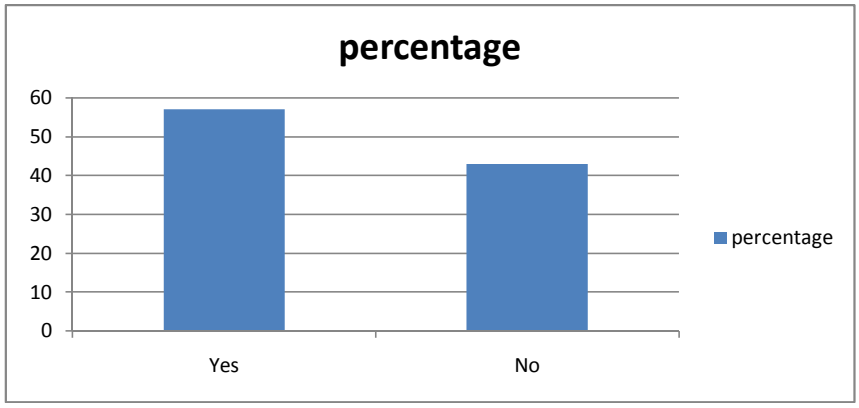

Figure 1. Consumers decision to consume beef when price continue to increase
Source: Field survey 2017.

Table 2. Distribution of respondents according to their preferred form of beef to consume.

Various forms	Frequency	Percentage
Cooked	16	16.0
Smoked	19	19.0
Fried	12	12.0
Fresh	53	53.0
Total	100	100

Source: Field survey 2017.

Table 3. Distribution of respondents according to the frequency of beef consumption.

Frequency of consumption	Frequency	Percentage
Daily	60	60.0
Weekly	27	27.0
Monthly	12	12.0
Occasionally	1	1.0
Total	100	100

Source; Field survey 2017.

beef even when the price continue to increase up to certain level, which implies that an increase in the price of fresh beef may not affect their decision to consume it. On the other hand, (43%) of the respondents decide not to consume fresh beef as the price continue to increase. This shows that, beef consumption in the area is somehow elastic.

Forms in which fresh beef is consumed by the respondents

Table 2 shows the distribution of respondents according to their likely preference for the various forms that fresh beef can be consumed. The table indicates that most of the respondents (53%) preferred to consume beef in a fresh state, possibly because of the taste, flavor and juiciness. Nineteen percent of the respondents prefer to consume beef in a smoked form and only few twelve percent (12%) prefer to consume beef in a fried form possibly because of the taste. Frying keep the beef preserved for a longer period of time and it also gives it an additional taste. Taste happen to be one of the factors that affect consumption, and in relation to this result it shows that taste affect consumer preference for beef in the study area.

Frequency of fresh beef consumption

Table 3 shows the distribution of respondents according to their frequency of fresh beef consumption. The Table

indicates that majority (60%) of the respondents consumed fresh beef daily, while only few (12%) and (1%) consumed fresh beef monthly and occasionally, respectively. This results shows that most of the respondents consumed fresh beef on daily basis. This is in line with the statement that; beef is widely cherished and consumed in households almost on daily basis. It is a source of high quality protein (Aduku and Olukosi, 2000; Oloyede, 2005).

Conclusion and recommendations

The study concludes that, there is preferences for beef over other meat type in the study area, since majority of the respondents have preferences for cattle beef over other meat sources in the area. Considerable proportions of the respondents have reported consuming beef on a daily basis. It was also found that beef consumption is significantly influenced by consumer's income, level of educational level occupation and age. The research concludes that, majority of the beef consumers in the study area had low income and are aware of the health benefit of consuming fresh beef. Beef consumption in the study area exhibit a relatively inelastic demand. Based on the research findings, the study recommended that, Government intervention programs should be targeted towards improvement in the income and purchasing power of the consumers, since income has positive effects on the consumer's expenditure on beef and overall nutrition security. The model has the necessary desirable properties that are consistent with theory. Government should provide financial support in form of credit to beef marketers to boost beef marketing activity in the study area.

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