The East African Journal of Social Sciences and Humanities (EAJSSH)
ISSN: 2619-8894 (Online), 2619- 8851 (Print)

Socio-Economic Incentives Influencing Livestock Investment Decisions Among Smallholder Farmers in Mbulu and Bariadi, Tanzania

[1]Nyanjige M. Mayala, [1]Mangasini A. Katundu, [2]Elibariki E. Msuya

[1]Moshi Co-operative University (MoCU), Department of Management, Box.474, Moshi, Tanzania
Email: nyanjige.mayala@mocu.ac.tz; nyanjigem@yahoo.co.uk

[1]Moshi Co-operative University (MoCU), Department of Management, Box.474, Moshi, Tanzania
Email: mangasini.katundu@mocu.ac.tz; atanasi.mangasini@gmail.com

[2]Sokoine University of Agriculture (SUA), Department of Agribusiness, Box.3000, Morogoro, Tanzania
Email: mzeeba@hotmail.com

Received: February 12, 2019; **Accepted:** June 25, 2019; **Published:** May 3, 2020

Abstract: ***Livestock are socio-economically useful assets to rural communities in Tanzania. Different aspects, however, do affect smallholder farmers' decisions to commit resources (investment) in livestock. This paper assesses the socio-economic incentives influencing livestock investment decisions among smallholder farmers in Mbulu and Bariadi districts. A cross-sectional research design was employed whereby data was collected from 333 randomly selected respondents and 9 key informants. Qualitative data was analysed using content analysis while for quantitative data a benefit, costs, and revenue (Gross Margin) analysis was used to determine net gain. A Binary Logistic Regression Model (BLRM) was used to determine the influence of the socio-economic incentives to livestock investment decisions. Study findings show that all three ruminants are profitable while the availability of capital, costs associated with keeping livestock, herd size, returns on investment, market availability and need for draft power influence livestock investment decisions significantly at (p<0.05). The study generally concludes that availability of livestock economic opportunities influences investment decisions amongst smallholder farmers in the study area. It is recommended that the government should support smallholder farmers through livestock investment education programmes and infrastructure development.***

Keywords: *Socio-economic Incentives, Livestock Investment Decisions, Smallholder farmers, Tanzania.*

1. Introduction

Economic incentives are measures planned to persuade the size, location or industry thereby affecting its relative cost by varying the risks attached to it through various inducements (Ahmed and Julian, 2012; Charlton, 2013). Generally, economic incentives are quantifiable advantages provided by the trade surroundings to particular business undertakings (Ahmed, 2006; Thomas, 2007). The goal may be to attract new speculation choices or to retain an existing facility (Srholec, 2004; Dreyhaupt, 2006).

Across the world, livestock takes a very important function for a lot of rural people as they are not only used as a source of income but also utilized as food, for draft power, fuel and store of wealth (Corral and Reardon, 2012; Ginevičius and Šimelyte, 2011). The trade out of livestock provides a major fraction of annual cash returns and capital assets of households, predominantly in pastoral areas. In diverse agricultural systems, livestock is often the only source of draft power and manure for crops and also providing crop residues after harvest (Steinfield *et al.*, 2010). Moreover, livestock does offer a safety net when crops fail (Fafchamps and Shilpi, 2003; Feng and Seasholes, 2005; Dolberg, 2011;). According to FAO (2013), the enlarged demand for animal-related products is highest as compared with any other agricultural sub-sector and it is forecasted that by 2020, this sector will generate more than half of the agricultural yield globally (Ahuja and Redmond, 2014; Hamadou *et al.*, 2015;).

The spatial location of livestock in Tanzania follows the agro-climatological zones: arid, semi-arid, sub-humid, humid, and the highlands (Gunderson, 2013; Pica-Ciamarra et al., 2011). Pastoralism in which traditional cattle, sheep, and goats predominate is intense in the northern (Arusha, Manyara) savannah plains where climatic and soil conditions do not favour much crop production. Also, agro-pastoralism is found in low rainfall areas of western (Shinyanga, Mwanza, Simuyu, Tabora) and central (Dodoma, Singida) zones where cultivation of sorghum and millet is practiced (Jeromark, 2013). Furthermore, to the above, smallholder dairy production includes cattle under the coconut systems in the coastal regions and stall-fed crossbred dairy cattle in the Northern and Southern highlands, Kagera and peri-urban and urban dairying in and around major cities and towns. Commercial ranching (mostly NARCO beef ranches) accounts for about 7% of the marketed livestock products in Tanzania (FAO, 2015).

Studies conducted in Tanzania on the commercial side have taken into account only marketed products and less on livestock investments in a broader sense (Van Schalkwyk *et al.,* 2012; Moll, 2013; Ciamarra *et al.,* 2015; FAO, 2015;). Therefore, the economic importance of non-market outputs of these livestock ruminants is difficult to value by livestock technical staff and policy analysts (Ouma *et al.,* 2004; Scoones, 2003; Moll, 2001; Slingerland, 2000). Yet, such information can contribute to a better understanding of livestock production systems and the formulation of effective policies for increased livestock investment.

2.0 Theoretical Framework and Debate

2.1 A Review of the Economics of Livestock Investment

Household economic decisions are influenced by the amount of income from various sources, both agriculture and non-agricultural sources, formal and non-formal credit, and other factors such as family characteristics (Saleem, 2011). The empirical problems most often faced are (a) even though there is credit and agricultural capital support received by the farm households, the production, productivity, income, and welfare of the farm households are still low (Nwaru *et al*., 2011), (b) there isn't much internal information about farm household behaviour in demanding and allocating credit and capital support and the effects on farm household production, income, and expenses (Adebayo *et al*., 2008), and (c) how does policy change in agricultural funding through credit and capital support impact farm households' welfare and especially which it comes to livestock investment (Mauyila, 2012).

Olagunju, (2007) observes that a significant number of smallholder farmers do not utilize borrowed money for buying input or other technologies like veterinary services (Nwaru *et al.*, 2011; Yasmeen *et al*., 2011). It is evident from the aforementioned research works that, households' allocation of capital goes to production activities, spending, and investment. Several studies have been conducted on the position of credit facilities for smallholder farmers; though the centres of these studies normally are biased, looking at farmers as persons who are capable to compose livestock investment decisions on their own. Also, they mainly examine the farmers' from an outside look (Muayila, 2012; Saleem, 2011; Hussein, 2007; Syukur, 2002). Despite some explicit studies about farmers' households been done, they still analyse smallholder farmers' households from the pure producer and pure consumer points of view independently (Priyanti *et al., 2007;* Sahara, 2012). However, in actual sense the smallholder farmers' households are the element in which production decisions are not disconnected from home spending decisions; they shape each other (are non-recursive).

Ellis and Freeman (2014) found that mean livestock herd/flock size grows inversely along with income quartiles in Kenya, Malawi, Tanzania, and Uganda. USAID (2013) also observed a negative correlation between mean income and cattle herd size in Botswana. Further to the above, things are not different elsewhere in the developing world. GoI (2016) and the World Bank (2014) report a positive association between livestock herd size and investment decisions of households in Nicaragua. This is consistent with findings by IFAD (2011) for Botswana and by Roland-Holst *et al.* (2010) for Senegal and Vietnam.

Yunez-Naude and Taylor (2001) found a positive relationship for land size as an asset and livestock income in Mexico. They also found a negative relationship between land size and participation in wage employment, as do Winters *et al* (2002) for Mexico. Also, Corral and Reardon (2001) found a positive but diminishing effect of land on total farm income in Nicaragua but also found a negative link to non-agricultural wage employment participation and income as well as farm wage income. For Egypt, Adams (2002) reported a positive relationship to agricultural and livestock income and a negative relationship to overall non-agricultural income. Several other studies show a negative relationship between land size and non-agricultural employment participation or income for a range of countries including Chile (Berdegue *et al.*, 2001), Ecuador (Elbers and Lanjouw, 2001), China (de Janvry *et al.*, 2005; *Zhang et al*., 2005), and India (Lanjouw and Shariff, 2002). Thus, land ownership seems to dictate whether households remain in agriculture (to include livestock) or shift to off-farm activities.

According to Ouma *et al*. (2004), the benefits of livestock in a production system outweigh costs when non-market parameters are considered. Generally, the rate of return on livestock capital investment is higher than that obtainable from cash, in a form of savings that can be invested in formal or non-formal financial institutions. These benefits of livestock keeping are of special importance in developing countries, where financial markets function poorly and opportunities for risk management through formal insurance are generally absent (Moll *et al.,* 2001). Apart from the financial benefits derived from livestock farming, Fafchamps *et al.* (2008) reveal that farmers may invest in livestock as part of a tribal custom or tradition, or use livestock as an investment device in the absence of access to banking.

Evidence shows that animals have been used more or less like human labour in the production function (Boyd, 2001; Gunderson, 2013).). Agency and skills in production have usually considered only human resources. But non-human animals possess agency and in some cases skills that can contribute to the production process (King *et al*., 2006). Horses, for example, can follow routine paths with minimal direction, sheep and cows can be readily herded, cows want to be milked, cats are autonomous hunters of mice, and dogs, in particular, interact with humans more as partners than as automatons (Clutton-Brock, 2012). Thus, the history of human interactions with domestic animals involved the invention and refinement of methods (which requires an investment of time and materials) to exert control over the agency of these domestics (Hribal, 2010).

As for markets, rural transportation systems such as roads and bridges are weakly developed, (Dixon *et al*., 2001; Rola-Rubzen *et al.,* 2012) and communication services are deficient if they are at all (Ciamarra *et al.,* 2015). Because of these inbuilt challenging conditions, transaction costs are often high. It is not shocking therefore that, terms of trade are harsh (Gunderson, 2013). Input costs are usually high, transport, management, and communication costs are also

high. The deprived terms of trade extended to smallholder farmers at times act as a disincentive to increase their investments in livestock (Hribal, 2010).

Likewise, costs associated with keeping livestock for profit, in rural areas are high. This is because of elements associated with animal health which greatly affect livestock functions. It is not only by direct effects on animal productivity but also by indirect effects, namely concerning human health, coasts associated to disease control, international movement restrictions of animals and animal products as well as animal welfare (Barrett *et al.*, 2008; van Schalkwyk *et al.*, 2012). Moreover, the limited success of rural development policies is owed to the supply-side challenges such as weak institutional support, high transaction costs, high risk associated with new products, poor infrastructure, high price variability and weak bargaining power of smallholder producers (Ortmann and King, 2010; Obi *et al.*, 2012). The challenges to smallholder farming systems are more pronounced in the livestock sub-sector than in the crop or fishery sub-sectors. Also, livestock production is mainly found in marginal and remote areas (Ciamarra *et al.*, 2015).

Also, deprived grazing management in Tanzania (e.g. continuous overgrazing) does contribute to the shortage of feed resources (Alemayehu, 2015; Ahmed *et al.*, 2011) as a result of the replacement of productive and nutritious flora by unpalatable species (Ahmed, 2011). Feed supply from natural pasture fluctuates following seasonal dynamics of rainfall (Solomon *et al.*, 2009). Feed shortage, particularly during the dry season, is the main constriction in livestock production and it determines to a large extent the performance of the livestock sector. In some areas, smallholder farmers usually opt to move out with animal herds for the search of water and feeds, a situation that is not conducive for livestock investments.

2.2 Resource Allocation Theory

Resource Allocation Theory (RAT) is an investment analogy strongly related to the financial plan, a notion built around the hypothesis that the first step to achieving objectives is an acceptance of the mix of operational and economic resources required to achieve them (Kazlowski,1991). This represents internal resources that affix to an investment asset base, while direct and non- direct costs serve to absorb resources. Particularly, information on existing and prospect resources serves as equally an input to and an output from the planning process. To this explanation, Prowle and Morgan (2005) put forward that, an ideal resource allocation approach as one which presents the maximum overall fulfillment in meeting objectives whereas concurrently limiting the use of resources to precisely those which are accessible. The explanation carefully identifies the two issues that result in this ideal situation certainly not being attained as presented by Port and Burke (1989). The first of these is the need for internal conformity over investment objectives and the second is that resources are forever limited so that the demand for them usually exceeds supply (Cropper and Crook, 2000; Campbell and Goold, 1988).

The term Resource Allocation Model (RAM) is used to describe the formulae or method(s) used by both commercial and non-commercial livestock keepers. RAT is relevant in explaining socio-economic factors influencing smallholder farmers towards LIDe because it emphasizes cost allocation but also a focus on the expected results. As for this particular study, RAT is directly connected in terms of financial planning as an outcome of the investments in livestock and at the same time the conscious allocation of resources in terms of costs to manage the livestock investments in rural areas.

3.0 Methodology

3.1 The Study Areas, Design, Sample Size, and Data collection

The study utilized both qualitative and quantitative data from the household surveys for the year 2016 conducted in Mbulu and Bariadi districts. The choice of the districts was based on the concentration of the number of livestock in the area; the site being among those with the high number of livestock in the country (URT, 2012). A cross-sectional research design was employed in gathering information using a questionnaire and key informant interviews. The sample frame was smallholder farmers keeping cattle, goats, and sheep. A total of 333 smallholder farmers were randomly selected in Mbulu (158) and Bariadi (175) making a response rate of 86.7% respondents from the original sample size of 384 calculated using a formula of Fisher *et a*l. (1991) for a population greater than 10000 (Appendix I). Key informant interviews (9) were conducted with 3 ward veterinary officers and 4 traders in the livestock markets, as well as 2 traditional livestock keepers. Thereafter a content analysis was done where themes were developed. Testing for external consistency of the instrument, a Cronbach alpha of 0.673 was obtained indicating an acceptable reliability measure of the tool (questionnaire).

3.2 Benefits, Costs, and Returns Analysis

A benefit, cost, and revenue analysis (gross margin) was calculated to see if livestock keeping in the study area was profitable, hence, need for investment. A similar approach was used by Rahman in Nigeria to test the profitability of small ruminants (Rahman *et al.*, 2002) this approach was considered to fit this particular study. The costs incurred for cattle, goats, and sheep production was categorized into (i) cash costs and (ii) non-cash costs. Both costs were calculated per household and herd unit basis for the three ruminant species then a conversion rate for TLU was used. The cash costs identified include veterinary services, medicines/drugs, dipping services, purchase of feed supplements, hired labour, and fencing (animal shades). However, the non-cash costs are animals lost due to mortality, theft or missing. The number of animals lost/dead accounting for the difference was multiplied by the price per kilogram or price per liter of milk to obtain the total non-cash costs for particular ruminant species. Revenue or incomes were termed as gross productive values (selling prices) of the ruminants or products adjusted to debtors (including monies not paid by customers). Later on, a Net Benefit (NB) was calculated to determine the most profitable ruminant type.

3.3 Binary Logistic Regression Analysis

A Binary Logistic regression was opted over Chi^2 or Fischer's exact test primarily due to the fact that it can include more than one explanatory variable and that, logistic regression model provides a quantified value for the strength of the association adjusting for other variables (removes confounding effects) as also used by Moll (2013).

From the reviewed literature, it was hypothesized that:

(i) Availability of capital significantly influences livestock investment decisions,
(ii) Herd size significantly influences livestock investment decisions,
(iii) Assets owned by the household significantly influences livestock investment decisions,
(iv) Return on investment significantly influences livestock investment decisions,
(v) Need for draft power significantly influence livestock investment decisions,
(vi) Market availability significantly influences livestock investment decisions,
(vii) Costs of keeping livestock for profit significantly influences livestock investment decisions, and
(viii) The availability of animal feeds significantly influences livestock investment decisions in the study area.

The Logistic Regression equation used is presented in the form of:

$$L_i = \ln\left\{\frac{P_i}{1-P^i}\right\} = \beta + \beta_1 AVCAP + \beta_2 HERSIZ + \beta_3 ASSETS + \beta_4 RoI + \beta_5 DRAPOW + \beta_6 MARKETS + B_7 COSTS + B_{8FEEDS} + \varepsilon_i \quad \ldots\ldots (i)$$

Where; L_i = Livestock investment decisions measured in a management style of profit-making approach; B_1, β_2, β_3, β_4, β_5, β_6, β_7, β_8, = coefficients measuring the probability likelihood of livestock investment in a household; AVCAP = availability of capital, HERSIZE = herd size, ASSETS = value of assets owned by the household, RoI = return on investment, DRAPOW = need for draft power, MARKETS = availability of markets, COSTS = costs of keeping livestock for profit, FEEDS =availability of animal feeds, and Ɛ is the error term.

Table 1: Explanatory Variables and Hypotheses included in BLRM Analysis

Variable	Variable Description	Measurements	Expected Level of Influence
AVCAP	Availability of capital	- (Yes=1, if capital available; No=0, if not)	+
HERSIZE	Herd size	- (bellow 50 TLU small, 51 and above TLU big herd size – according to Tanzania standars)	+
ASSETS	Assets owned by the household	- (Value of assets in Shillings)	+
RoI	Return on investment (RoI)	- (Value in Shillings)	+
DRAPOW	Need for draft power	- (1, if Yes, 0, if not)	+
MARKETS	Market availability	- (Yes=1, if available; No=0, if not)	+
COSTS	Costs of keeping livestock for profit	- (1, if expensive; 0, if not – budget allocate or not)	-
FEEDS	Availability of animal feed	-(Yes=1, if available; No=0, if not)	-

The model fit results indicated that the Lemeshow Goodness-of-Fit test statistic was Chi- Square 8.225; sig. At 0.346, implying that the model`s estimate fits the data at an acceptable level. Since R^2 cannot be exactly computed for Logistic Regression (Norusis, 2004), a pseudo R^2 was therefore computed. Nagelkerke R^2 was computed in this study as a proxy estimate to R^2 in OLS regression which according to Norusis (2004), measures the proportion of the variation in the response that is explained by the model. In this study, Nagelkerke R^2 of 0.786 was obtained indicating that more of the variation was explained by the model with an overall prediction percentage of 78.6 as shown in Table 3.

The ruminant type's performance in terms of returns was analysed through maximization of net farm benefits. Net farm benefits were calculated from the market value of farm production minus variable costs incurred to manage livestock. Hired labour was calculated on the bases of total hired labour hours and the market wage rate. Returns on investment in labour were assessed by comparing benefit per labour with wage rate per hour of hired labour. Family labour time was also calculated the same as hired labour.

4.0 Findings and Discussion

4.1 Benefits, Costs, and Returns Analysis Results

Results from this study show positive farm benefits ranging from 34.92 for cattle, 2.86 for goats, and 2.64 for sheep in 000' TLU Tanzanian shilling. This means that all ruminant types were profitable in the study areas as shown in Table 2. This result is similar to a study by Kessy *et al*, (2013) who showed that the three ruminants in Dodoma were profitable.

Table 2: Estimation of Variable Costs, Benefits and Returns for Three Ruminants

Variables	Cattle	Goats	Sheep
Livestock Population reached (000')	4.26	4.53	1.92
Livestock fed with supplementary feeds (%)	0.2	0.1	0.0
Number of livestock fed on supplementary feeds (000')	0.85	0.43	0.00
TLU convection factor	0.7	0.1	0.1
Veterinary service per TLU	0.3	0.2	0.2
Medicines per TLU	1.5	1.3	1.3
Dipping per TLU	0.1	0.1	0.1
Transportation per TLU	0.3	0.1	0.0
Labour per TLU	1.5	1.3	1.2
Farm benefits, costs and returns in Tanzania Shilling (000')			
Gross benefits per annum	59.80	7.26	7.18
Total variable costs per TLU/annum	24. 88	4.40	4.54
Net Benefits (NB)	34.92	2.86	2.64

From the findings in Table 2, it should be noted however that not all farmers sell cattle, goats, and sheep every year, implying that gross margin computation for a single year may be negative if the farmer used or purchased inputs and sold no animals. Thus, gross margin calculations as presented here are averages for the year 2016 and illustrate cash generation rather than underlying profitability which makes it irrelevant for a discount rate to be used. Information regarding the livestock numbers and density were generated from the interviews with the farmers. The total number of livestock was converted to Tropical Livestock Unit using TLU conversion factors for the three livestock species: Total

TLU = Livestock Nr * TLU factor and the Live Weight = TLU * 250 (ILCA, 1990), 1 TLU is equivalent to the weight of zebu cow of 250 kgs. The livestock corresponding conversional factors were 0.7 for cattle, 0.1 for goats, and 0.1 for sheep.

From these results, it can further be said that cattle are much more profitable followed by goats and sheep being the last. This may indicate that much more cost is incurred in keeping a sheep per year or the benefits gained per TLU for sheep is less than the revenue gained for cattle and goats.

4.1.2 Regression coefficient analysis results

The Binary logistic regression results are presented in Table 3. All regression variables conform to a principle that its p (sig.) value is not greater than 0.05. By this standard, only six variables (availability of capital, herd size, return on investment, need for draft power, market availability, and costs of keeping animals) had a significant association with smallholder farmers' decisions to invest in livestock. Other variables (assets owned by the household and availability of animal feeds) were not significant, implying that these were not associated with smallholder farmers' decisions to invest in livestock and so their hypotheses were rejected.

Table 3: General Results of the Logistic Regression

Variable	B	S.E	Wald	Df	Sig.	Exp(B)
AVCAP	0.830	0.309	7.212	1	0.007	0.436
HERSIZE	-0.928	0.326	8.119	1	0.004	0.395
ASSETS	1.093	1.432	0.582	1	0.445	2.983
RoI	1.651	0.360	21.022	1	0.000	7.434
DRAPOW	1.079	0.351	9.021	1	0.001	2.942
MARKETS	2.006	0.340	34.846	1	0.000	7.434
COSTS	-1.871	0.365	9.312	1	0.003	6.495
FEEDS	1.817	1.502	0.601	1	0.521	6.153
Constant	0.614	2.923	0.044	1	0.834	1.848

Omnibus Test of Model Coefficient (Chi-square =72.121; sig. = 0.000); Cox & Snell R Square = 0.422
Hosmer and Lemeshow Test (Chi- Square = 8.225; sig. = 0.346); Nagelkerke R Square = 0.786

Per every unit increase in access to capital availability (AVCAP), log odds of investment increase by 0.830 all other independent variables held constant. Otherwise, without access to capital through credit schemes, farmers may not be able to have enough cash to invest in their livestock. Credit, for example, has a role in increasing farmers' income and welfare through the improvement of production and increase in consumption patterns. The purpose of extending production capital support through credit facilities, for example, is basically to increase livestock production through the purchase of veterinary materials and extension services, paying labour wages, animal feeds, purchasing capital goods, and other materials. Nuryartono *et al.* (2005) and Zidana *et al.* (2007) noted a similar positive relationship between farmers' access to capital and livestock production in Kenya to support the capacity to manage well the livestock enterprises. One key the informants reported that: *''smallholder farmers lack the necessary capital to invest in livestock the way it is required. Accessing capital from financial institutions for this purpose is difficult as most do not have a package product for livestock to smallholder farmers. Otherwise farmers need much more of the financial facilities for investment'*.

Study results in Table 3 show a negative effect on the factor herd size (HERSIZE) concerning livestock investment. Per every unit increase in livestock, a 0.928 decrease in the log odds of investment by smallholder farmers was observed. This may be attributed to an increased population and land cultivation especially in rural areas resulting into compelling smallholder farmers to either move from their original places or reduce the number of livestock they hold. Contrary to this explanation, however, Kapanda *et al.* (2015) noted the positive relationship between the number of livestock and livestock investment in Zambia. The increase in household milk production, for example, can be driven by higher productivity of individual cows, or by an increase in the number of cows producing milk. The study by Kampanda *et al.* (2015) documented that, in sub-Saharan Africa, the impact of herd size on the productivity per cow, brings about big results when an overall herd size is big enough. Training can impact different channels leading to stable or increased herd sizes by getting knowledge of when and how to inseminate animals to increase the success rate of breeding and calving. Disease control through technical advice and adequate veterinary services assure stable livestock herds. This, in turn, leads to an increase in herd size without having to purchase animals which bring benefit from economies of scale. One of the key informants said that *'Having large herds becomes unmanageable which results in low output per head. Buying supplement feed, veterinary services, and proper handling become complicated'*.

Results from the study also show that there was a significant and positive effect of return on investment (RoI) on smallholder farmers' decisions for livestock investment in the study area. Per every unit increase in return on investment a 1.651 increase in the log odds of livestock investment decision is made. A significant p-value of (0.000) with a positive coefficient confirms this relationship implying the strength and direction of the influence of profit for livestock investment. Monies earned from livestock and livestock products sale may be used to finance households for different needs such as sending children to school, paying hospital bills and meeting other household expenses. This may be the case because; most of the rural population is not employed in the formal sector where a steady flow of income is assured. Mutambikwa *et al.* (2014) reported the same relationship in Zimbabwe whereby it was found that most rural smallholder farmers rely on incomes obtained from sale of live animals and animal products to support their households' daily expenses.

A positive significant coefficient of a need for draft power (DRAPOW) indicates its positive influence on livestock investment decisions which was as expected. Per every unit increase in draft power need, a 1.079 increase in the log odds of investment by smallholder farmers all other variables being constant was confirmed. The most likely explanation of the relationship may be the fact that in rural areas household members are expected to have better access to farms, wells, and rivers where fetching of water is done and carrying of different commodities from distant market places and relatives. This is because another communication infrastructure such as roads is not well developed. Similar findings have been reported by Kapanda *et al.* (2015) in Zambia whereby a significant positive relationship between the need for draft power for rural households and the

probability of investing more in livestock was observed. Also, motorcycles (bodaboda) may be expensive when hired by poor rural households compared to using animal power when it comes to the ferrying of their produce. A significant p-value (0.001) in the model confirms this relationship. One of the key informants also confirmed the need for draft power by saying that '*Motorcycles which have recently become a common means of transport and bicycles cannot replace the fact that most of the rural activities such as cultivation, carrying of produce and water fetching are done by animals. We need animals so that economic activities can be done smoothly*'.

There was a positive significant ($p \leq 0.000$) association of availability of market (MARKETS) and smallholder farmers LIDE. Study findings show that per every unit increase in markets in terms of buyers and good prices, a 2.006 increase in the log odds of investment in livestock by smallholder farmers was expected all other independent variables being constant. Probably the more livestock markets are located with respect to fields of households, the more farmers would want to participate in selling of animals and animal products because the probability of getting meaningful returns from decreases of distance from households makes assurance of volume of sales and lowering of transaction costs ceteris paribus. One of the key informants confirmed by saying that '*The more livestock markets such as the general markets and abattoirs are available, it encourages many to invest in animals for expectations of future returns being assured of where to sale*'.

Costs of keeping livestock for profit (COSTS) indicated to be a significant factor associated with smallholder farmers' livestock investment decisions. Per every unit increase in costs associated with livestock investment, a 1.871 decrease in the log odds of livestock investment decision is made, holding all other independent variables constant. This may be attributed to the expenses that are supposed to be incurred especially on veterinary services, proper feeding, and vaccination to protect animals from diseases. In addition to this explanation, a lot of cost goes into hired labour to move animals from dry grazing areas to more available feed and water places. The purchase of veterinary services and supplement feeds such as salt block increases the costs to smallholder farmers in their attempt to increase livestock productivity (FAO, 2015). This is also confirmed by one of the key informants who said that ''*It is very expensive for smallholder farmers to finance costs of dipping, veterinary services and supplement feeds so that we can realise better earnings from livestock and livestock products*'.

5. Conclusions and Recommendations

From these results, several conclusions and recommendations are drawn from the analyses which may provide useful insights towards the designing and implementation of livestock investments programmes in rural Tanzania. The effects of adjustments in input price such as an increased calf price may decrease cattle production, but if it is followed by an increased amount of capital support and an increased animal selling price, it will increase the incentive for smallholder farmers to invest more. The policy implications are: (1) to increase the ability to finance agribusinesses in farm households, more credit and capital support schemes are needed, (2) the utilization of credit and capital support has a non-recursive impact on the economic behavior of farm households, thus credit and capital support policies for farm households must take the household economics concept in an account.

Farmers who are motivated to keep a manageable number of animals with a focus on productivity may be more productive than those owning extremely big numbers. It is recommended that smallholder livestock farmers having a big number of animals they have at the moment should be encouraged to engage in and practice rotational grazing. This will reduce overgrazing and uncontrolled land degradation. Smallholder farmers also should be trained on how to make reserves such as hay and silage so that they can conserve surplus forage in dry seasons. Farmers should also be advised to plant fodder plants to reduce pressure on the natural land, and also to introduce legumes into their pastures to produce forage throughout the year. Farmers can also increase the land's productivity by establishing fodder grass and fodder shrubs along with contour bands.

Regarding returns on investment, it can be concluded that a positive coefficient obtained in the analysis indicates that livestock comes up with developmental impacts of returns to other different factors of production. Rural households are engaged in animal husbandry but also in other productive activities such as crop production and small businesses. Households may enjoy strong and positive income growth from livestock which is to be invested in other economic activities and household consumption. In that aspect, rural households may be better off than their urban counterparts who are constrained by space and regulations to keep much livestock in urban centers. It is recommended that livestock investment in rural areas is encouraged so that it has a strong favorable effect on improving household consumption and the country's external trade as well.

Furthermore, the availability of markets has been confirmed to be a positive influencing factor to smallholder farmers' livestock investment decisions. It can be concluded that smallholder farmers are interested in making profits from their investments in livestock. In this respect, decision-makers need to pursue a dual-track approach to livestock development. On the one hand, market-oriented or potentially market-oriented producers should be supported, as increasing livestock production and productivity of emerging farmers will generate spill-over benefits to employment and consumption. On the other hand, poor rural or relatively poor livestock keepers should be supported to make full use of their livestock assets, which is an effective way to sustain their livelihoods in the short to medium term while utilizing resources with few alternative uses.

Development of livestock opportunities necessitates adequate investment policies and sector restructuring that target appropriate markets as this was found to be one of the influencing factors to the positive side. However, this requires indulgence of classification of producers who can knock into those market prospects as well relevant industry models that are efficient enough to create employment that stands for a major livestock's trail out of deficiency. Devising efficient livestock sector strategies and institutional changes, however, necessitate a stream of information on the market environment and on the limitation to productivity and market entry, which do not often readily exist. It is

recommended that investments in data collection, data collection systems, and analytical capacities in the country are a significant base to sector growth and should be given sufficient precedence when formulating livestock sector policy and sector reforms.

Additionally, as a factors costs associated with keeping livestock for profit turned to be negative, this may be an indication that most of the smallholder farmers are not able to cope with the high transactional costs associated with purchasing equipment and facilities (e.g. windmills, crawl pens, head clamps, dipping tanks, veterinary drugs, and feed supplements). It is recommended that the government of Tanzania should provide subsidies for the purchase of breeding stock and dosing products; distribution policies that will ensure all smallholder farmers at the grassroots level benefit.

References

Adebayo, O and Adeola, R.G (2008) Sources and uses of agricultural credit by small scale farmers in Surulere local government area of Oyo State', *The Anthropologist*, Vol.10, no.4, 313- 314.

Adams, R (2002) Nonfarm Income, Inequality and Land in Rural Egypt', *Economic Development and Cultural Change*, vol. 50, no. 2, 339-363.

Ahuja, V and Redmond, E (2014) 'Livestock services and the poor', *Tropical animal Health and production*, vol.36, no. 3, 247-268.

Ahmed, H, Abule, E, Mohammed, K and Treydte, A.C (2011) Livestock feed resources utilization and management as influenced by altitude in the Central Highlands of Ethiopia', *Livestock Research Development*, 4, 79-102.

Alemayehu, M (2015) *Feed Resources Base of Ethiopia:* Status Limitations and opportunities for integrated development', Proceedings of the 12th Annual Conference of the Ethiopian Society of Animal Production (ESAP) held in Ethiopia, Addis Ababa, pp.410 pp.

Al-Rimavi, A.S. (2002), 'The role of Jordian women farmers in livestock production with implications to agricultural extension education', *Journal of International Agricultural and Extension Education*, vol.9, pp. 11-19.

Barrett, C, Bezuneh, M, Clay, DC and Reardon, T. (2008) Heterogeneous Constraints, Incentives and Income Diversification Strategies in Rural Africa', *Quarterly Journal of International Agriculture*, vol.44, no.1, 37-60.

Berdegue, M, Thornton, PK, Gerber, P and Reid, RS (2001) Livestock, livelihoods and the environment: understanding the tradeoffs', *Current Opinion in Environmental Sustainability*, vol.1: 111–120.

Boyd, W. (2001) Making meat: Science, Technology, and American Poultry Production', *Technology and Culture*, vol. 42: pp. 631–664.

Campbell, A and Goold, M. (1988) Adding value from corporate headquarters', *London Business School Journal*, vol. 52, pp. 65-79.

Charlton, A. (2013) Incentive bidding for mobile investment: economic consequences and potential responses', No 203, OECD Development Centre Working Papers, OECD Publishing, 33 pp.

Ciamarra, P, Ugo, R, Tasciotti, L, and Otte, J. (2015) Livestock in the Household Economy: Cross-Country Evidence from Microeconomic Data', *Development Policy Review*, vol. 33 no. 1, 61-81.

Cropper,P and Cook, R. (2000), Activity Based Costing in Universities – Five Years', *Public money and Management*, vol.3, 61-68.

Coetzee, J. (2012) An effective sheep management programme is non-negotiable for profitable sheep farming', *Voermol Feeds*, 15 pp.

Corral, L and Reardon, T. (2001) Rural non-farm incomes in Nicaragua: Patterns, determinants, and implications', *World Development*, vol. 29, no. 3, 1-17.

Clutton-Brock, J. (2012) Animals as domesticates a world view through history. Michigan', Michigan State University Press. 51 pp.

Dixon, J, Gulliver, A and Gibbon, D. (2001) Farming systems and poverty: improving farmers' livelihoods in a changing world', Rome and Washington, D.C, FAO and World Bank, 412 pp.

Dreyhaupt, S.J. (2006) Locational Tournaments in the Context of the EU Competitive Environment', Wiesbaden: German University Verlag Press, 67 pp.

Dolberg, F. (2011) Herding Livestock Programs toward Nutrition: A Critical Analysis with a Focus on Rwanda's Feed the Future Dairy Program', *Journal of Livestock Development*, vol. 61, 230-242.

Dossa, HL, Gauly, M and Wollny, C. (2007) Smallholder's perceptions of goat farming in Southern Benin and opportunities for improvement', *Tropical Animal Production*, vol. 39, no.1, 49-57.

Duku, S, Price, LL, Tobi, H and Zijpp, A. (2011) Influence of male or female headship on the keeping and care of small ruminants: the case of the transitional zone of Ghana', *Livestock Research for Rural Development*, vol. 66, 430-447.

Elbers, C and Lanjouw, P. (2001) Intersectoral Transfer, Growth and Inequality in Rural Ecuador', *World Development*, vol. 29, no.3, 481-496.

Ellis, F and Freeman, A. (2014) Rural Livelihoods and Poverty Reduction Strategies in Four African Countries', Journal *of Development Studies*, vol. 40, no. 4, 1-30.

FAO (2013) The State of Food and Agriculture: Livestock in the Balance', FAO, *Rome*, 66 pp.

FAO (2015) The State of Food and Agriculture: Livestock in the Balance', FAO, *Rome*, 105 pp.

Fafchamps, M, Udry, C and Czulcas, K. (2008) Drought and saving in West Africa: are livestock a buffer stock?, *Journal of Development Economics*, vol.55, 273 -305.

Fafchamps, M and Shilpi, F. (2003) The Spatial Division of Labour in Nepal', *Journal of Development Studies*, vol. 39, no.6, 23-66.

Fitzgerald, AJ, Kalof, L and Dietz, T. (2016) Slaughterhouses and increased crime rates: An empirical analysis of the spillover from "The Jungle" into the surrounding community', *Organization and Environment, vol.* 22, no.2, 158–184.

Fisher, DS, Mayland, HF and Burns, J.C. (1991) Variation in ruminant preference for tall fescue hays cut at either sundown or sunup', *Journal of Animal Science*, vol.*77, no.*3, 762.

Gunderson, R. (2013) From cattle to capital: Exchange value, animal commodification, and barbarism', *Critical Sociology, vol.* 39, no. 2, 259–275.

Ginevičius, R and Šimelyté, A. (2011) Government incentives directed towards foreign direct investment: a case of Central and Eastern Europe', *Journal of Business Economics and Management*, vol. 2, no. 3, 435-450.

GoI (2016) Livestock Ownership across Operational Land Holding Classes in India 2002-2003', NSS 59th Round, Report No. 493, 201 pp.

Hamadou, S, Tou, Z and Toé, P. (2015) Le lait, produit de diversification en zone périurbaine à Bobo Dioulasso (Burkina Faso)', *Cahiers Agricultures*, vol.1, no. 7, 473–478.

Hussein, H.K. (2007) Farm household economic behavior in imperfect financial markets' Faculty of Natural Resources and Agricultural Sciences, Department of Economics Uppsala Press, 53 pp.

Hribal, J. (2010) Animals Are Part of the Working Class: A Challenge to Labour History', *Labour History*, vol.44, no.4, 435-453.

IFAD (2011) Rural Poverty Report – The Challenge of Ending Rural Poverty',. Rome, IFAD, 57 pp.

ILCA (International Livestock Centre for Africa) (1990) Livestock Systems Research Manual. Working Paper 1, Vol. 1. ILCA, Addis Ababa, Ethiopia, 287 pp.

de Janvry, A Fafchamps, M and Sadoulet, E. (2005) Peasant household behavior with missing markets: Some paradoxes explained', *The Economic Journal*, vol. 101, no.4, 140–147.

Jerolmak, C. (2013) *The Global Pidgeon* Chicago', University of Chicago Press, 76 pp.

King, J, Tiffin, D, Drakes, D and Smith, K. (2006) Water use in agriculture: establishing a baseline', Report for Defra Project WU0 102 pp.

Kapanda, S, Honde, GJ and Abraha, F.G. (2015) Botswana', *African Economics Outlook, vol. 4, 12-36*

Kozlowski, J. (1991) Resource Allocation Theory: Studying the multilevel dynamics of emergence costs in production processes', A behind-the-scenes guide, New York, NY: Routledge Academic, 260-283.

Kosgey, IS, Baker, RL, Udo, H.M.J and Van Arendonk, J.A.M. (2006) Success and failures of small ruminant breeding programmes in the tropics: A review', *Small ruminant research*, vol.61, 13-28.

Lanjouw, P and Shariff, A. (2002) Rural Non-Farm Employment in India: Access, Income and Poverty Impact', NCAER Working Paper Series No. 81, 30 pp.

LeMay, P. (2006) Are household expenditure decisions cooperative? Evidence from Benin', Mimeo CRED, University of Namur Press, 30 pp.

Mauyila, H.K (2012) Assessing the impact of credit constrains on farm household economic welfare in the hinterland of Kinshasa, Democratic Republic of Congo', *AJFAND on line Scholarly Peer Reviewed*, vol.12, no.3, 20-37.

Moll, H, Staal, S, and Ibrahim, M. (2001) From meat to milk: smallholders' livelihoods and markets', Paper presented at the 12th Symposium of Tropical Animal Health and Production, Dairy Developments in the Tropics. University of Utrecht, 20 pp.

Moll, H. (2013) Costs and benefits of livestock systems and the role of market and non-market relationships' *Agricultural Economics, vol.* 32, no.2, 181-193.

Mutambikwa, A., Barton, A.P., Ellis-Jones, J, Mashingaidze, A.B, Riches, C and Chivinge, O (2014) Soil and water management options for seasonal wetlands (vleis) in semi arid areas of Masvingo province, Zimbabwe' Seventh Eastern and Southern Africa regional maize conference. 11-15 February 2014, 274-280.

Nuryartono, N., Manfred, Z and Stefan, S. (2005) Credit rationing of farm households and agricultural production: empirical evidence in the rural areas of Central Sulawesi, Indonesia Tropentag Stuttgart-Hohenheim', Conference on International Agricultural Research for Development, 17 pp.

Norusis, M. (2004) *SPSS 13.0 Statistical Procedures Companion'*, Upper Saddle-River, NJ Prentice Hall Inc, 112 pp.

Nwaru, J, Ubon, C, Essien, A and Onuoha, R.E. (2011) Determinants of informal credit demand and supply among food crop farmers in Akwa Ibom State Nigeria', Journal *of Rural Community Development*, vol.6, no.1, 129–139.

Obi A., van Schalkwyk, H.D, and van Tilburg, A. (2012) Market access, poverty alleviation and socioeconomic sustainability in South', Mansholt Publication Series, *Wageningen Academic Publishers*, 45 pp.

Ouma, EA, Obare, GA and Staal, S.J. (2004) 'The socio-economic dimensions of smallholder livestock management in Kenya and its effects on competitiveness of crop-livestock systems', Paper prepared for presentation at the Naro Conference on Integrated Agricultural Research for Development: Achievements, Lessons Learnt and Best Practice. Kampala, Uganda, 23 pp.

Olagunju, F.I. (2007) Impact of credit use on resource productivity of sweet potatoes farmers: Integrated Poverty Assessment for Livestock Policy', *Economics Journal*, vol.3, 33-45.

Ortmann, G.F. and King, R.P. (2010) Research on agri-food supply chains in Southern Africa involving small-scale farmers: Current status and future possibilities', *Agrekon AEASA*, vol.49, no. 4, 397-417.

Priyanti, A, Sinaga, BM, Yusman, S and Sri Utami, K. (2007) Impact of integrated crop-livestock system programme on farmers' income and expenditures: Household economy simulation analysis', *Forum IPB Graduate School*, vol.31, no.1, 45-58.

Prowle, M and Morgan, E. (2005) Financial Management and Control in Higher Education', *Abingdon, Routledge Falmer*, vol.11, no.3, 17-28.

Port, J and Burke, J. (1989) Why Higher Education Must Learn Its ABC', *Public Finance and Accountancy*, vol.4, no.12, 75- 98.

Rahman, J.D, Ja'afar-Furo, M.R, TashKalma, A.K and Ezekiel, C.S (2009) Economic of Cattle production in the Southern part of Adamawa State Nigeria', *International Journal of Animal Science*, vol. 1, no.1, 75-96.

Roland-Holst, D, Otte, J and Ifft, J. (2010) Integrated Poverty Assessment for Livestock Policy: FAO Policy Briefing to the Government of Vietnam', *Hanoi*, 210 pp.

Rola-Rubzen, F, Murray-Prior, B and Batt, J. (2012) Impact of clustering on vegetable farmers in the Philippines: Proceedings of smallholder hopes', International Hotel, Cebu, Philippines, 55 pp.

Saleem, M.A. (2011) Sources and uses of agricultural credit by farmers in Dera Ismail Khan (District) Khyber Pakhtonkhawa Pakistan',. *Europ J. Buss Manj*, vol.3, no.3, 111-122.

Sahara, D. (2012) The production and consumption behavior of rice farm households in Southeast Sulawesi', *Ph.D Dissertation, Bogor Agricultural University, Bogor, Indonesi*, 303 pp.

Scoones, I. (2003) The economic value of livestock in the communal areas of Southern Zimbabwe', Agricultural *Systems, vol.*39, no. 4, 339-359.

Steinfield, H, Wassenaar, T and Jutzi, S. (2010) Livestock production systems in developing countries: status, drivers and trends', *Revue scientifi que et technique – office international des epizooties, vol.* 25, no.2, 505–516.

Solomon ,G, Peden, D, Amare, H and Mpairwe, D. (2009) Factors affecting livestock water productivity: animal scale analysis using previous cattle feeding trials in Ethiopia', *The Rangeland Journal*. Vol.31, 251–258.

Slingerland, M. (2000) Mixed Farming, Scope and Constraints in West African Savannah', *Wageningen University and Research Centre, Wageningen*, 51 pp.

Syukur, S. (2002) Analysis of sustainability and members' economic behavior of credit scheme for poor household', *Ph.D Dissertation, Bogor Agricultural University, Indonesia*, 109-154.

Srholec, M. (2004) Přímé zahraniční investice v České republice', *Teorie a praxe v mezinárodním srovnání*. Praha: Linde, 44 pp.

Thomas, P.K. (2007) Investment incentives: Growing use, uncertain benefits, uneven controls: Geneva', *Global Subsidies Initiative*, 301 pp.

URT (2012) Ministry of Livestock and Fisheries Development: Investment Opportunities in Livestock Industry', *Report* No. 89, 205 pp.

URT (2012) Ministry of Livestock and Fisheries Development: *Investment Opportunities in Livestock Industry Report*, 89: 205-231.

USAID (2013) Analysis of the Poverty Impact of the January 2012: Increase in Beef and Cattle Prices in Botswana', USAID / Southern Africa, Gaborone 54 pp.

Van Schalkwyk, HD, Groenewald, JA, Fraser, GCG, Obi A and van Tilburg, A. (2012) Unlocking Markets for Smallholder in South Africa', *Wageningen Academic Publishers, Wageningen*, 46 pp.

World Bank (2014) World Development Report 2014: Agriculture for Development', Washington DC, 201 pp.

Winters, M, Leuenberger, H, Künzi, N and Blum, W. (2002) Influence of high altitude grazing on productive and physiological traits of dairy cows: Influence on milk production and body weight', *Journal of Animal Breed and Genetics, vol.*106, 278–288.

Yasmeen, K, Shakeel, S and Tanveer, H. (2011) Government policy regarding agricultural loans and its impact upon farmers' standards of living in developing countries', *J. Publ Adm. Govn.* Vol.1, no. 1, 16-30.

Yunez-Naude, A and Taylor, P. (2001) The Dismantling of CONASUPO, a Mexican State Trader in Agriculture', *The World Economy*, vol.26, no.1, 97- 122.

York, R. (2014) Guest editor's introduction: Animal studies and environmental sociology', *International Journal of Sociology, vol.*44, no.1, pp. 3–9.

York, R and Mancus, P. (2013) The invisible animal: Anthrozoology and macrosociology', *Sociological Theory*, vol.31, no.1, 75–91.

Zhang, M, Faran, M and Ly, T. (2005) Animal feed resources in Pakistan', Proceedings of an APO Symposium on Animal Feed Resources, Asian Production Organisation, China, 55 pp

Zidana, A, Kaunda, E, Phiri, A, Khalil-Edriss, A, Matiya, G and Jamu D. (2007) Factors influencing cultivation of the Lilongwe and Linthipe river banks in Malawi: Case study of Salima district', *Journal of Applied Sciences, vol.*7, no. 21, pp. 334-347.