

## FACTORS AFFECTING SMALLHOLDER FARMERS' DECISIONS ON LIVESTOCK INVESTMENT OPTION IN MBULU AND BARIADI DISTRICTS, TANZANIA

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### ABSTRACT

*With the increased demand for livestock related products, Tanzania remains low in terms of livestock investment. Smallholder livestock farmers still suffer from low income levels and poverty. This may be due to the different aspects affecting choices of investment options. This study investigated factors affecting smallholder farmers' choice of Livestock Investment Decisions (LIDe) in Mbulu and Bariadi Districts when exposed to other investment options. A cross sectional research design was used where 333 smallholder farmers were surveyed. A Multinomial Logit Model (MNL) was applied for the analysis. It was found out that, head of household age, female headed households and wage employment have negative effects, while household size, availability of labour, income levels, assets owned, distance from the markets and investment outcomes have positive effects towards LIDe. Moreover, calculations of marginal effects results correspond with the odds likelihood to select an investment option by smallholder farmers. It is concluded that the direction of LIDe in rural Tanzania can be predicted from the corresponding effect of the factors. It is recommended that smallholder farmers need to be assisted to the appropriate choice of investment options.*

**Keywords:** Investment Options, Livestock, Smallholder Farmers, LIDe, Tanzania.

### 1.0 INTRODUCTION

The choices by smallholder farmers to commit resources in domesticated useful animals for expectation of future returns (Livestock Investment Decisions-LIDe) are an important ingredient for livestock and rural development. Active participation by smallholder farmers in livestock markets results into exploitation of developing regions' comparative advantages and transformation of rural economies (Boughton *et al.*, 2007; Rios *et al.*, 2009; Mathenge *et al.*, 2010). Commercializing smallholder livestock management systems has led to increased productivity and improved quality of animal and animal products, thereby contributing to improved incomes. Hence, investments by smallholder farmers in livestock have the potential to lead to specialized market- oriented farming systems (Rios *et al.*, 2009).

Livestock investments in developing countries have been described by disintegrated and clumsy projects funded by a range of donors, inadequate market orientation to smallholder farmers and imperfect focus on animal health, appropriate feeding procedures, breeding and management of livestock commodity value chains (Delgado *et al.*, 2001). Furthermore, livestock development programmes are predominantly complex as they involve dissimilar subsectors like poultry, goats, sheep and cattle a few to mention. Meanwhile, it has been acknowledged however that, the demand for products originating from animals is growing at a higher pace in developing economies resulting into consumers' improved levels of nutrition (Delgado *et al.*, 1999, Ciamarra *et al.*, 2014). The major concern is vested on the capacity of world agriculture to suffice supplies sustainably. Apparently, Africa is experiencing a rapid expansion and development of livestock markets which is largely caused by improved income levels, growth of the urbanized middle class, and the changing consumption and dietary habits (Ciamarra *et al.*, 2014; Coetzee *et al.*, 2005; Uzchezuba *et al.*, 2009). This situation presents new opportunities for smallholder livestock farmers necessitating involvement. Farmers' decisions to take this opportunity present a turnaround in terms of economic utilization of livestock resources.

In Tanzania, even if it is disputed that smallholder livestock farmers are unable to act in response to rational investment challenges, a few are able to take part aggressively in best livestock management practices and markets (Ciamarra *et al.*, 2014). However, differences in farmers' aims to livestock productivity hinder development of efficient livestock procedures to advance smallholder farmers' efforts (Barrett *et al.*, 2004). Plans for improving productivity through livestock investments and marketing of animal products should therefore concentration to deliberation of farmers' purpose in livestock investment, understanding on support or hindrance factors and knowledge in livestock investment (Dovie *et al.*, 2006). These in turn will shade light on how smallholder farmers make decisions on livestock investments.

Scholars in livestock managements agree that embracing better livestock management styles results into better outputs, decreased deficiency and argument benefits to livestock farmer (Awotide *et al.*, 2012; Adekambi *et al.*, 2009; Mendola, 2007; Nguezet *et al.*, 2011). In the face of the current technologies and adaption of improved livestock management

systems however, livestock output in Tanzania is low and the farmers are suffering from low income and their life conditions continue to be at the back (Nguezet *et al.*, 2011). According to the World Bank (2016), the deficiency in smallholder farmers can be reduced with the involvement in the production markets. This adds to the increase of output if farmers understand these trends and take positive actions. Sustainable increase in livestock output and development can be achieved with the help of market oriented approach through investment decisions (Awotide *et al.*, 2012) which may not be happening because smallholder farmers are not positive about these trends.

The literature on livestock management (Udmale *et al.*, 2014; Awotide *et al.*, 2012; Ciamarra *et al.*, 2014) acknowledge that, many of the livestock investment issues in the developing countries such as technology adoption, improved animal health and market aggregates are taken negatively, or farmers are indifferent by a variety of factors made from daily familiarity and external basis (Altschuler and Brownlee, 2016). Hence, consideration of farmer's insight on the various aspects/factors that affect their investment decisions is important. Farmers' continued adjustment actions, and further associated aspects are crucial to enlighten policies intended to promote successful investments in the livestock sector (Bojovic *et al.*, 2015; Jin *et al.*, 2015). In that case, appropriate course of action is expected to affect LiDe positively and vice versa.

Studies conducted in Tanzania regarding livestock investments focused on exact investment issues, like water reservoirs construction (Karl and Thurlow, 2010) catering for storage and water availability as part of animal feed programmes, livestock development in terms of policy, extension services and technology adoption (Beegle *et al.*, 2012). Further researches focuses on investments in specific livestock sub-sector like the dairy sector (Atkinson and Lugo, 2010). This paper examines the major factors that affect smallholder farmers on livestock investment decisions option. Serious attention on these factors might facilitate formation of appropriate course of actions to improve livestock investment. This will increase participation of smallholder livestock farmers in optimum utilization of livestock resources in rural Tanzania. The document will add to the literature by evaluating factors affecting decisions of smallholder farmers towards livestock investments option in Mbulu and Bariadi districts.

## **2.0 LIVESTOCK INVESTMENT DECISIONS IN RURAL AREAS**

Scholars in livestock development acknowledge that the continuous growth of demand for animal food presents an opportunity and expands market for smallholder farmers in developing economies (Amare *et al.*, 2014). In many cases however, rural household do not automatically lead to prosperity through livestock investments due to a number of factors. In Tanzania for example, smallholder farmers in rural areas are regularly in little eminence and weak situation to take the opportunities (Ciamarra *et al.*, 2012). Households' investment options are prone to external condition factors like institutional surroundings, technology and location-specific factors as established for China by Feder *et al.* (1992). Land ownership to the other hand decreases threats and consequently presents encouragement for extended investment in livestock as it is connected to feeding space and mixed farming practices (Fenske, 2011; Place, 2009). Smallholder farmers meet favourable fewer supportive environment for investments as opposed to larger ones who learn to attain superior point of investment effectiveness (Hayami, 2007) and have healthier entrance to capital markets and other facilities to support profitable livestock undertakings (Fan and Chan-Kang, 2005).

Therefore, rural households hold on to the traditional livestock farming strategies (Hayami, 2007). Thus, transformation in livestock investments is sluggish and the improvement of better and additional livestock investment is weakened (Leturque and Wiggins, 2011; Poapongsakorn, 2006). The situation leads to little deliverance by smallholder farmers regardless of significantly improved yield prices that may exist (Volker *et al.*, 2012), creating unfavourable livestock investment in rural settings. Little practical confirmation exists on the level of smallholder farmers' investment decisions in useful resources and the determinants of such investments (Meijer, *et al.*, 2015; Pannell, *et al.*, 2006; Pulido & Bocco, 2014; Reimer, *et al.*, 2012).

It should be noted that, behaviour towards investments is complicated and no regulations or principles are acknowledged to direct human actions. Nevertheless, common beliefs to support practices corresponding to situation, surroundings, traditions and knowledge (Reardon *et al.*, 2000) do exist. Likewise choices also are predisposed by reasons like someone's practices through knowledge of conditions or recognition of characters such as investment attitudes. Because choice is a reaction to incentive, similarly an individual's relationship with social motivation and substances play a significant aspect in the sensitivity of other shared spur (Ellis, 2000).

Household demographics for example persuade family's preferences in investment decisions. Authors like Bryant and Gray (2005) and Hardeweg *et al.* (2013) opine that, households headed by women and households with elders and those not with as much as formally learned heads tend to be more threat averse landing them to less likelihood to invest. This is because elders will have less focus towards investments as opposed to social benefits of livestock keeping (Fenske, 2011). Female headed household (as most household in Africa are headed by men) on the other hand are normally dependant to

relatives and children on the decisions about livestock. These situations affect negatively women involvements in livestock investment decisions (Felicia *et al.*, 2013).

Inadequate capital sources affect households' wealth situation; as a result household's possessions enhance the monetary capability level (Reardon *et al.*, 2000). One option to overcome liquidity boundaries for financing farm investments is non-farm income (Davis *et al.*, 2009; Hertz, 2009). Nevertheless, non-farm service and non-farm investment potentials are able to compete with livestock for manual labour and resources (Huang *et al.*, 2009; Reardon *et al.*, 2000). Kilic *et al.* (2009) highlights that, the net collision of non-farm revenues on livestock is compound and complicated to evaluate since it may diverge depending on households' type in terms of behaviour and preference potentials.

The gaps that exist in the literature is that, profitability limitations and obstacles to livestock investment such as community approval, commitment and a lot of more that limit smallholder farmers' decisions in livestock investment are not well explained in specific context (Ciamarra *et al.*, 2014). These measures comprise tactics like modification in domestic animals management (e.g., breeding procedures, change in the mix of animal ruminants) and livelihood strategies (e.g. mixture of farming and non-farming actions, or temporary vs lasting relocation). An important concern in livestock investment decisions is the way how farmers revise their prospect of potential returns in reaction to new investment styles and hence their investment decisions. An additional significant subject linked to livestock management is how opinions are transformed into investment decisions. Deressa *et al.*, (2009) pinpoint that if smallholder farmers are often trained on factors and situations that support their investment decisions, with time will understand the finest practices and the best alternatives existing. All these makes it important to investigate factors affecting smallholder farmers' choice of livestock investments.

### **2.1 Rational Choice Theory (RCT) and Livestock Investment Decisions**

Rational choice theory is a collective phrase for a range of expressions explaining common occurrences as an effect of human beings' actions that can in a number of ways be interpreted as consistent (Durlauf, 2002; Amsberg, 2003). According to Sen (1987), there are a number of versions of rationality in existence. One accepted view of rationality is attentive consideration. This is not the meaning that is associated with the choice concept as put forward by Lionel Robbins (1932) or the 'as if' methodology of Milton Fredsman (1953). But when Herbert Simon (1957) argued that prudence was surrounded, he used this term to refer to computational and on purpose capacity. To presume that a RCT is possible is to believe that choices can be affected by reason. In general, this theory starts by contemplation of the preference conducts of a person or group decision-making elements. RCT philosophers habitually assume that a persons' preference element is distinctive or an agent of a bigger set (Evans and Letki, 2003; Nowotny and Wallace, 2001; Marsh, 2000; Paldam and Svendsen, 2002.). When a persons' conduct is recognized, the scrutiny shifts to observe how persons' selection network to create results. Rational actions are conducts to facilitate appropriate understanding of definite ambition, knowing the boundaries presented by circumstances (Torsvik, 2000, Zak e Knack, 2001).

The important fundamental of all rational choice clarification are persons' first choice (preference), attitude (beliefs), and limitations (constraints). Preferences represent constructive or unconstructive assessment of a person to connect to probable result of their actions. First choice can have lots of pedigree, varying from ethnic background, variety of flavor for economic activities or additional objects to individual behavior and obligations (Guiso, Sapienza and Zingales, 2004). Beliefs present knowledge of ground- consequences of relations, with the hypothetical possibility through which person's actions force effect in various likely result (Temple, 2001). A village household might expect that to invest in livestock for enhancing a fresh milk business has higher probability of success than from sale of animals' oil. Constraints describe the restrictions to a set of possible measures (e.g., the sum of monies obtained from a loan obliges a budget limitation on persons in view of purchasing hybrid livestock as part of their investment strategy). The theory of rational choice is relevant in explaining the factors that affect choice of livestock investment because it covers the explanation of behaviour for a single person or group decision-making units. In this perspective, an individual, group and community members' behaviour toward choice of investment options are well explained by this theory.

## **3.0 METHODOLOGY**

### **3.1 The Study Area**

The study was carried in Mbulu and Bariadi Districts in Manyara and Simiyu Regions respectively in 2016. The reason for the choice of the study area is that these are among areas with the greatest number of livestock in the country (URT, 2013). This makes it logical that much more livestock production through investments may be realized. With these resources however, these are among the areas mentioned to be poor with low livestock productivity in the country (URT, 2013) which may explain that much is not committed in livestock productivity for expectation of future returns (investment) as opposed to the traditional livestock management style. The 2012 Tanzania National Census indicates that, residents of Mbulu District were 320,279 and the main tribal clusters being the Iraqw, Mbulu and Barabeig (URT, 2013). Bariadi

District is in Simiyu Region to the North East of Tanzania had a population of 605,509. Populaces who are mainly the Sukuma known as Nyantuzu carry out nomadic pastoralist and crop cultivation (URT, 2013).

Farmers in Mbulu and Bariadi Districts are mainly subsistence farmers primarily engaged with keeping cattle, sheep and goats (animals of interest in this study) under extensive grazing conditions. Personal livestock selling is done by farmers to abattoirs and personal purchasers whom in turn transport animals to much bigger markets. A little number of livestock is sold in the course of public sale or authorized methods prearranged by farmers associations and to a smaller amount by farmers' cooperatives.

### 3.2 Data Analysis and Techniques

A Multinomial Logit Model (MNL) was used to examine factors influencing choice of investments in the study area. This is a discrete choice analysis which deals with simulation of alternatives with a limited position of separate choices. Normally, these are dual preference sculpt done by any of a probit or logit conditions (Riddington *et al.*, 2000). Either model estimates the outcome of illustrative variables on a dependent variable involving numerous alternatives among unordered response categories. In this case, a MNL condition was tailored to mould investment choice behaviour of farmers concerning different dependent variables with several alternatives. The benefit of using MNL is to allow the investigation of choices transversely to more than two types, permitting the purpose of preference likelihood for dissimilar alternatives. For MNL to be suitably useful, the options have not to be ranked. Mainly for this study, the model illustrates the behaviour of smallholder farmers while they are countenance with assortment of investment options through common gain objectives. Nevertheless; the alternatives and selection ought to be extremely distinguished through their features. MNL estimation has been used in numerous experimental researches like that of Goktolga *et al.*, 2005; Schupp *et al.*, 1998; Luzar *et al.*, 1998; Seddighi and Theocharous, 2002; Haartsen *et al.*, 2003; Baker, 2003; Hatirli *et al.*, 2004) but also as it fits this particular study.

The logit model theoretical form of its alternative likelihood is significant from the accidental utility maximization theory (Ben-Akiva and Lerman, 1995) which explains how satisfaction of the choice by an individual or a household can be presented with regards to choice of an investment alternative. The MNL model for the selection likelihood is specified by:

$$\Pr(i/C) = \frac{e^{x_i \beta}}{\sum_{j=1}^n e^{x_j \beta}}$$

Where,  $\beta$  is a vector of unknown regression constraint, C is a set of  $n$  alternatives, represented by  $\{1; 2; \dots; n\}$ . A subject is presented with choices in C and is requested to select the mainly liked selection and  $x_i$  is a covariate vector connected with the options  $i$ .

From the studied literature, it was hypothesized that: head of household age, size of household, female headed household, education level of head of household, availability of labour, wage employment, income level, value of assets owned by the household, culture, capital availability, market availability, formal and informal groups support, and investment outcomes are the key factors perceived to persuade livestock investment choice in the study areas. It was hypothesized that the mentioned factors when they are in favour of the households' direction of choice then these factors become an important set of variables that affect households' investment choices.

Consequently, households with better income are highly probable to select an investment option among the alternatives available than households with little incomes. It was also the assumption that household heads that have gone a bit higher for formal learning are more probable to be employed as salaried workers than those who did not. Furthermore, household size variable affects rural household investment choices. An assumption also was that crowded families are more likely to select livestock investment as prime choice of investment as large families are extra capable to undertake most of the activities associated with livestock keeping than less crowded households.

### 3.3 The Dependent Variables

The dependent variables for the MNL model used in this study is households' choice on the investment options available in Mbulu and Bariadi Districts. The alternative investments choices include livestock, crop cultivation and small businesses. These are commonly reported economic activities in the study area of which households incline to do (URT, 2013). Thus, the dependent variables in the model is categorical variable taking values 1,2 and 3 representing the mentioned choices above, where;

- (1) Livestock investment involves committing resources like capital in terms of incurring costs for profit making intensions i.e proper feeding, veterinary services, labour and proper breeding procedures.



- (2) Crop cultivation investment which involves committing resources in terms of proper agronomic practices like use of improved seeds, proper fertilizers, harvesting procedures and storage and management of post-harvest losses.
- (3) Small business investments which involves stocking and sales management and hence growth and sustainability of the business.

Table 1 presents the key independent variables used in MNL model and the anticipated signs.

**Table 1: Definition of Variables of the MNL Model and Hypothesis Included in the Equation**

Variable	Definition and Description	Expected signs
AGE- (HHH age)	Number of years since birth (continuous)	(-)
SIZ- (HH size)	Number of members in the household (continuous)	(+)
FEM- (Female HHH)	1= Female, 0= Male	(-)
EDU- (Education of HHH)	Number of years spent at school (continuous)	(+)
LAB – (Availability of labour)	1=available, 0=not available	(+)
WEP- (Wage employed)	1=support, 0=discourage	(-)
INC- (Income level)	000' Tanzania shillings (continuous)	(+)
ASS- (value of assets owned)	000' Tanzania shillings (continuous)	(+)
CAP – (Capital availability)	1= available, 0= not available	(+)
MAK-DIS- (Market distance)	1=close to, 0= Far from the market	(+)
FIG- (Formal and informal groups support)	1=Support, 0= discourage	(+)
INVO- (Investment outcomes)	1=encourage, 0=discourage	(+)

Source: Own construct

## 4.0 RESULTS AND DISCUSSION

### 4.1 Demographic Characteristics of Respondents

Descriptive statistics in Table 2 indicates that, the minimum and maximum age of respondents keeping cattle, goats and sheep in the study area is 24 and 102 years respectively. This shows that livestock keeping is an activity that is carried by both the youth and the elders.

**Table 2: Demographic Characteristics of Respondents**

Variables	Min	Max	Range	Medn	Mean	Mode	Std. Dev.	Var.
Age	24	102	78	49	50.82	42	11.783	138.834
Education level HH	0	14	14	7	7.07	7	2.336	5.456
Education level of Spouse	0	12	12	7	6.62	7	2.661	7.079
Experience (Years)	5	69	64	31	44.13	22	6.15	23.112
Household size (number)	2	9	7	5.5	7.01	6	2.01	5.351
Household income (in Tshs)	35,000	430,000	395,000	29,000	42,000.08	39,100	1,133.735	1,138.072

HH= Head of Household, Min =Minimum, Max =Maximum, Medn= Median, Std Dev = Standard Deviation, Var =Variance.

However, the mean age result is 50.8 years indicates that livestock keeping and hence livestock investment could mostly be undertaken by older smallholder farmers. Furthermore, results from Table 2 indicate that, an average number of years spent for schooling by heads of household are 7.07 and 6.62 for the household spouse. This shows that, most of the smallholder farmers have no formal education or have primary level of education which may suggest that most of them are not salaried employees and so they depend on farm activities like crop cultivation and livestock keeping. On the average a household had 7 members with the lowest comprising of 2 persons while the most crowded with 9 persons. This indicates that, most of the rural households are crowded. This may be a good sign for family labour availability to handle farm activities if most of the family members are to be engaged in farm activities. Based on findings in Table 2, smallholder farmers income monthly was between 35,000 to 430,000 Tanzania Shillings and mean income being 42,000.80. This average income indicates a low level of income to most smallholder farmers which may indicate a low level of financing investment options available.

### 4.2 Multinomial Logistic Regression Results

The estimation of the MNL model was made by normalizing one category, which is usually referred to as the base category. In this study, “no investment” decision was used as the base category. The likelihood ratio statistics as indicated

by the chi-square statistics indicated to be highly significant (Table 3). Then, the model was tested for the soundness of the Independence of Irrelevant Alternatives (IIA) assumptions by using McFadden test. This test accepted the null hypothesis of independence of investment options, signifying that the multinomial logit (MNL) condition is suitable to model investment options of smallholder farmers in the study area. MNL model requirement was used by several researchers to model smallholder farmers' investments in Africa (Deressa *et al.* 2009; Nhemachena and Hassan, 2008).

Multicollinearity between variables was tested using Variance Inflation Factor (VIF). VIF for all variables were less than 10 (1.03–2.11) which indicates that multicollinearity is not a serious problem in the model estimation. Consequently, all the hypothesized explanatory variables were integrated in the model. The estimated coefficients of the MNL model and their levels of significance are presented in Table 3. Therefore, in this study, only those variables, whose coefficients were statistically significant at less than or equal to 10% probability levels were presented in the discussion.

However, it should be noted that, factor estimates of the MNL model presents only the bearing of the effect of the independent variables on the dependent variable; they do not signify the definite extent of change of likelihood. Thus, the marginal effects of the MNL, which assess the anticipated adjustments in the possibility of a certain alternative being made with respect to a unit change in an independent variable, were calculated. In all cases, the predictable coefficients were compared with the base category of no investment. Table 4 presents the marginal effects along with the levels of arithmetical implication.

Determinants of different investment type results show (Table 3) that as expected, the age of household head discourages investments. It significantly reduces the probability of decision to invest in livestock and in small business investment. Perhaps with most aged people, (as mean age for the head of household in the study area was 50.82 years) normally start to distance themselves from committing much resource for future returns rather than focusing on the social aspects and careful uses of assets of the family. In the African context, and as it has been hypothesized basing on the literature, age affects decisions to choice of investments. This also reflects the position of the demographic characteristics in rural areas where commonly kids and the aged people stay at the back in the performance of economic activities as found out by (Ciamarra *et al.*, 2014).

**Table 3: Factors Affecting Choice of Investment Decision Options**

	Investment in livestock	Investment in crop production	Small businesses Investment
AGE	-0.15***(0.05)	0.08 (0.06)	-0.23** (0.12)
SIZ	0.03** (0.01)	0.02***(0.01)	0.02* (0.02)
SEX	-0.28**(0.11)	-0.01 (0.31)	-0.31 (0.31)
EDU	0.02 (0.02)	0.02 (0.04)	0.08* (0.04)
LAB	0.67** 0.(04)	0.83**(0.13)	0.03*** (0.32)
WEP	-0.32** (0.21)	-0.41* (0.21)	0.08 (0.32)
INC	0.50** (0.13)	0.62 (0.41)	0.06 (0.23)
ASS	0.21** (0.07)	0.19* (0.11)	0.59** (0.15)
CAP	0.23 (0.12)	0.18*** (0.31)	0.16* (0.38)
MAKERT	0.22*** (0.33)	0.22 (0.12)	0.42* (0.27)
FIG	0.07 (0.21)	0.03 (0.05)	-0.14 (0.09)
INVO	0.11** (0.11)	0.32** (0.12)	0.13 (0.17)
Base category	No investment		
Number of observations	333		
LR Chi <sup>2</sup> (57)	156.613***		
Log likelihood	-103,115		
Pseudo R <sup>2</sup>	0.278		
McFadden	0.152		

Source: Multinomial logit model outputs based on household survey. \*  $p < 1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ , (Numbers in blackest are errors terms).

Further results indicate that number of persons residing in a household considerably increases the likelihood of investing in all available investment options. This may be dictated by the demand for food and money to finance different family needs like paying school fees, hospital bills and other social utilities. To the other side, investing in three alternatives may be supported by labour availability if most of the family members are of working age and not of dependent age. For smaller households this may be complicated on how division of work can be managed taking into consideration that most of

activities in the rural settings are done by family members as opposed to hired labour. The demographic characteristics as indicated in Table 1 support these findings where family sizes were found to be on the higher side but also the rational choice theory which contemplates on persons conduct towards selection of action to create results in terms of preference, beliefs and limitations. In this case labour may be a limiting or supporting factor in terms of the working persons to be engaged in investment options for the household.

It is more expressed that, households with female heads significantly decrease the possibility of livestock investments. This match to cultural aspect as indicated in the literature especially in the rural areas where normally major livestock ruminants are being referred to as men's owned animals while small ruminants like chicken being referred to as female owned livestock. Ownership and hence investment decision may be connected to this fact where female headed households depends on children or relatives regarding livestock including investment decisions. Actions like animal cross breeding, sale of live animal to general markets and animal products like hides and skins, milk, oils and processed animal products, may be a limited undertakings to be carried by females in that respect. Again such results are in line with theoretical perspective (RCT), in the sense that the theory looks at beliefs as one of the important fundamentals for individual and group (society) choices. In this regard the belief that women are not much concerned with livestock decisions leads to poor participation of women in livestock investment.

Result regarding education level of head of household shows significant and positive coefficient effect to investment on both livestock, crop production small business investment. This may indicate that persons with a slight upper level of formal trainings are able to handle multiple investments in the rural areas. Incomes generated out of livestock and crops is used as capital to establish small businesses, sustain or for expansion purposes. This concurs with findings by Ellis (2000) in Kerio valley Kenya that, mostly non-farm revenue actions in the rural areas are financed by incomes generated from livestock, crop production or both. The rest of the non- farm revenue creation activities may be financed from micro finance institutions like cooperatives, formal and informal groups.

Availability of labour and allocation corresponds positively with all the three type of investment. However, results indicate that households invest more in crop production followed by livestock and less in small business. This implies that households may choose dissimilar progress pathway through a focal point on crop production, livestock investment or small business management. It seems that households with many members involved in small business learn to invest less in livestock but more on crop production and businesses. This may be based on the fact that, every season smallholder farmers are able to do crop cultivation over a short period of time and harvest as opposed to animal husbandry which takes a little longer time especially with cattle, goats and sheep. In this aspect, households may be pursuing an alternative strategy for income generated out of crop production to supplement income from small businesses to expand capital base.

Likewise, results show that income levels affect selection of livestock investment options positively. Households with relatively high level of income have a possibility of investing in livestock than those with relatively lower come. This may be attributed with financial capability to purchase supplement feeds like salt blocks, vaccination and drugs, pay hired labour and veterinary services. Asset endowments (in terms of asset values) to the other hand are found to positively affect all types of investments. The effect is tougher for those who undertake all investment options which suggest that relatively richer household's branch out more to different investment options. Reflecting back the rational choice theory which supports these findings, it may suggest that more asset ownership by the households is an indication of wealth which reduces the limitations to investment an important element of individual and groups' rational choice.

Capital availability is not an influencing factor for livestock investment, but it is significant for crop cultivation and small business investment in the study area. Possibly, rural lending organizations support business investments and crop cultivation over livestock investment. Moreover, households investing in crop cultivation tend to be with land and may have good revenues in most times of the year and may possess own monetary basis. Distances from the market to the other hand positively affect livestock and crop cultivation investment decisions. This indicates that, smallholder farmers are confident to commit resources in livestock and crop cultivation when there is assurance of the markets and vice versa.

There is positive significant effect of outcomes for livestock and crop investments. A stronger coefficient of the effect is in crop cultivation investment. Perhaps this emanates from basic reasons as to why households find themselves in the two different kinds of undertakings. Crop cultivation is kind of a mandatory activity done by households to suffice food and income needs of the families as opposed to livestock keeping which has a mix of cultural embed aspect, food and income generation in need times and not as a permanent commercial activity. However, results indicate that, smallholder farmers in the study area identify positively the outcomes from both livestock and crop production. This shows that smallholder farmers' investment decisions are affected by what is obtained in the two undertakings.

Table 4 indicates calculations of the marginal effect of the factors that affect LIDe among smallholder farmers. Results show that, an increase to smallholder farmers' age by one year, the possibility of choosing livestock investment and business as the primary preference in the two investment options decline by 0.0342 and 0.0020, in that order. Nonetheless, the likelihood of selecting crop production as an investment option increases by 0.0221 units.

**Table 4: Marginal Effects Calculation on Investment Options**

Variable	Smallholder farmers' primary preference of investment		
	Livestock	Crops	Farm and Small business
AGE- (HHH age)	-0.0342	0.0221	0.0020
SIZ- (HH size)	0.0045	0.0300	0.0023
FEH- (Female Headed HH)	0.0892	-0.0216	-0.0123
EDU- (Education of HHH)	0.0286	0.0052	0.0222
LAB – (Availability of labour)	0.0311	0.0022	0.0412
WEP- (Wage employed)	-0.0213	-0.0214	0.0011
INC- (Income level)	0.0015	0.0221	0.0033
ASS- (value of assets owned)	0.0210	0.0256	0.0120
CAP – (Capital availability)	-0.0231	0.0271	0.0218
MAK- (Market distance)	0.0332	0.0222	0.0023
FIG- (Formal and informal groups support)	0.0011	0.0121	0.0003
INVO-(Investment outcomes)	0.0035	0.0012	-0.0021

Source: MNL results

Furthermore, the additional outcome of household size indicated an increase in all investment options by 0.0045, 0.0300 and 0.0023 units per every increase of one more member in the household. Likewise, the female headed household variable indicates that per every increase in one household headed by a female, there is a decrease in all investment options by 0.0982, 0.0216 and 0.0123 respectively. The marginal effect in livestock investment is even higher as compared to crop production and small business.

The variable availability of labour indicates that, every increase in one labour the probability of investment decisions in all investment options increases by 0.0311, 0.0022 and 0.0412 units respectively. The probability of investment choice in livestock is even higher as compared to crop production and small business when combined with the rest of investment options. Likewise, income level variable shows that each 10,000 shilling increase in household income increases the chances of choosing livestock investment by 0.0015, 0.0221 and 0.0033 units in livestock, crop cultivation and small business investment.

Furthermore, marginal possibility to invest in livestock decrease by 0.0231 per every unit increase in capital which indicates that the primary choice of smallholder farmers in terms of investment goes to other options other than livestock. The distance from the market variable by this results has indicates an increase of 0.0332, 0.0222 and 0.0023 units per every increase of one unit market distance. Likewise, one unit increase in formal and informal groups support has indicated marginal increase in 0.0011, 0.0121 and 0.0003 units increase respectively across the three investment option. As for the investment outcome variable, results show that an increase in one unit of investment outcomes results in 0.0035 and 0.0012 units increase in livestock and crop production investment while it causes a decrease by 0.0021 units in small business.

## 5.0 CONCLUSION AND RECOMMENDATIONS

The study found that age, female headed households and wage employment affect negatively smallholder farmers' decisions to invest in livestock. On the other hand, size of the household, availability of labour, income level, distance from the market and investment outcomes are the factors perceived by smallholder farmers to affect livestock investment decisions positively. Most of the factors are shared across different investment choices only that the direction of effect differs following the disposition of the investment in focus. So, this makes it reasonable to bring a close argument that aspects which clarify on households investing in farm activities and sometimes combines the two with small business investment are given by this explanation. Livestock herds' ownership for example is important to rural households to hand out as a back-up strategy in time of needs while crop cultivation to the other hand stands mandatory for households' resilience for food security and income generation. It is also evident that the majority of smallholder farmers still maintain livestock traditionally as opposed to revenue incentives completely. It is therefore recommended that:

- (i) Because age of head of household affect negatively all investment options in the study area (livestock and crop cultivation investment and in small business investment), then the government of Tanzania in collaboration with



other development partners should be committed to sensitize smallholder farmers on the importance of succession plans in investment. Women and the youth may start taking a lead role in making sure that animal herds are managed in a profitable manner. This will facilitate independence of women and youth from early stages on their involvement to livestock management styles and decisions about the resource. This requires awareness and change of mind-set that livestock investment can be taken as any other business. By so doing, this may give assurance of livestock investment decisions over generations.

- (ii) As wage employment turned to have negative effect to both livestock and crop cultivation investment, seems residents that depend on salaried employment have a propensity of not concentrating to boost own useful assets in livestock and crop cultivation. Still labour availability is an important aspect to farm investments and a pool of labour asset needs to be encouraged. Households that depend on wage employment in turn may be advised to invest in other supportive livestock infrastructure like dipping ponds, animal shed construction or join formal and informal group for enhancing capacity to diversify more in different investment options.
- (iii) Because income levels was positively significant indicating resource endowment's power to finance livestock investment, this effect play an important role for smallholder farmers' decision on livestock investments option. Hence, from the demographical perspective, productive investments may tend to cluster better amongst economically stronger households. Less wealthy households appear to depend on accessible resource available to carry on their utilization height fairly than investments. Here smallholder farmers with lower levels of income may be advised to source incomes from sale of few live animals they have to boost their capital base or join formal and informal groups where they can be assisted as members.
- (iv) From the findings regarding the educational level, the government of Tanzania can arrange a number of learning programs on choices of investment options basing on the demographic characteristics of smallholder farmers. These will increase knowledge of investment by using additional strategies like media which may have extremely important dependability in attractive information transmission for the smallholder farmers.

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