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## Determinants of Market Participation Decision in Small Ruminants' Market by Livestock Keepers in Isiolo and Marsabit Districts, Kenya

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### Abstract:

Production and sale of livestock in Kenya has been changing in terms of quantity over time. As population, urbanization and income growth increases, pastoral livestock keepers should be able to respond to potential increases in demand for livestock and livestock products by releasing small ruminants into the market. This study critically examines the sales decisions of the rural livestock keepers in the arid and semi arid lands (ASALS) of Kenya by analyzing the significant determinants of the market participation decisions in small ruminants market by the pastoral livestock keepers. The study was carried out in Isiolo and Marsabit Districts where data were drawn by interviewing a sample of 250 livestock keepers through administration of structured questionnaires in July 2010. These were supplemented with secondary data from libraries and government offices in the study area. The two step selectivity model was used to analyze the data collected from the study.

The study results show that road conditions to the markets, price for small ruminants, group membership, cash relief, credit facilities and the herd size are the significant determinants of market participation decisions by livestock keepers. The study recommends that in order to increase participation of livestock keepers in the small ruminant market, it is imperative to improve the conditions the of the roads, discourage reliance of pastoralists in relief by promoting diversification of activities in the ASALS and motivate pastoralists to be commercially



oriented by focusing on investments that result in marketable surplus through increased production.

*Key words: market participation, pastoral, small ruminants*

## **Introduction**

Small ruminants are a major component of the pastoral population's household economy in Kenya (Njanja *et al.*, 2003). They are kept for both tangible (cash income, milk, meat and home consumption) and intangible (savings, insurance against emergencies, cultural and ceremonial purposes) benefits (Verbeek, 2007). The current population of small ruminants in Kenya is estimated to be 27.7 million goats and 17.1 million sheep (CBS, 2009).

Pastoralists keeping small ruminants are likely to benefit from potential increase in demand for animal food products which has been depicted to be rising sharply in many developing countries (Delgado *et al.*, 1999), if they respond positively by increasing participation in the market. Their efforts will probably be enhanced since small ruminants are relatively easy to keep; they reproduce quickly, spread the risk inherent in agricultural production (Ehui *et al.*, 2003) and can be used as a first step on the ladder out of poverty (Peacock, 1995).

Although pastoral livestock keepers are presumed to sell small ruminants, they have not fully exploited the potential demand for livestock and livestock products. An in-depth understanding on how best to strengthen small ruminant producers' bargaining power at the markets and the steps required to achieve positive changes in market structures will definitely guide in improving their participation and increase the benefits gained from the markets. This study was designed to assess the determinants of sales decisions of pastoralists in Isiolo and Marsabit, two districts which are a representative of the regions that supply small ruminants for meat to the Nairobi and Middle East markets.

## **Materials and Methods**

### **Sampling Procedures**

Data were collected from a sample of 250 households in the larger Isiolo and Marsabit districts using geographical boundaries as a guide in selecting clusters (5 divisions per district) randomly. Systematic random sampling was used to pick respondents from the selected clusters/

divisions. For each of the divisions, a list of households was obtained from chiefs/ assistant chiefs and local elders. The households were picked randomly by establishing intervals created by dividing the total population of households in each of the divisions by the sample size required per division. In Marsabit, every kth household (N/30) was selected from the intervals created. In Isiolo, every k<sup>th</sup> household (N/20) was picked from the list obtained per division.

**Data Types and Sources**

Data for the study were obtained from primary and secondary sources. Primary data were collected from a sample of 250 livestock keepers through administration of structured questionnaires. These comprised of information on basic household and socioeconomic characteristics of livestock keepers. Secondary data were collected from public libraries and government institutions, journals, previous studies related to the study and annual agricultural reports.

Data were analyzed using OLS regression method with the aid of STATA version 9, software used in running the model used in the study. Descriptive and non-parametric analyses were used to elicit the household characteristics and sale trends for small ruminants.

**Estimation Procedure**

The determinants of market participation in the small ruminant market were estimated using the probit model. Since the dependent variable is a qualitative dependent variable, that is, it estimates the probability of selling small ruminants, the probit model was appropriate to use for the analysis. The model is similar to the logit model except that it uses normal distribution (Moyo, 2010). Probit model constrains the estimated probabilities to be between 0 and 1 and relaxes the constraint that the effect of the independent variable is constant across different predicted values of the dependent variable (Nagler, 2002). The model assumes that while we only observe the values of 0 and 1 for the dependent variable, there is a latent, unobserved continuous variable that determines the value of the dependent variable.

The decision to sell (the selection equation), specified in equation (1), was used to predict the probability that a given household will sell small ruminants and was estimated by maximum likelihood as an independent probit model from the entire sample of the livestock keepers who sell and those who do not sell.

$$\Pr (Z_i =1 | w_\gamma, \alpha) = \Phi (h (w_\gamma, \alpha)) + \varepsilon_i \dots\dots\dots (1)$$

Where  $Z_i$  is the dependent variable equal to unity for households that sell small ruminants zero otherwise,  $\Phi$  is the standard normal cumulative distribution function, the  $w$  is a vector of factors affecting the decision to sell, the  $\alpha$  is a vector of coefficients to be estimated, and  $\varepsilon_i$  is the error term assumed to be distributed normally with a mean of zero and a variance  $\sigma^2$ . The variable  $Z_i$  takes the value of 1 if the marginal utility the household  $i$  gets from participating in market is greater than zero, and zero otherwise. From equation 1, then:

$$Z_i^* = \alpha w_i + u_i \dots\dots\dots (2)$$

Where  $Z_i^*$  is the latent level of utility the household gets from selling small ruminants,  $u_i \sim N(0, 1)$  and,

$$Z_i = 1 \text{ if } Z_i^* > 0 \dots\dots\dots (3)$$

$$Z_i = 0 \text{ if } Z_i^* \leq 0 \dots\dots\dots (4)$$

### Results and Discussion

Table 1 below presents descriptive results consisting of the household characteristics. It is observed that the households interviewed had an average size of 6.3 people with 88% of these households being male-headed. Eighty eight percent of these households were male-headed with mean age of the household head being 46.7 years.

**Table 1. Characteristics of the households in the study sample (n=250)**

Variable code	Description of the independent variables	Mean	Std. Dev.
GENHH	1 if the household is female headed	0.12	0.33
AGEHH	Age of household head in years	46.73	13.32
HM01EDUC	No. of years of formal education of the household head	3.72	5.08
HM01_OCC	1 if the household head is a pastoralist	0.51	0.50
HM01_20C	1 if the household head is employed formally	0.10	0.31
TTHHMNO	Total number of household members	6.27	2.23
GMEM	1 if any household member belongs to a group	0.42	0.49
AVEPPRSG	Average price of small stock	1,234.40	1,101.40

<b>V a r i a b l e code</b>	<b>Description of the independent vari- ables</b>	<b>Mean</b>	<b>Std. Dev.</b>
HRDSZTLU	Herd size (Tropical Livestock Units)	20.36	23.20
NONFAM- KS	Average amount of non-farm income in KShs	4,485.20	2,694.67
CR	1 if the household received cash relief	0.08	0.27
FR	1 if the household received food relief	0.72	0.45
FRAMNT1	Amount of food relief received per household in kgs/yr	40.16	36.33
CLAG	1 if any household member is casually employed	0.15	0.36
FENAG	1 if any household member is formally employed	0.22	0.42
HHBSELF	1 if any household member is self em- ployed	0.24	0.43
HHLB	1 if the household engaged hired la- bour	0.17	0.38
HHDLMKT	Distance of the household from local market	10.37	14.23
HHDMMKT	Distance of the household from the ma- jor market	158.60	188.51
HHDROAD	Distance of the household from the nearest road (km)	4.86	5.65
RDMKTNO	1 if road to the local livestock market is good	0.18	0.39
CRKNOW	1 if the respondent has knowledge on credit	0.40	0.64
HHCRT	1 if anyone in the household received any credit	0.27	0.45
CRDAMNT	Amount of loan/credit received	4,017.40	11,527.60
	<b>Description of the dependent vari- ables</b>		
SELLONOT	1 if the household sells small rumi- nants	0.60	0.49

Source: Authors' Household Survey (2010)

The education level of the household heads in the study area is quite low. Most of the households own livestock, with an average herd size of about 20 tropical livestock units (TLUs). One TLU is equivalent to 0.7 camels, 1 cattle, 10 goats, or 11 sheep. About 42 percent of the households had members belonging to groups, mostly self-help groups comprising of women and youth. About 35.79% of the group members benefit from the groups in terms of savings. However, only 14% of the members cited marketing as the role that the groups play. This shows that marketing at the group level should be evaluated and necessary efforts taken to boost on their performance to improve marketing of livestock and livestock products. Goats were preferred by the livestock keepers because they can survive harsh climatic conditions, fetch higher prices compared to sheep and can be milked. The main reason for keeping sheep by the households was found out to be due to their early maturity which results in quick multiplication.

The average distance of most centres in the study area from major livestock was 158.6 km. This explains the reason for the livestock keepers choosing to sell their small ruminants mainly at the local markets which have a mean of 10.37 km from the homestead. The only readily available means of transport for small ruminants and other livestock is by trekking the animals to the markets. Most of the livestock keepers and traders are forced to travel long distances, sometimes up to about 100km to find appropriate markets for their animals. These distances strain and exhaust their energy thus discourages them from looking for good markets for their animals.

## **Regression Analysis Results**

### **Probit Results**

Table 2 presents results of the Probit analysis of the determinants of market participation decisions by the livestock keepers in the market for small ruminants. The average price, road conditions to the market, cash relief, credit facilities and herd size were significant at 1% while group membership was significant at 5%, in determining decision to participate in the market.



**Table 2: Determinants of market participation decisions by the livestock keepers: Probit Results**

Variable	Coefficient estimates	Standard error	P> z	Marginal effects
Gender of the Household Head	0.50964	0.34224	0.136	-0.19518
Age of household head (yrs)	0.00917	0.00888	0.302	0.00332
Education level of household head (yrs)	0.00058	0.02528	0.982	0.00021
Occupation of household head if pastoralist	-0.26131	0.23700	0.270	-0.09421
Occupation of household head if formal	-0.40395	0.43393	0.352	-0.15392
Household size	-0.07137	0.05116	0.163	-0.02583
Average price of small ruminants	0.00060	0.00012	0.000***	0.00022
Group Membership	-0.48491	0.22638	0.032**	-0.17706
Road Conditions to the Market	-1.32279	0.37352	0.000***	-0.49152
Distance to the Livestock Market(km)	-0.22298	0.25280	0.378	-0.07864
Employment of labour	0.04562	0.31026	0.883	0.01640
Cash Relief	-1.07594	0.38024	0.005***	-0.40938
Food Relief	0.12842	0.08308	0.122	0.04647
Non-farm Income	0.00008	0.00006	0.184	0.00003
Credit Facilities	0.75157	0.28797	0.009***	0.24486
Herd Size (TLU)	0.03817	0.00825	0.000***	0.01381
Constant	-1.18367	0.57225	0.039	

N=250, Log likelihood = -114.45217;  $\chi^2 = 106.77$ ; Pseudo R<sup>2</sup>= 0.32; \*\*\*, \*\*, \* significant at 1%, 5% and 10% probability respectively.

Source: Regression Estimation from Authors' Household Survey (2010)

Cash relief had a negative significant effect decreasing the probability of selling small ruminants by 41%, all else held constant. Cash relief provides an alternative source of income for the livestock keepers to meet basic needs. Accessibility of credit facilities by the households had a positive significant effect on the probability to sell small ruminants. Access to credit by the households increased the probability of selling small ruminants by 24%, other factors held constant. Credit is a production-enhancing input which boosts productivity and consequently increases the level of surplus marketable output thus encouraging livestock keepers to sell small ruminants.

Herd size had a positive significant effect with a unit increase in herd size increasing the probability of selling small ruminants by 1.3%, all other factors held constant. Households with larger small ruminant herds have a marketable surplus at their disposal and can readily sell their stock. This result discredits the common perception that livestock keepers prefer to cling to their livestock as a store of wealth even when they own large herds.

The effect of the average price for shoats determining market participation by pastoralists was found to be positive and significant. A unit increase in the price for shoats increases the probability of selling small ruminants by 0.02%, all other factors held constant. This is consistent with a priori expectations and also the economic theory that price induces increased supply. Similar results have been observed in Alene et al. (2008) and Komarek (2010). The results therefore, suggest that prices are an important driver of market entry for the small ruminant livestock keepers.

Group membership had a negative significant effect on market participation. Being a member to a pastoralist/women group decreases the probability of selling small ruminants by 17.7%, all else held constant. Only 14.7% of the households who were members of a group used their groups for marketing purposes, while a higher proportion, 35.7%, benefited in terms of savings. The negative significant effect of group membership may imply that the savings derived by households from the groups discourages selling of small ruminants as households have alternative sources of income hence do not need to disposal of small ruminants to acquire income to meet basic household needs.

The road condition to the market had a negative significant effect on the probability of selling small ruminants. Over 80% of the livestock keepers in the region of study live in areas served by very poor roads or no roads. The bad condition of the roads decreased the probability of selling small ruminants by 49%, other factors held constant. Road access is highly



correlated with transport costs, thus, participation in the small ruminants' market by the livestock keepers would be encouraged if the condition of the roads connecting pastoralists with the markets is better.

## Conclusion

Important factors that may hinder pastoralists from engaging with the market and benefiting from the rising demand for meat in the urban centres include the negative influence of bad road conditions, cash and food relief. Marginal changes in the average price for small ruminants is an incentive for livestock keepers to participate in the livestock markets and if the market players ensure that some of the price benefits accrue to the small ruminant keepers, by improving efficiency in the market chain, they are likely to release more small ruminants to the market. Small ruminant keepers should be offered with adequate information on credit access and utilization to increase their financial capital.

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