

## CONSUMPTION OF, AND WILLINGNESS TO PAY FOR, INDIGENOUS SMALL RUMINANTS' MEAT IN MARSABIT, KENYA

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### **Abstract**

*Indigenous sheep and goats are among the most important species of livestock in Kenya. They constitute an important productive national asset that generates a flow of income and employment throughout the year. Demand for food of animal origin in developing countries is expected to double by the year 2020, creating markets for these animal products. Growth of meat markets will depend on the consumption behaviour of consumers, among other factors. Consumer tastes and preferences will act as the deciding factor for the development of the livestock sector in general and small ruminants in particular. Although the importance of indigenous small ruminants is well recognized, this importance has not been well quantified. One contributing factor is lack of data and information on the marketing of these animals. This paper aims at contributing to filling this information gap by collecting and analyzing data on consumption and buyer preferences of indigenous small ruminant meat. Specifically, studying animal types and traits that the market prefers and identifying the price premium consumers are willing to pay for meat quality.*

*The research area included the Marsabit district in the North and the Kariobangi region of Nairobi, Kenya. 103 households were randomly selected through a transect line method. A single-bounded logit model was used to explore factors affecting willingness to pay for small ruminant meat quality. Results show that 55% of households prefer and consume small ruminant meat to beef. Of these, about 70% were willing to pay the price bid for small ruminant meat quality. Average price bid was about Kshs 11.40 (an equivalent of US\$ 0.17) which is 7.6% above the current price of small ruminant meat. An econometric analysis showed that the current price of the product, household income, number of adult members in a household and the consumer's perception of meat qualities were factors found to influence willingness to pay. The paper concluded that there is willingness to pay for meat quality. Dissemination of these findings is important in assisting both scientists and extension workers to educate producers and*

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*encourage them to produce what is most highly demanded by the market, enhancing pastoralist's market access, leading to increased incomes and improved livelihoods.*

## **1. Introduction**

Indigenous sheep and goats are among the most important species of livestock (Shalander and Pant, 2002) in Kenya. They contribute significantly (Demeke, 2004) to households' income, especially to the rural poor (Turner, 1991). They also have short generation intervals, high prolificacy, and are easily adaptable to a wide range of climatic conditions (Shalander and Pant, 2002). As a result, they constitute an important national productive asset that generates a flow of income and employment throughout the year (Lebbie and Kagwini, 1996 and Rege et al., 2001). These characteristics mean small ruminants are particularly important in the household economy of the poor, particularly in the marginal environments of arid and semi-arid regions. The major products from indigenous sheep and goats are meat, milk, and skins (Ehui et al., 2003), with meat and milk having high nutritional value for humans.

Demand for food of animal origin in developing countries is expected to double by the year 2020 (Delgado et al., 1999). Enhanced by increases in urbanization, population and income growth, such demand will create markets for animal products and encourage commercialization of livestock production (Delgado et al., 1999). The extent of this commercialization depends on the consumption of the products by consumers. Meat consumption behaviour is the deciding factor for the development of the livestock sector in general and small ruminants in particular (Thammi Raju and Suryanarayana, 2005). Consumer tastes and preferences are reflected in the market. These are revealed through purchase decisions and price premiums that consumers pay for both visible (Langyintuo et al., 2004) and invisible characteristics of meat. This paper aimed at identifying the price premium consumers are willing to pay for small ruminant meat. This is relative to their perceptions of palatability of indigenous small ruminant meat over beef. A number of research studies have been carried out in the area of livestock in northern Kenya (Barrett et al., 2003 and 2004; Njanja et al., 2003). However they have focused mainly on production aspects with little being focussed on the consumption patterns of small ruminant meat products.

## **2. Materials and methods**

The section describes the study area from which data was sourced. This includes the methodology used in the survey, techniques and tools used in data collection and analysis of the empirical work.

### **2.1. Study area**

The study area included Marsabit district and Nairobi city. Marsabit district is one of ASAL districts in Kenya and lies to the north of eastern province. Most of the district is an extensive plain lying between 300m to 900m above the sea level, and is characterised by hills and mountain ranges, inselbergs, volcanoes cones and calderas. The land spans agro-ecological zones III, IV, V and VI and mostly suitable for camels, sheep and goats (GoK, 2002). About 80% of the district's residents are pastoralists deriving their livelihoods from livestock and livestock-based industries.

Nairobi is the main terminal market as well as abattoir for indigenous sheep and goats that come from Marsabit and other regions in Kenya. The market serves all categories of households. Consumers buy either in kilograms or whole animal (both alive and slaughtered).

### **2.2. Survey methodology**

A consumer survey was administered in Marsabit town and the environs of Nairobi-Kariobangi market (main abattoir area of supply). Personal interview methods based on a structured questionnaire were used to elicit information on consumer demand for small ruminant meat and their willingness to pay for their preferences. A sample size of households was determined according to Mugenda and Mugenda (1996). Consequently, 69 households were to be covered in each study area. However, due to financial constraint the sample size for Marsabit was reduced to 34 households while the sample size for Nairobi remained at 69 households. During the survey major landmarks (shopping centres, schools, churches and hospital) were identified at random and transect lines drawn between each pair following a major road. Sampling was then done following the marked transects. Households were interviewed at an interval of every three households on either side of the roads.

### **2.3. Data collection**

Data collection was administered through personal interviews using a pre-tested structured questionnaire. Consumers were interviewed to elicit information on quantities of meat

purchased and cost, their perception of meat qualities and preference for small ruminant meat, their willingness to pay an increased price, and household characteristics.

#### **2.4. Empirical analysis**

The empirical analysis utilized a contingent valuation dichotomous choice methodology. A single-bounded logit model was used to explore factors affecting willingness to pay for small ruminant meat. The mean price that households were willing to pay for small ruminant meat was also estimated. A consumer's decision to continue buying small ruminant meat (willing to pay) or not to buy given some increase in price is a binary or dichotomous mode, in which probabilistic modelling frame work can be applied. In this case both logit and probit models can be used. Theory states that the difference in the models is related to the assumption of the error term distribution and that both yields roughly the same results for the variables of interest. Consequently a logit regression was taken to analyse the specified model.

### **3. Results of analysis**

Results include analyses of willingness to pay for the product by the consumers. The analysis involved both statistical as well as econometrics analyses.

#### **3.1. Statistical analysis of willingness to pay for small ruminants' meat**

The survey results show that 55% of consumers prefer and consume small ruminant meat compared to beef. 53% of consumers ranked small ruminant meat as of high quality relative to beef based on their perception of meat qualities. The findings regarding the willingness to pay for small ruminant meat, among households that consumed the product, revealed that, about 70% were willing to pay an additional amount (price bid) over the current price to continue consuming small ruminant meat. The study results showed means based on the above 55% of households that consumed small ruminant meat. An average price bid that households were willing to pay was about Kshs 11.40 which is 7.6% (an equivalent of US\$ 0.17) which is 7.6% above the current price of small ruminant meat.

Results in table 1 reveal the mean differences between those households that were willing to pay relative to those not willing to pay. Comparing the Marsabit and Nairobi study areas, households in Marsabit district were willing to pay a mean price bid of about Kshs 9.10, while households in Nairobi were willing to pay a mean price bid of about Kshs 12.30. Households in Nairobi offered a higher price bid. The mean current price for small ruminant meat at the time of survey was about Kshs 146. 60 per kg for households willing to pay compared to the price of

Kshs 152.50 per kg paid by the households not willing to pay. Households not willing to pay were showed as already paying a higher price. Average monthly income spent on food for households willing to pay a price bid for small ruminant meat was Kshs 4,414.80. This was more compared to households not willing to pay a price bid. These households had an average monthly income spent on food of Kshs 3,735.80. Considering household budget, expenditure share of meat for households not willing to pay is about 17.09% compared to 14.84% of households willing to pay a price bid. Households not willing to pay, have a higher proportionate expenditure on meat, and are not willing to increase that proportion. Household size by adult equivalent was measured by the number of individual adult members. It was calculated using an adult equivalent scale for adjusting the household size in terms of age according to Stefan and Pramila (1998). The mean household size for those households that are not willing to pay an additional price is approximately 5 persons, relative to households that are willing to pay an additional price that have 4 persons.

Table 1: Description of key variables for the consumer response on willingness to pay

Variables	Combined Mean	Mean for households willing to pay	Mean for households not willing to pay
Small ruminant price per kg in Kshs	148.25	146.59	152.50
Household monthly income spent on food	4,224.18	4,414.76	3,735.81
Percent purchase cost on SR meat / month	15.47	14.84	17.09
Household size by adult equivalent	4.08	3.97	4.35
Household head age in years	39.68	39.34	40.57

SR = small ruminant

### 3.2. Econometric analysis of willingness to pay for small ruminants' meat

A logit model was estimated. The dependent variable was the stated response of consumer's willingness to pay for indigenous small ruminant meat. This actually meant that a consumer was willing to pay an additional amount (in this case referred to as price bid) over the current price in order to continue consuming sheep and goat meat. The price bid was based on the perception of consumer's preference of small ruminant meat over beef. The response was "yes" for a willing household and/or "no" for non-willing household. The objective was to analyse the overall willingness to pay for indigenous small ruminant meat. To determine statistical significance of the model, a likelihood function of the estimated model was compared to that of the base model according to a likelihood test (Hensher et al, 2005). The results of the analysis are found in table 2 below.

The results of the maximum likelihood coefficients from the logit estimation indicate that the current price of small ruminant meat, household monthly income spent on food, the proportion spent on small ruminant meat per month relative to household monthly income spent on food, household size adult equivalent and perceived ranking of small ruminant meat as of good quality relative to beef, have a statistically significant influence on the probability of willingness to pay for indigenous small ruminant meat.

The coefficient of the current price of small ruminant meat is negative and significant ( $p < 0.1$ ) in explaining the probability of willingness to pay for the small ruminant meat. This implies that the higher the current prices at which household are buying small ruminant meat, the lower the likelihood of household to be willing to pay for small ruminant meat. The coefficient on monthly income spent on food by households is positive and significant ( $p < 0.05$ ) in explaining the probability of willingness to pay for the small ruminant meat. This indicates that the higher the household income, the higher is the probability that the household would be willing to pay for the small ruminant meat. The coefficient of the proportion spent on small ruminant meat per month, relative to household monthly income is negative and significant ( $p < 0.05$ ) in explaining the probability of willingness to pay for the small ruminant meat. The results indicate that the larger the household budget share paid for meat, relative to household income, the less the probability that the household will be willing to pay for the small ruminant meat. This could be explained by the fact that household income is distributed among many food needs, so if the cost of meat increases then other food needs will not be achieved. The coefficient of household size by adult equivalent is negative and significant ( $p < 0.1$ ) in explaining the probability of willingness to pay for the small ruminant meat. This implies that as the number of adults members per household increases, the probability of a household buying small ruminant meat decreases. This result is not as expected, based on the hypothesis that food requirement increases with the number of persons in a household. The coefficient on perceived ranking of small ruminant meat as of good quality by households, relative to beef is positive and significant ( $p < 0.05$ ) in explaining the probability of willingness to pay for the small ruminant meat. This indicates that relative to beef, households' perception on quality of small ruminant meat as being higher increases the probability of household willingness to pay for the small ruminant meat. The coefficient on the District of household location and age of household head do not have influence in explaining the probability of willingness to pay for the small ruminant meat.

Marginal effects ( $\partial y / \partial x$ ) of independent variables were estimated after the logit estimation. Empirical marginal effects for the probability of a household willing to pay a higher price were evaluated at the means of the independent variables shown in table. The value of  $y = 0.79$  estimates the probability of a household willing to pay higher price when the various independent variables are at their sample means (shown in the x-column in the table). An additional Shilling on the current price at which households buy small ruminant meat would reduce the likelihood of households willingness to pay for the small ruminant meat by 0.01 units. An additional unit of household income spent on food per month would raise the probability of household willingness to pay for the small ruminant meat by  $9.44e-6$  units. An additional unit in the percentage purchase cost on small ruminant meat per month, relative to household income would lower the probability of household willingness to pay for the small ruminant meat by 0.01 units. Similarly an additional adult equivalent in the household would reduce the probability of household willingness to pay for the small ruminant meat by 0.10 units. A consumer that ranks small ruminant meat as high quality relative to beef would increase the likelihood of willingness to pay for the small ruminant meat by 0.45 units.

Table 2: Parameter estimates and marginal effects of logit model for factors influencing willingness to pay for indigenous small ruminant meat

Independent Variables	Maximum likelihood coefficient	Std. error (MLE)	Marginal effect ( $\delta y / \delta x$ )	Std error ( $\delta y / \delta x$ )	X (sample mean)
Small ruminant price / kg in Kshs	-0.06**	0.03	-0.01*	0.00	148.25
Household monthly income spent on food	0.00*	0.00	0.00*	0.00	4,224.18
Percent purchase cost on SR meat/ month	-0.08*	0.04	-0.01*	0.01	15.47
District of household (Msb = 1, Nbi = 0)	-0.77	1.20	-0.14	0.24	0.28
Household size by adult equivalent	-0.60**	0.37	-0.10**	0.06	4.08
Ranking of SR meat perceived as quality (higher quality =1, 0 = otherwise)	2.12*	0.87	0.45*	0.19	0.82
Household head age in years	0.04	0.04	0.01	0.01	39.68

\* and \*\* = significance at 5% and 10% respectively SR= small ruminant  
Msb = Marsabit Nbi =Nairobi

#### 4. Conclusions and recommendations

The purpose of the study was to analyse the overall willingness to pay for indigenous small ruminant meat. The study intended to establish whether households were willing to pay an additional amount (in this case referred to as a price bid) over the current price in order to continue consuming sheep and goat meat. The price bid was based on the consumer's preference

of small ruminant meat quality over beef. The survey was carried out on consumers both in the pastoral production area of Marsabit district and in the market area of Nairobi. It also aimed at highlighting policy implications arising from the study that may contribute to formulating appropriate policies in encouraging indigenous small livestock markets and thus improving the livelihood of livestock keepers. This section discusses survey results for both Marsabit and Nairobi consumers.

#### **4.1. Conclusions**

The paper concluded that there is willingness to pay for meat quality. Of the households that consume small ruminant meat, 70% are willing to pay, revealing a mean price bid of Kshs 11.40 which is 7.6% extra for current price of small ruminant meat. The current price of meat, income, number of adult members in a household and consumer's perception of meat qualities were factors found to influence the willingness to pay. In general households in Nairobi were willing to pay more, relative to households in Marsabit. Dissemination of these findings is important in assisting both scientists and extension workers to educate producers and encourage them to produce what is most highly demanded by the market. Thus, enhancing pastoralist's market access, leading to increased incomes and improved livelihoods. Since pastoral breeds are the ones that can survive the harsh environment of Marsabit and similar areas, development of the livestock sector would also be improved by selecting and concentrating on the animals that they already have with the goal of improving their stock.

#### **4.2. Recommendations**

Recommendations are presented in terms of policy implications. The study results indicate that household consuming small ruminant meat will not necessarily turn to beef when the price of small ruminant meat increases. This would mean that consumption of either small ruminant meat or beef is an issue of preference and not price difference. This also means that within the consumer population there is a section that prefers and consumes small ruminant meat. This would mean that there is a niche market for small ruminant meat. Therefore there is a need to properly identify and establish this market niche and assist both producers and consumers to access it. This would help improve the marketing of small ruminant meat product, providing opportunities for rural communities to generate greater incomes (Darby et al 2006), thus improving the livelihoods of these small livestock keepers. A potential policy option is to

establish a number of slaughterhouses or processing factories close to consumption areas and in various towns to broaden the market as well as providing improved market access to producers.

Secondly, given that there is a willingness to pay for indigenous small ruminant meat, there is a justification for exploring the potential for the conservation of small ruminants through the estimation of demand and willingness to pay for selected animal characteristics and types. Livestock development policies should consequently seriously incorporate considerations of relevance to indigenous small ruminant production, and this may be expected to subsequently lead to an improvement of the livelihoods of the poor in rural pastoral areas.

### **Acknowledgements**

Funding support by ILRI-BMZ-Hohenheim-Göttingen Collaboration on “Improving the Livelihoods of Poor Livestock Keepers in Africa Through Community-Based Management of Indigenous Farm Animal Genetic Resources” is greatly acknowledged. Appreciation also goes to the traders’ support in sharing personal and business information with us.

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