DETERMINANTS OF MARKET PARTICIPATION FOR SMALLHOLDER INDIGENOUS CHICKEN FARMERS IN GULU DISTRICT

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DECLARATION

I AKIDI IRENE LYNETTE declare that this thesis is my original work and has not been presented in any institutions of higher learning for any awards.

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APPROVAL

This research dissertation was done and submitted under our supervision.

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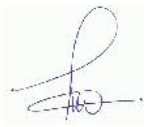
Signature 

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DEDICATION

This research thesis is dedicated to my father and mother, Mr. and Mrs. Edison Oceng, sisters Suzan, Julie, Winnie, Doreen, Daniella, my brother Moses, my dear sons Malcolm and Miguel and to their father Edward who have always believed in me and supported all my efforts.

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LIST OF ACRONYMS AND ABBREVIATIONS

COFOG	UN Classification of Functions of Government
DSIP	Development Strategic Investment Plan
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
IC	Indigenous Chicken
IFAD	International Fund for Agricultural Development
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
SSA	Sub- Saharan Africa
UBOS	Uganda Bureau of Statistics

ABSTRACT

Indigenous chicken play an important role in the livelihoods of the rural poor in developing countries. They act as a source of nutrition and also supplement household incomes. Despite the tremendous market opportunities available for the farmers, there are still low levels of market participation of the indigenous chicken farmers. This study aimed at establishing the factors affecting market participation and the value of indigenous chicken sales in Gulu district. A multi-stage sampling procedure was done at three levels, first a purposive selection of Gulu district from which Laroo division, Unyama, and Bobi Sub-counties were also purposively selected. Secondly, Laroo division and Unyama sub-county were also purposively selected because they receive training and information from the Gulu University while Bobi sub-county was selected as a control group. Thirdly, random selection of farmers from the primary sampling units (farmers in Laroo and Unyama involved in the farmer's attachment program) and those in Bobi farmers association was done. Cross sectional data from the household survey were entered in SPSS and analyzed using STATA software to generate descriptive statistics of the socio-economic characteristics of the respondents. In addition, a two-stage Heckman model was used to model the decision of the smallholder farmers to participate in the market and then determine the factors affecting the value of sales thereafter. Results from the descriptive statistics showed that there were 126 market participants and 24 non-participants. Both flock size and nonfarm income differed significantly (5%) between market participants and non participants. The participants had a larger flock size while non-participants had more income. The results of the Probit model further revealed that the first stage of market participation was significantly affected by distance of the household to the market (1%), flock size (10%) and ownership of a bicycle (1%). In the second stage,

(outcome model) the OLS results revealed that flock size, distance to the market and market price of indigenous chicken significantly (1%) affected the indigenous chicken farmer's value of sales.

In conclusion, creation of effective marketing systems of the indigenous chicken and provision of extension and veterinary services will not only increase the flock sizes kept by the smallholder farmers but also the value of sales of indigenous chicken for the farmers that participate in the market.

Keywords: Heckman model; smallholder farmers; indigenous chicken; market participation; Gulu district

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Agriculture in Sub-Saharan Africa (SSA) accounts for more than 30% of Gross Domestic Product (GDP) and 60% employment excluding South Africa (World Bank 2003). In Uganda, it provides employment to at least 72% of the working population and, contributes more than 20% to GDP (UBOS 2013) as reflected in Table 1. A greater percentage of the farming populations are smallholder farmers. Growth of the agricultural sector has continued to be lower than industry and service growing at just 1% annually over the last decade and a half, resulting in declining real incomes which results into wide spread agricultural poverty (effects of low agricultural development).

Table 1: Contribution to Uganda's GDP by sector 2013/2014 using 2009/10 as base year

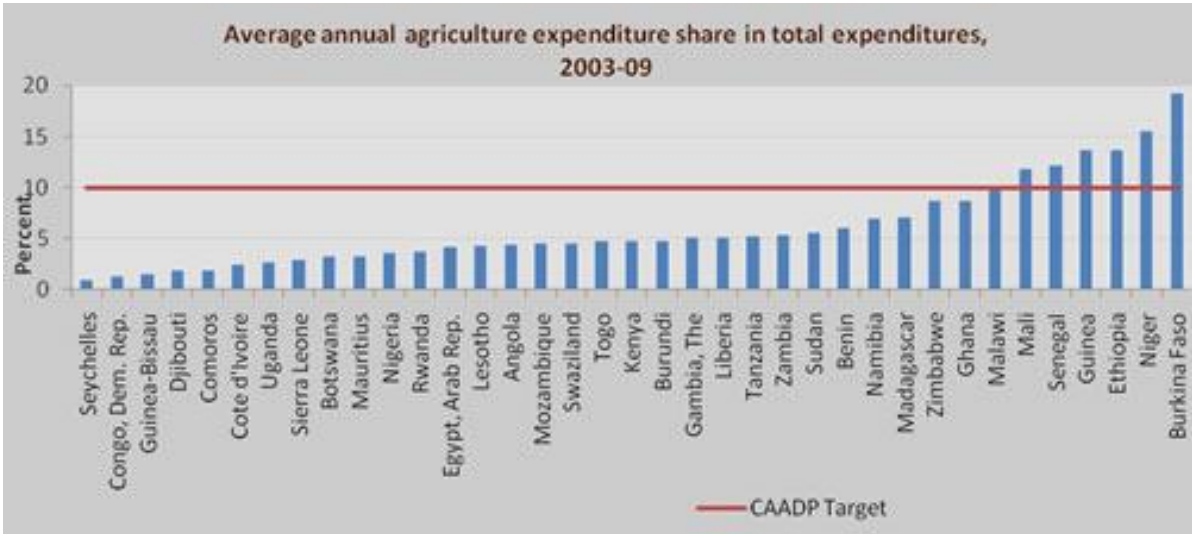
Sector	2009/10	2013/14
Agriculture	24	26
Service	46	49
Industry	25	18

Source: UBOS 2013

1.2 Budgetary allocations to the agricultural sector in Uganda

The need for an extensive budget in agriculture cannot be overemphasized. This sector is important not only to rural development by providing employment to the rural population but also nationally by its contribution to GDP makes it an attractive niche for investment in developing countries (UBOS, 2013). This could be due to the fact that Uganda has a competitive merit in agriculture as compared to other sectors.

In 2003, African governments were just recovering from the long and severe rigor of the structural adjustment plans deployed in the 1980s. The New Partnership for Africa's Development (NEPAD), launched in 2001, were in some way a consecration of African governments' sudden awakening and an affirmation of renewed will to revive national and regional economies. In the agricultural field, this African awakening took the form of the 2003 launch in Maputo of an ambitious continental programme, the Comprehensive Africa Agriculture Development Programme (CAADP). Through this programme, the aim is for African governments, with NEPAD's support, to improve the funding gap in the sector. To mark their determination, African heads of state pledged to devote at least 10% of their national budgets to agriculture and by so doing progressively overcome the public investment deficit that had long been building up in this sector. This promise raised high hopes among farmers on the continent. The famous 10% was supposed to allow most countries to attain the 6% agricultural growth supposedly needed to halve extreme poverty and hunger by 2015 or 2020 (the first Millennium Development Goal).



Source: ReSAKSS, 2012

Figure 1: Average Share of Agriculture Spending in Total Public Spending per Year from 2003 to 2009

Uganda, was not only a member but also a pilot country for implementing the CAADP Pillar of NEPAD, information collected on public expenditure on the COFOG (UN Classification of Functions of Government) defined agricultural sector since 2001/02, at both the central- and local-government level by GoU and donors, shows the share of the GoU budget allocated to the sector falling from 8 percent in 2001/02 to 5.7 percent in 2005/06. The budget has decreased, in real terms, from approximately UGX 295 billion at the start of the decade to UGX 210 billion in 2005/06 (MAAIF, 2008). MAAIF is responsible for over 80 percent of this budget. Decentralization in sector financing is deepening with the share of the sector budget channeled through local government rising from 7 percent of the total at the start of the period to 19 percent by 2005/06 (MAAIF, 2008). Despite these commitments, the agricultural sector in Uganda has only received less than 5% of the public expenditure with General Public Administration, Defense and Public Order and Safety Affairs taking the largest share of the central government expenditure in 2011/12 (MAAIF, 2013). Figure 1 illustrates the actual budgetary allocations to agriculture of the different countries compared to the agreed upon 10% at the Maputo declaration. This limits the investments to sectors most especially indigenous chicken through research and development.

1.3 Poultry sub-sector in Uganda

The poultry sub-sector is crucially important in the context of agricultural growth and improvement of diets of people in Uganda. The sub-sector is particularly important in that it is a significant part of the household's nutritional intake. It is an attractive economic activity as well, especially to women and the rural poor. However, the indigenous chicken's potential has not been exploited in Uganda, as much as has been

done in other African countries. This therefore creates a gap in not only marketing but also production aspects of the indigenous chicken.

Despite the tremendous expansion of the commercial poultry sector since the 90s, scavenging poultry have not been given much attention on improvement of the breed though still account for more than 90% of the total poultry production. As reflected in Table 2, of the estimated 45.9 million chicken present in Uganda, rural scavenging chicken were estimated to represent 39.6 million (about 86.4%) of the total in 2012 (UBOS, 2013)

Table 2: Poultry numbers ('000) and egg production (tones) from 2009-2012 in Uganda

Year	Poultry and poultry products		
	Indigenous chicken	**Exotic chicken**	**Eggs**
2009	33,820	4,737	24,761
2010	34,834	4,879	25,504
2011	35,879	5,026	26,269
2012	39,644	6,257	27,057

Source: UBOS 2013

Generally, the indigenous chickens (IC) are raised at a subsistence level with free range system being more predominant and this has been found to be more profitable than keeping indigenous chicken under confinement (Menge *et al*., 2007). However, these birds need extra feed to supplement that obtained from their scavenging activity (Kingori *et al*., 2010). Usually, these flocks are small and external inputs few (Okitoi *et al*., 2006), flock sizes vary between 17-22 birds composed of cocks, hens, pullets, cockerels, and chicks (Illango *et al*., 2006). Owing to the scavenging nature of these birds, a key farm-level problem is periodic pest and disease attacks which at times wipes out the flocks to uneconomical production levels. Besides, the indigenous chicken tends to grow a little slower than expected under the intensive system as compared to their exotic counter-parts. The indigenous chickens have a tremendous potential as a source of wealth and development and can promote gender equity since

most of them are kept by women, alleviate poverty and improve livelihoods among rural households.

1.4 Efforts for agricultural transformation in Uganda

In addition to being a part of the Maputo declaration, the Ugandan government has made a number of efforts to transform agriculture. Some of these include; the Uganda Poverty Eradication Action Plan (PEAP) which was prepared in 1997 and provides the basis for development activities in Uganda. It promotes the eradication of poverty through sustainable agricultural development to improve food security and rural incomes. It aims to reduce the population living in absolute poverty from the present 38% to less than 10% by 2017. It emphasizes that the best way to fight poverty is to enable households to earn incomes through secured access to productive assets and creation of income earning opportunities, macroeconomic stability and microeconomic incentives, provision of adequate health and education, improved socio-economic infrastructure, consideration of vulnerable and good governance. PEAP's dual challenge was increasing productivity in the production sectors and increasing investment by the poor (Mukiibi – Mukai and Kirunda, 2005). To offshoot PEAP and enhance agricultural policy development and strategy, Plan for the Modernization of Agriculture (PMA) was formulated in 2000. PMA's primary focus was eradicating poverty through transforming subsistence agriculture to commercial agriculture. Therefore priority was given to those investments that were in line with the goals and objectives of PMA. Its objectives were to:

- Increase incomes and improve the quality of life of poor subsistence farmers through increased productivity and increased share of marketed production.
- Improve household food security through market based delivery systems rather than trying to achieve self-sufficiency through subsistence production methods.

- Provide gainful employment through the secondary benefits of PMA implementation such as agro – processing factories and services, and
- Promote sustainable use and management of natural resources by developing a land use and management policy and promotion of environmentally friendly technologies.

In addition to the above, the National Agricultural Advisory Services (NAADS) - program which mainly dealt with advisory services and input provision to the farmers was also established to complement the agricultural development process and this was later replaced by the operation wealth creation (OWC) which is currently being run in the country. Despite these interventions, the indigenous chicken has been given less attention and this could account for the low productivity and hence affect market participation of the farmers.

1.5 Consumption of poultry and poultry products in Uganda

The per capita meat consumption in Uganda is estimated at just 6kg/person/year which is below the FAO minimum per capita requirement of 50kg (Mukiibi-Mukai and Kirunda, 2005). This therefore reflects a deficit in per capita meat consumption of 44 kg/person/year. However, due to the increasing knowledge on the benefits of white meat, the demand for poultry and poultry products is on the increase and specifically, indigenous chickens have invaluable characteristics that are not found in the exotic strains. On the demand side, the indigenous chickens are more popular on the domestic and regional markets than the exotic types. The preference of indigenous chicken is because they are tastier, have no drug residues, and are believed to be more nutritious. Eggs from the indigenous chicken too tend to have a yellow attractive yolk an indication of high content of iron compared to the grey type of exotic birds. This demand is not well balanced with the supply of the indigenous chicken.

Whereas the merits for indigenous chicken are numerous, smallholder farmers have not fully exploited the opportunities available to participate in the market. In part, this is attributable to institutional and marketing constraints that smallholder farmers face. There are also transaction costs that impede the market participation potential of indigenous chicken farmers. Despite the recognition of these challenges, the research community has barely paid attention to indigenous chicken marketing in Northern Uganda.

1.6 Marketing of agricultural products

Farmers' failure to participate in the market is influenced by a number of factors. Gausi *et al*. (2004) in their study on market participation in Malawi, show that the farmers' decision to participate in the market is not only influenced by prices but also dependent upon the farmers needs at that particular time. Better access to markets and better markets per se are a key to improving people's income and livelihoods in the society. These facilitate farmers to get better prices for their produce, which in turn enhances production and productivity because farmers are assured of high returns. IFAD (2003) and World Bank (2008) show that the intensification of agricultural production systems and increased commercialization must be built upon the establishment of efficient and well-functioning markets and trade systems that keep transactions costs low, minimize risks and extend information to all actors, particularly those living in marginal areas of productivity and weak infrastructure.

Since market participation also contributes to economic development, many SSA countries were using market led paradigms and widespread liberalization during the 1980's to 1990's as engines for development and structural adjustment policies in their economies, including the agricultural sector. In order for agrarian and rural transformation to occur, and result in economic development, households must

transition from a subsistence mode to a market oriented mode, where families do not have to only produce what they consume but also enable them be able to produce surplus that they can sell for income. This can only happen when farmers participate in markets, by trading most of their output to gain income for purchasing inputs and other needs.

In developing countries however, there are challenges that smallholder farmers face in participating in markets, transaction costs being among the challenges. Transaction costs can be defined as costs incurred when looking for a trading partner, negotiating with them, making a contract, or reinforcing it. These could be in the form of money spent or the opportunity cost of time.

Generally, the non-commercial birds are raised at a subsistence level with no market-oriented objective. Those that make it to the market are the ones that have grown too old, are diseased, or are sold for quick financial gain to meet a domestic need. Therefore, their meat is usually of poor quality. A farmer mainly sells traditionally indigenous chickens when there is a need for money. In some places, the chickens are sold in village markets to hawkers or intermediaries who subsequently assemble and transport them to urban traders (Okot, 1990). In this case, intermediaries take the advantage of the situation and pay far lower prices to the poultry farmers. Chandraschka, 1998 found out that organized marketing of free-range rural poultry is difficult because of small size of the output per household generated at irregular intervals.

In Uganda today marketing of local chickens is not well streamlined although few studies have tried to trace out gross margins and to determine the parties that benefit

in the marketing chains of indigenous chickens (Mukiibi-Muka and Kirunda, 2005). Marketing channels for products and live birds are undefined. This may be attributed to the low and irregular chicken productivity (Mbugua, 1990). As such live birds and eggs are sold at the gate or in the local market. Live chicken are sold during the time of need for cash or when the birds sick (Nwosu, 1990; Williams, 1990). Eggs are also sold when hatching is not required. Local traders purchase live chicken and eggs from farmers and transport them for sale to urban markets (Andrews, 1990; Nyaga, 2007) while eggs are also sold within households or through the local shop outlets. Live birds are sold when aged six months and over (Olaboro, 1990).

Most of the research aimed at improving indigenous chicken has been skewed towards technical and managerial aspects of the chickens, hoping that these constitute the principal constraints. There is very little information regarding the marketing of indigenous chickens. The scanty market information that is available is not only informal but also mostly carried out for traders neglecting the smallholder producers. This research gap prompted the curiosity of the present study.

1.7 The problem statement

Smallholder farmers normally face two critical decisions; the quest to meet food security requirements and the need to realize marketable surpluses. These farmers are not only known for their subsistence-surplus level of production but are also characterized by weak links to information systems outside the communities in which they stay. In northern Uganda particularly Gulu district, there are a number of market opportunities for indigenous chicken. This is due to increasing demand for chicken and chicken products locally, regionally and from neighboring South Sudan due to not

only the increasing population but also the increasing consumer awareness of the health benefit of white meat. A number of studies have been carried out to characterize the poultry sector within and out of the country but with more emphasis on production, management, pests, and diseases.

Numerous studies (Goetz, 1992; Bellemare and Barret, 2004; Olwande and Mathenge, 2012; Omiti *et al*., 2009; Randela *et al*., 2008) have been carried out on market participation of smallholder farmers in Africa. These studies established that socioeconomic characteristics such as age, education, farm size, ownership of some assets and output were observed to have positive effect on market participation of various agricultural commodities. In addition to these, public assets variables have also been found to have positive relationship with market participation especially with respect to access to credit and insurance (Cadot *et al*., 2006; Stephens and Barrett, 2011) and input use and access to extension services (Alene *et al.*, 2008).

In Uganda, a study conducted by Sebatta *et al*. (2014) on market participation using the Heckman's two-stage model focused on sweet potato marketing by smallholder farmers. On the other hand, Emuron *et al*., 2010 conducted a study on factors influencing trade of local chicken in Kampala city markets in Uganda and some outstanding facts were that; these markets are informal and the chicken are majorly sold in the live form. The study further revealed that this market offered a number of opportunities and challenges. However, the study of Emuron *et al*., 2010 only focused on the urban traders with no consideration to the smallholder farmers.

Although a number of market participation studies exist, there is still limited literature on the factors that affect market participation of smallholder indigenous chicken

farmers despite there being a potential market for the indigenous chicken. Little attention has been paid to study the factors that affect market participation of indigenous chicken and the intensity of participation if these farmers choose to participate. Thus, in order to comprehensively understand the factors, the research modeled and estimated the participation decision of smallholder indigenous chicken farmers in Gulu district using a two-stage model involving a probit model and OLS regression.

1.8 Research objectives

1.8.1 Overall objective

The general objective of the study was to examine the participation of smallholder farmers in marketing of indigenous chicken in Gulu district.

1.8.2 Specific objectives.

1. To characterize smallholder indigenous chicken farmers in Gulu District

2. To determine the factors that affect market participation of smallholder indigenous chicken farmers in Gulu District

3. To determine the factors that affects the value of indigenous chicken sales in Gulu District

1.8.3 Research hypothesis

1. There is no difference in the means of non-farm income, distance to market, flock size, trading experience, education level, household size, and age between indigenous chicken market participants and non-market participants.

2. The market participation decisions of indigenous chicken farmers is influenced by flock size, ownership of transport means, distance to the market, indigenous chicken trading experience and other socio-economic factors.

3. The value of sales for indigenous chicken is influenced by age of household head, distance to the market, price, and the sex of household head, household size, and other socio- economic variables

1.9 Justification of the study

This study has contributed to the scientific knowledge of the factors influencing market participation of smallholder indigenous chicken farmers in Gulu district. It is therefore a significant addition to the body of knowledge on indigenous chicken marketing, which is currently very limited. Indigenous chicken is one of the poultry species marked for increased production and productivity by development agencies as a way to contribute to livelihoods of the rural poor.

The study will contribute to knowledge examining the poultry market in the region. In so doing, Gulu University will get information to help scale up the intervention on student farmer attachment by providing information needed to give the students a better understanding of the environment in which they work and provide indigenous chicken farmers with knowledge on how and where to sell their products all other factors taken into consideration. This information will contribute to knowledge utilized by extension agents and other chicken marketing promoters to better advise farmers on how and where to sell their chicken, based on a clear understanding of factors affecting their effective participation within Gulu district

Through contribution to the body of knowledge, the study will help inform policy makers and in so doing guide the formulation of policies that not only focus on price incentives but also looking at other factors affecting marketing will accelerate the smooth growth of IC rearing in this region.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Characteristics of smallholder farmers

African smallholder farmers can be categorized based on: (i) the agro-ecological zones in which they operate; (ii) the type and composition of their farm portfolio and landholding; or (iii) on the basis of annual revenue they generate from farming activities. In areas with high population densities, smallholder farmers usually cultivate less than one hectare of land, which may increase up to 10 ha or more in sparsely populated semi-arid areas, sometimes in combination with livestock of up to 10 animals (Dixon *et al*, 2003). On the basis of farm revenue, smallholder farmers range from those producing crops only for family consumption to those in developed countries earning as much as USD 50,000 a year (Dixon *et al*, 2003). Most smallholder operations occur in farming systems with the family as the centre of planning, decision-making, and implementation, operating within a network of relations at the community level. Based on this understanding, a number of studies have been done to characterize the indigenous chicken farmers and these are discussed below;

The indigenous chicken are majorly owned by women who usually make decisions on their sale but men too owned them in the absence of women. These were also agreed upon by a similar study by Ndegwa *et al*., 2001 in Kenya. In a study conducted by Gueye (1998), the result showed that over 80% of the indigenous chickens were owned by women and majorly managed by women and children as also illustrated by

Aberre 2000 and Alemu 1995. This could be an important and powerful tool for rural women empowerment.

Alemu (1995) found out that more than 60% of the households in Ethiopia kept birds and these are majorly kept under free-range system. Abeykoon *et al*., 2013 established that over 96.3% of the farmers kept their birds under free-range system with an average flock size of 7-10 birds (Aberre 2000 and Tadelle 1996). It was observed in south East Asia that majority of the farmers did not provide housing for their birds. The chicken roosted outdoors mostly at the treetops. Most of the farmers feed their chicken on unbalanced supplements for example kitchen refuse, grains with majority feeding maize. Other grains fed to the chicken included sorghum, millet and a few were given bran. These findings were concomitant with Mwalusanya *et al.* 2001. The percentage mean Crude Protein (CP) level of the scavenging diets is 11.2. The Crude Protein (CP), Metabolizable Energy (ME), Ether Extract (EE), Crude Fiber (CF), Ash, Nitrogen Free Extract (NFE), Starch, and Dry Matter (DM) intake is similar for growers and layers in medium high and low agricultural areas (Birech, 2002). Comparison of the protein requirements for growers and layers (King'ori *et al*., 2003) with the estimated intake under scavenging conditions (Birech, 2002) indicate that there is a deficit of 2.4 and 0.8 g CP per day respectively. This partly contributes to the low productivity of indigenous chickens under scavenging conditions. Nutrient intake of indigenous chickens under free-range system is enough to meet their maintenance requirements and support minimal growth rate and egg production indigenous chickens are 20, 16 and 14% and 17, 14 and 12% for the heavy (1.66-2.14 kg) and light birds (1-1.65kg) respectively, during the 5-8, 8-14 and 14-21 week growth periods (Chemjor, 1998). This is not adequate for these birds as they grow.

Poor nutrition has also been reported as a factor contributing to low productivity of Tanzanian indigenous chicken (Mwalusanya *et al*., 2001). While studies by Mekonnen, 2007 indicated that about 73.8% of the farmers provided water to their birds though the farmers never really knew the importance of water to birds. This is in line with the findings of King'ori,*et al*., 2003 where drinking water is irregularly provided in tins or broken clay pot pieces.

Record keeping on the indigenous chicken was totally lacking among the farmers as also noticed by McAinsh *et al*., 2004 and this would complicate culling, as the unproductive birds would not be easily noticed.

In a study conducted by Aini (1990), in south East Asia, it was identified that two systems of poultry rearing in this region that is, commercial sector and traditional based systems. In this region, the increasing commercial birds have less affected the traditional system. They discovered that this system relied on minimal resource inputs. This system is characterized by low inputs where birds scavenge but are also given supplementary feeds obtained from own production on the farm (Aklilu, 2007 and Halima, 2007). This activity is a secondary activity to other agricultural activities. It is also observed as a source of income and high quality protein. Chickens are an important hedge against unexpected cash needs, such as medical and school fees. More chickens are sold to meet such emergency scavenging expenses (Moreki *et al*., 2010). These birds are majorly fed on kitchen left over or fed on locally available grain. This finding is in agreement with Mwalusanya *et al*., 2001.

Disease risks are high in free-range systems as birds are left to freely roam and mix with other flock. They are recognized as a constraint in smallholder poultry

production. Expenditure on disease control is minimal and chick mortalities average 40-60% over the first 8 weeks (Ondwassy *et al*., 1999). Newcastle Disease (NCD) is the most prevalent and fatal in poultry in Kenya (MoALD and Marketing, 1996) just as it is for Uganda. A similar situation has been reported for Botswana (Moreki *et al*., 2010). The control of NCD is possible through vaccination and vaccines are available at the local chemists. Very few smallholder producers of indigenous chickens do vaccinate their poultry but many of them are not aware that NCD can be controlled by vaccination. The vaccine requires being stored under refrigeration and is packaged in doses for 100 chickens. This packing poses a limitation to the use of vaccines for NCD as some of the refrigeration services cannot be accessed by smallholder farmers. Other common diseases are fowl pox, fowl typhoid and coccidiosis.

2.2 Factors affecting Market Participation of Smallholder farmers

Literature is enormous on studies of factors affecting market participation though studies that explore the limitation of smallholder market participation are limited. For instance, these factors range from social to economic.

2.2.1 Institutional factors

Bellemare and Barrett, (2004) suggest that certain market frictional forces act as an obstruction in market participation. The households therefore become less interested in participating in the markets and affect government incentives to influence microeconomic behavior through changing market incentives. Most governments have concentrated on price policies as an incentive to encourage market participation because price does not only affect the farmers decision to participate but also the value of sales the farmers will obtain if they participate.

This means shifting the focus from production-related programmes to more market-oriented interventions. This has placed renewed attention on institutions of collective action, such as farmer groups, as an efficient mechanism for enhancing marketing performance (Kariuki and Place, 2005).Smallholder organization in farmer groups is seen as a possible institutional solution to overcome high transaction costs and other market failures in developing countries (Markelova *et al*., 2009).

In-group composition attributes gender and age of members has no relationship with farmers' ability to access the markets. Only education level of group members was found to be significant in accessing the banana markets (Jagwe, 2011). In this, the study findings concur with Lambert (2006) who established that higher education levels have been found to be associated with higher uses of management intensive collective practices and environmental behavior by farmers. Whereas in the group characteristics, older groups were found to access the banana market by use of human labor and less mature groups were more likely to use other means of transport to access the market. The size of the group was found to being insignificant in accessing the banana market. Olson (1965) argues that smaller groups are more successful in collective action than larger groups as the distribution of benefits is more likely to be inadequate in larger groups.

When considering the group assets both land ownership and banana acreage were found to be significant in determining the kind of market the farmers are engaged in, Jagwe, 2011. Majority of farmers would prefer to sell their bananas to the brokers in the price offered is not reliable. However, farmers with reliable water supply were

found to influence the access to banana market due to higher quality and quantity of bananas produced. Agarwal (1997) who found out that participation in a group activity is greatest among those who possess a minimum level of assets or skills set such as reliable water that is useful to a project supports this finding.

In group governance trust among members and good leadership was found to be significant in pursuit of markets by banana farmers. This is supported by findings by Markelova (2009) who found out that group rules are crafted by members themselves and adopted and there is a higher likelihood of being understood and followed, which contribute to the effectiveness and sustainability of collective efforts. Jagwe, (2011) found that farmers who belonged to a farmers' group had cohesion in terms of gaining and sharing knowledge as well as capacity to produce more for a marketable surplus. Kirsten and Sartorius, (2002) also added that farmers organize themselves into farmer organizations to gain more bargaining power.

Shepherd, (2007) also suggested collective action inform of farmer co-operatives or groups to increase smallholder market participation. Njuki *et al*., (2006) however added that forming farmer groups though recognized as essential for efficient farmer learning, receiving external support and achieving economies of scale, it must be accompanied by incentives to participate in markets. (Minot and Ngigi, 2004; Poulton *et al*., 2004; Nyoro and Ngugi, 2007) still have evidence that show the capacity of well managed farmer groups being reasonably successful in generating better terms of trade and this means greater value for farmers produce. Jaleta *et al*., (2009) on the other hand, found that household crop market participation was determined by literacy of the head of household, nearness to the market place and the household's market

orientation, defined as making production decisions based on prevailing market signals. Holden *et al*., (1998); Jagwe *et al*.,(2009); Eskola,(2005) all found that transaction cost-related factors such as geographical location, market information sources, and travel time to the nearest market, labor availability, farming experience, gender of household head, off-farm income and household asset base affect the smallholders' likelihood and intensity of participation in markets. Such factors that affect participation in crop markets are likely to be the same as those that affect Indigenous Chicken farmers' participation in markets.

2.2.2 Transaction costs

Coase (1937) first introduced the discipline of Transaction Economics (TE). Williamson (1975) and (1981) developed on Coase's ideas and not only justified Transaction costs but also classified them. Coase further suggested that transaction costs included costs of finding a new partner, negotiating a sale agreement, and monitoring or enforcing performance of the terms of trade, but on top of this, Hobbs (1997) further divided transaction costs into three broad categories that is information search costs, negotiation costs, and monitoring costs.

Information costs as defined by Hobbs (1997) are the costs associated with sellers obtaining information about markets and providing information to buyers before poultry are sold. Negotiation costs on the other hand are those associated with the give and take between buyers and sellers as they decide the terms of transactions (Hobbs 1997). Further, Hobbs (1997), defines monitoring costs as those involved in supervising the terms and condition of sale after it is completed.

A number of studies; de Janvry *et al*., (1991), Goetz (1992), Abeykoon *et al*., 2013 and Jagwe, 2011 have tried to explain how transaction costs affect market participation. These were some of the findings; de Janvry *et al*., (1991) found out that a household's decision to be a participant in a given market is determined by: price which depends on transportation costs to and from the market, mark-ups by merchants, the opportunity cost of time involved in selling and buying (search, recruitment and supervision costs), risk associated with uncertain prices and a variety of other transaction costs that are largely household specific. The poorer the infrastructure, the less competitive the marketing systems, bearing in mind that transportation forms part of the transaction costs. When less information is available, this would mean transactions would be risky, and the greater is the size of the price band. As long as the households' shadow price for a commodity falls within the price band, market participation will not occur. Goetz (1992) too found out that many households failed to operate in trading of coarse grains due to the transaction costs that caused a large difference between the selling price and the buying price therefore causing some commodities not to be traded.

2.2.3 Household socio-economic factors

The decision of a household to participate in the market is influenced by sex of the household head and religion (Abeykoon *et al*., 2013). Male-headed households showed more probability to participate in poultry market compared to female-headed households. This result is consistent with the findings of Gebregziabher (2010) that

the probability to participate in poultry market decrease with female household headship.

Ownership of a bicycle or a car by a household reduces the probability of market participation as a seller, which seems counterintuitive. Only 38% of the sample households own at least one bicycle Ouma *et al*., 2009. A plausible explanation is that ownership of a bicycle or a car is considered an asset for the wealthier households who could be participating less in the banana markets. Results from other surveys in the region reveal that most smallholder farmers travel to the market on foot, physically carrying goods on their head or back.

Education level is inversely related to the probability of market participation as a seller, a finding that suggests that the more educated people engage more in off farm activities as a source of income than on farm activities. That advancement in education reduces time spent in on-farm compared to off-farm income generation activities. Access to off-farm income raises the probability of market participation as a buyer

Years of farming, experience is positively related with the probability of participating in the market as a seller. Gabre-Madhin (2001) and Bellemare and Barrett (2006) have shown that successful repeated contacts, gained through long-term marketing relationships, enhances trust, an important element in market exchange

Distance to the preferred marketing channel is negatively and significantly correlated to the probability of participating in the market Onoja *et al*, 2012. This suggests that households, which are closer to market outlets, are more likely to sell than those

households living further away are. This is due to both fixed and variable marketing costs. Distant markets can be source of fixed costs in the form of transport and lodging for the participant, as well as variable costs. Barret *et al.* (2006) also found that reduced costs to market participation for Ethiopian pastoralists stimulate livestock marketing at the margin. It is interesting to mention that commercial farmers that are at the same distances from markets do sell their products on a regular basis. Thus, this issue requires further investigation by incorporating the differences in transaction costs over long distances. Bartha and Bauer (2007), also agree to this.

The results also show that access to credit raises the probability of market participation for buyers Gebremedhin *et al*. (2001). This implies that credit acts as a consumption-enhancer rather than a production enhancing input. However, interestingly, this is not significant on studies such as Osmani and Hossain, (2015).

Sex is a categorical variable but its effect on market participation has been found to be differing in different studies. Studies such as Adewale and Ikeola (2005) and Verstralen and Isebor (1997) in Nigeria found out that the probability of participation increased with household head being female while in other studies, it showed that the probability of participation increased with household being male headed. This could be because, male producers are more resource endowed than female producers are, making them better able to produce more. Market participation is strongly influenced by size of farm owned by a household, and on average, male producers normally have a tendency of owning a greater percentage of the land and other assets needed in production.

Price is another factor that greatly influences market participation. This suggests that households, which have higher expectations of making higher profits from price signals, are more likely to engage in or participate in marketing Onoja *et al*., 2012. This is in line with earlier findings of Komarek (2010) who indicated that sub-county prices had a stronger influence on initial market entry decisions of some agricultural marketers

2.3 Conceptual framework

The conceptual framework followed in this study is adapted from Boughton *et al*. (2007) and Barret (2008). The key features of the models are that smallholder farmers' access to markets are heterogeneous because households face differential transaction costs related to farm specific characteristics as well as meso-level factors related to spatial differences in costs of commerce and degree of competition among market intermediaries. Hence, the core issues in the models are the effect of asset endowments and access to physical and institutional infrastructure, which are regrouped as shown (Figure 2).

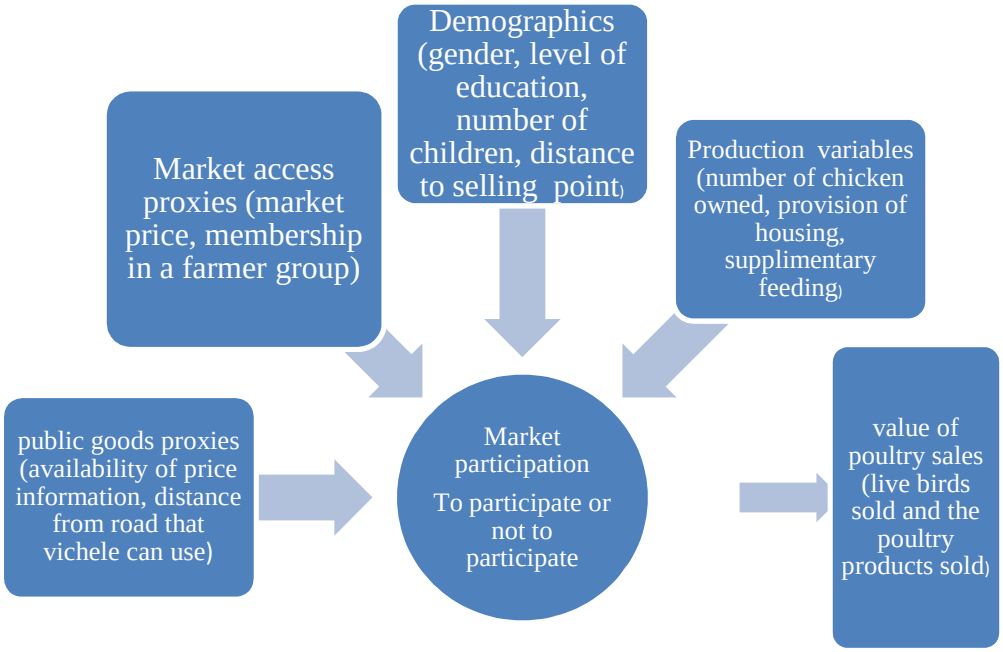


Figure 2: Conceptual framework of the factors that affect market participation of I.C farmers and value of sales

The factors displayed in Figure 2 were obtained from the various theories and studies and hypothesized to affect the decision to participate in the market and the value of sales. These factors are classified as Demographics (gender, level of education, number of children, and distance to the selling point), Production variables (flock size, provision of housing, supplementary feeding), Market access proxies (market price, membership in a farmer group) public goods proxies (availability of price information, distance of household from feeder roads).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Introduction

This chapter presents the methods and procedures that were used to find out the factors influencing market participation decisions of indigenous chicken smallholder farmers. It gives the model employed, the data used, and the methods of analysis.

As the decision to participate involves two decisions, i.e. the discrete decision of whether to sell or not and the continuous decision of how much is got from sales which is conditional on participation, a two stage model was used to find out the factors influencing market participation.

3.2 Study Design

The study was a cross sectional survey by design covering one production year (2015) which is important for collection of a great deal of information quickly and it is also important in correlation aspects. Primary data were obtained by the use of a structured questionnaire, which elicited responses on smallholder farmers' participation in indigenous chicken marketing in addition to socio-economic data such as age, education status, occupation, access to market information, distance to the nearest market, number of dependents in the household, and sex among others (Onoja *et al*. 2012). A multi-stage random sampling was used in selecting the respondents who participated in this research.

In this study, both qualitative and quantitative data were collected. Qualitative data were collected to deal with phenomena that are difficult or impossible to quantify

mathematically, such as beliefs. It helped investigate the why and how of decision-making, not just what, where, when. This kind of data was collected mainly through Focus group discussions (FGDs) with 8 members of the community which gives greater insights in controversial issues that would be difficult to obtain if only one person were to be interviewed at a time. Quantitative data was useful in bringing out cause-effect relationship of the study. It tests theories and can be used in generalization of results, which was useful in this study. The method used to collect this type of information was face-to-face interviews that enabled researchers to establish rapport with potential participants and therefore gain their cooperation. They yield the highest response rate and allow for clarification of ambiguous answers and also seek follow-up (Leedy and Ormrod, 2001)

3.3 Study area

The study was conducted in Gulu district located in Uganda. Specifically, the study took place in Laroo division, Unyama, and Bobi sub-counties. Gulu receives an annual rainfall of 10-250mm (www.weather) and temperatures of 17-30℃ with an average elevation of 1070m above sea level. Agriculture in this region is predominantly rain fed with non-farm activities and livestock rearing contributing to the people's livelihoods. The selection of Unyama sub-county and Laroo division was based on the fact that; i) they were located near Gulu town, a growing town serving most parts of Northern Uganda. This would naturally provide a market for the chicken given their demand in urban towns because of their nutritional value and taste compared to other sources of animal protein. ii) They were participating in the student-farmer attachment program that was being carried out by the faculty of Agriculture and Environment of Gulu University. Under this program, the students at

the end of their second year are attached to farmers within the community and this helps them apply the skills they have acquired and learn more from the field. This also helps the farmers have better access to information than their counterparts who do not receive attachment. Bobi sub-county on the other hand served as a control.

3.4 Sampling techniques

A multi-stage sampling procedure was done at three levels, first a purposive selection of Laroo division, Unyama; Bobi Sub-counties was done. Secondly, farmers engaged in the attachment program in Laroo division and Unyama sub-county was also purposively selected because they receive training and information from the University. Thirdly, random selection of farmers from the primary sampling unit (farmers in Laroo and Unyama involved in the farmer's attachment program) and those in Bobi farmers association was done. This association at the time had 6 groups. These groups were then divided according to how far they were from the road and from this; two groups a sample that is representative of those that are near the main road and those far away were selected. The actual households interviewed were then randomly selected.

3.5 Sample size determination

The overall sample size was 150 households. This was calculated using Sloven's formula (Yamane, 1967) for determining sample size for a finite population and with a confidence coefficient of 95% as below;

$$n = {}^{N}/_{1 + Ne^2}$$

Where,

N-population

n- Sample size

e- Degree of confidence level at 95%

$$n = {}^{110}/_{1 + 110(0.05)^2}$$

$$n = 92$$

For Bobi, two farmer groups with a total number of 50 farmers were selected and from the 2 groups we established our sample size using Sloven's formula above.

$$n = {}^{50}/_{1 + 50(0.05)^2}$$

$$n = 44$$

From the calculation, the overall sample size was 136, however including a 10% margin of error the sample size comes to 150 and this is summarized in Table 3.1

Table 3: Overall sample size by gender of household head

Sub-county of respondent	Sex of household head		Total
	Female	Male	
Unyama	31	44	75
Laroo division	14	5	19
Bobi	5	51	56
Total	50	100	150

3.6 Method for data collection

The questionnaires had both open-ended and close-ended questions. Open-ended questions were meant to capture data that allowed respondents freedom of expression. The variables of interest were grouped in four main categories; demographics, market

access proxies, production variables, and public goods proxy variables. The demographic variables were; age, gender, level of education, household size, and distance to selling point, indigenous chicken trading experience, monthly non-farm income

Among the production variables were; type of chicken reared, number of indigenous chicken owned, system used in indigenous chicken production, provision of supplements, type and form in which supplements are provided, provision of water, problems faced in indigenous chicken production.

The market access proxies included; alliance, which indicated whether a producer belonged to any farmers' forum or group, a dummy variable for radio ownership, was included to represent information availability to the household. Finally, a dummy for transportation means available on the farm for any household owning a truck, a car or motorcycle or a bicycle was included.

The public goods proxy variables were; availability of price information, distance from roads that a vehicle can use (indicating the infrastructure of the roads). Market relationships Observations were also done at household level.

3.7 Analytical methods

From the field, the questionnaires were always checked for any inadequacies like wrongly recorded information which were immediately edited and set aside.

The data from the questionnaire were then coded and entered into SPSS 13 and Excel where a number of tests were performed on variables used in both stages of the model were first checked for normality using Exploratory Data Analysis (EDA) using the coefficient of kurtosis and skewness, and the general correlation matrix. (Appendix 3)

The data were analyzed using STATA 13 software. Generation of descriptive statistics was done by running t-tests, frequencies, and percentages. STATA was used to run the regressions since it easily generates the marginal effects and inverse mills ratio important in the second stage.

3.8 Characteristic of Indigenous Chicken farmers

The variables used for description of characteristics of indigenous chicken farmers included sex coded (1=female, 0=male), age of household head (years), indigenous chicken trading experience (years), household size, non-farm income (UGX), distance to the nearest market (km), education (years).

For the categorical variables, the descriptive analysis performed were frequencies percentages and chi2 tests, while for the variables that were numeric that is those that were continuous, the statistics generated for analysis were t-tests, means and standard deviations

3.9 Factors that affect market participation of smallholder indigenous chicken farmers

3.9.1 Theoretical Models

The smallholder farmers' market participation as investigated in this study involved a two-stage decision problem for the household. The first is a discrete decision of whether or not to participate in the poultry market, while the second is a continuous decision of income earned from poultry sales and conditional on a positive first

decision. If unobserved preferences and characteristics affect both the discrete and continuous decisions involved, the error terms in the two respective equations are correlated. Moreover, the variables affecting the two decisions may not be the same. In such situations the Heckman's two-step model becomes appropriate (Heckman, 1979), as it corrects for the self-selection problem.

The decision to sell or not to sell depends upon a number of factors other than price. Abdula *et al*, 2007 reported that market participation is both a cause and consequence of economic development. This means that market participation brings about development and can be because of economic development. For example, when people participate in the market, they obtain an income for themselves and hence people tend to have investment intensions. In addition, when the economy is developed, such an economy tends to have well established infrastructures such as roads and markets that also enhance market participation

In the Heckman's two step model, first the equation on the discrete decision was estimated, and second, the equation on value of poultry sales was estimated with the inverse Mill's ratio (λe) obtained from the first estimation included as an independent variable. The procedure was as follows:

Whether or not to participate in poultry market (stage 1) is modeled as:

$$Y^* = Z^1 \propto + \varepsilon_1$$

Y=1 if $Y^* > 0$

Y=0 if $Y^* \leq 0$ **1**

Where

Y^* **= 1** if a household participate in the poultry market, and equals to zero otherwise.

$\propto$- is a vector of parameters to be estimated which measures the effect of explanatory variables on households decision

Z- Is a the vector of explanatory variables

ε_1-is the error and is normally distributed disturbance with mean (0) and standard deviation of δ_1 and captures all unmeasured variables.

Since the probit parameter estimates does not show by how much a particular parameter increases or decreases the likelihood of participating in the indigenous chicken market. Marginal effects were calculated by multiplying coefficient estimate $\propto$ by standard probability density function by holding other independent variables at their mean variables. The marginal effect of dummy independent variables were analyzed by comparing probabilities of that result when dummy variables take their two different values while holding all other independent variables at their mean values (Wooldridge, 2002). Finally, log likelihood function was maximized to obtain parameter estimates and corresponding marginal effects as:

$$\text{LnL}\left[\frac{\propto}{Y}, Z\right] = \sum_{y=1} In[\varphi(Z^1 \propto)] + \sum_{y=0} In(1 - \Phi(Z^1 \propto)) \qquad \mathbf{2}$$

A number of post estimation tests were carried out for example the goodness of fit test and the *estatclassif* command and the results are presented in Appendix 2;

The selection model that was used in the first stage was;

$\Pr(y_1) = f(x_1, x_2, \ldots\ldots\ldots, x_{11}, e)$, Where $\Pr(Y_1)$ is the probability of the farmer making a decision to sell poultry and poultry products in the market or not.

$x_1 - x_{11}$ Were the variables affecting the decision of the farmer to participate in the market and e is the normal distributed error term and these variables are presented in the Table 4

Table 4 Variables used in the selection model

Variable name	Description of variables	Expected sign
Dependent variable		
Indigenous chicken market participation	Dummy(1=Yes and 0=No)	
Independent variables		
Age of farmer	Age of household head in years	+/-
Sex of household head	Dummy (Female=1, otherwise=0)	+
Presence of transport means	Ownership of transport means(1=Bicycle, 2=Vehicle,3=Motorcycle)	-
Poultry trading experience	Experience in indigenous chicken keeping (Years)	+
Education level of household head	Time spent in school in years	-
Family size	Number of individuals within a given household	-
Monthly non farm income	Monthly income earned by farmer from off-farm activities in UGX	+
I.C trading experience	Experience in indigenous chicken trading in years	+
Ownership of transport means	Whether household owned a car, motorcycle or bicycle	+
Flock size	Number of indigenous chicken owned by the farmer	+
Distance to market	Distance to the nearest market where farmer sells their chicken in KM	-

3.9.2 Outcome model

Conditional on indigenous chicken market participation, variables affecting value of sales were modeled using 2nd stage OLS (outcome model) regression as specified below;

$$Z_i^* = W_i \propto + \varepsilon_2$$

Where;

$$Z_i = Z_1^* \text{ If } Z_i^* > 0$$

$$Z_i = 0 \text{ If } Z_i^* \leq 0 \qquad \textbf{3}$$

Z_1^* - Latent variable representing the value of poultry products sold which is observed if $Z_1^* > 0$ is unobserved otherwise.

Z_i- Value of poultry and poultry products sold

W_i-Vector of covariates for unit *i* for selection equation which is a subset of Z^*

$\propto$- Vector of coefficients for selection equation

ε_2- Random disturbance for unit of selection equation

One problem with the two equations 1 and 3 is that the 2nd stage decision making processes are not separable due to unmeasured household variables affecting both discrete and continuous decision thereby leading to correlation between errors of the equations. If the 2 errors are correlated, the estimated parameter values on variables affecting volume of sales are biased (Wooldridge, 2002).Thus the model that corrects selectivity bias while estimating factors affecting value of poultry sales has to be specified. For this purpose, in the first step mills ratio was created using predicted probability values obtained from first stage probit regressions of factors affecting indigenous chicken market participation. Then in the 2nd stage, mills ratio was included as one of the independent variables in the value of poultry sales regression. Thus the value of sales equation with correction of sample selection bias becomes;

$$V = w_i \propto + \lambda \left[\frac{\varphi(w_i \propto)}{\Phi(w_i \propto)}\right] + e_3$$

Where $\varphi(.)/\Phi(.)$ was the mills ratio, λ was the coefficient on the mills ratio, φ denotes standard normal probability density function ε_3 was not correlated with ε_1 and ε_2 and other independent variables. Under the null hypothesis of no sample selection bias λ was not significantly different from zero. V was the value of sales (UGX)

In the second stage of the Heckman model, an Ordinary Least Squares (OLS) estimation was used to test the effect of the hypothesized factors on the level of participation The model was stated as;

$S_n = f(y_{1,}y_{2,\ldots\ldots\ldots\ldots,}y_{13}, e)$

S_n - is the value of Indigenous Chicken and Indigenous Chicken products sold annually in the market

$y_1 - y_{13}$ Are the variables that were hypothesized to affect the value of Indigenous Chicken and Indigenous Chicken products sold by the farmer in the market and these are reflected in Table 5. While in this equation, e is the error term.

The data covered information necessary to make household level indices of social, economic, demographic, and institutional indicators comparable across different categories of households, thus continuous and discrete variables were identified based on economic theories and empirical studies.

Table 5: Variables used in the Outcome model

Variable	Unit and variable explanation	Expected sign
Dependent variable		
Value of poultry sales	UGX	
Independent variables		
Sex of household head	Dummy coded Female=1 and Otherwise=0	+
Age of household head	Age of household head in Years	+/-
Poultry keeping experience	Experience in indigenous chicken keeping in years	+
Household size	Number of individuals in a given household	-
Presence of transport means	Ownership of transport means(1=Bicycle, 2=Vehicle, 3=Motorcycle)	+
Education level of household head	Education level of household head in years	+
Farmers non farm income	Income earned by the farmer from non-farm activities	+/-
Source of market information	Sources of market information to the farmer	+
Flock size	Number of indigenous chicken owned by the farmer	+
Group membership	Membership in farmer group dummy(Yes=1, No=0)	+
Price	Price for each indigenous chicken in UGX	+
Distance to the market	Distance to the nearest market in KM	-
Sub-county	Sub-county of respondent dummy	+

The age variable could have a positive or negative effect on the probability of participation and intensity of participation as argued by Martey *et al*. (2012), the older and more experienced farmers could make better production decisions and have greater contacts that allow trading opportunities to be discovered at lower cost than younger ones. In addition, on the other hand, Enete and Igbokwe (2009) argued that younger heads are more dynamic concerning adoption of innovations both in terms of those that would enhance their productivity and enhance their marketing at a reduced cost. Randela *et al*. (2008) also observed that younger farmers are expected to be progressive, more receptive to new ideas and to better understand the benefits of

agricultural commercialization. These two opposing arguments render either the age variable an indefinite expectation that is it can take on a positive or a negative sign.

Gender was dummied hence measured the differences in value of sales of indigenous chicken between male and female farmers. Cunningham *et al*. (2008) found that men are likely to sell more grain early in the season when prices are still high, while women prefer to store more output for household self-sufficiency. By this, a positive coefficient is expected on the gender variable.

The educational status of a farmer measured the level of human capital and was expected to increase a household's understanding of market dynamics and therefore improve decisions about the amount of output sold (Makhura *et al*., 2001). Schultz (1945); Southworth and Johnston (1967); Ofori (1973); and Enete and Igbokwe (2009) argued that education will endow the household with better production and managerial skills which could lead to increased participation in the market. Randela *et al*. (2008) argue that the level of education gives an indication of the household's ability to process information and causes some farmers to have better access to understanding and interpretation of information than others and leads to the reduction of search, screening and information costs.

However, Martey *et al*. (2012) argue that it is also possible that education could increase the chances of the household head earning non-farm income. This could reduce the household's dependency on agriculture and thus commercialization. In line with this, Lapar *et al*. (2003) argued that if there are competing and more remunerative employment opportunities available that require skills that are enhanced

by more education market participation would reduce. Therefore, the expectation was not definite**.**

Horizontal alliances in the form of farmer groups or cooperative associations also increase the market supply participation of households as they improve market access and lower fixed transaction costs by providing information (Abdula *et al*, 2007). Products of various households can be marketed together, reducing transportation costs. Market discovery costs are reduced because this fixed cost is shared or distributed among all participating households. Information availability increases, as once a member of an alliance gets hold of information quickly pass it on to others and it is used for marketing decisions. Alliances also give high bargaining power to suppliers of a commodity. This prevents exploitation by traders and other agents in the supply chain

Trading experience was expected to have a positive relationship with value of sales. The more experienced the farmer the more the value for what is sold, and hence more income for the farmer.

Marital status was expected to have a positive effect on market value obtained. Married couples have more responsibilities to meet. This increases their probability to participate in the market through producing more output to generate marketable surplus. This subsequently increases the intensity of participation. The household size explains the family labor supply for production and household consumption levels (Alene *et al*., 2008).

Information costs often considered fixed transaction costs that influence market entry decisions (e.g. Goetz, 1992, Omamo, 1998, and Vance and Geoghegan, 2004). Also,

marketing efficiency is hindered by informational bottlenecks which increase transaction costs by raising search, screening and bargaining costs (Randela *et al*., 2008). Therefore, access to market information is expected to increase market participation.

Point of sale was dummied and used as a proxy for transaction costs. Key *et al.* (2000) and Makhura *et al*. (2001) found that distance to the market negatively influences both the decision to participate in markets and the proportion of output sold. In line with this, Omiti *et al*. (2009) observed that the variable transport costs per unit of distance increases with the potential marketable load size. Therefore, point of sale is expected to be negatively associated with the intensity of participation to households who sold in market centers. The form of sale variable does not have a definite sign.

The assumptions of the OLS regression were as follows; Model was linear in parameters, The data were a random sample of the population i.e. errors were statistically independent from one another, the expected value of the errors was always zero, the independent variables were not too strongly collinear, (Appendix 2). The independent variables were measured precisely, the residuals have constant variance, and the errors were normally distributed. A number of transformations were carried out for example the log of trading, IC trading, and distance off farm were obtained while for household size, the natural log was taken since pattern was monotonic with a downward curve, the best transformations to carryout was using powers less than 1. These included log, or square root. But for these variables the log seemed to fit better.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Characteristic of smallholder indigenous chicken farmers in Gulu district

Results in Figure 3 showed that the indigenous chicken are predominant in this region and are characterized by low input as all the farmers kept them under free range system as reflected in Table 6. All the farmers reared indigenous chicken with minority rearing layers. This could be because indigenous chicken required fewer inputs shown in studies such as Aberre 2000 and Tadelle 1996, than their exotic counterparts did.

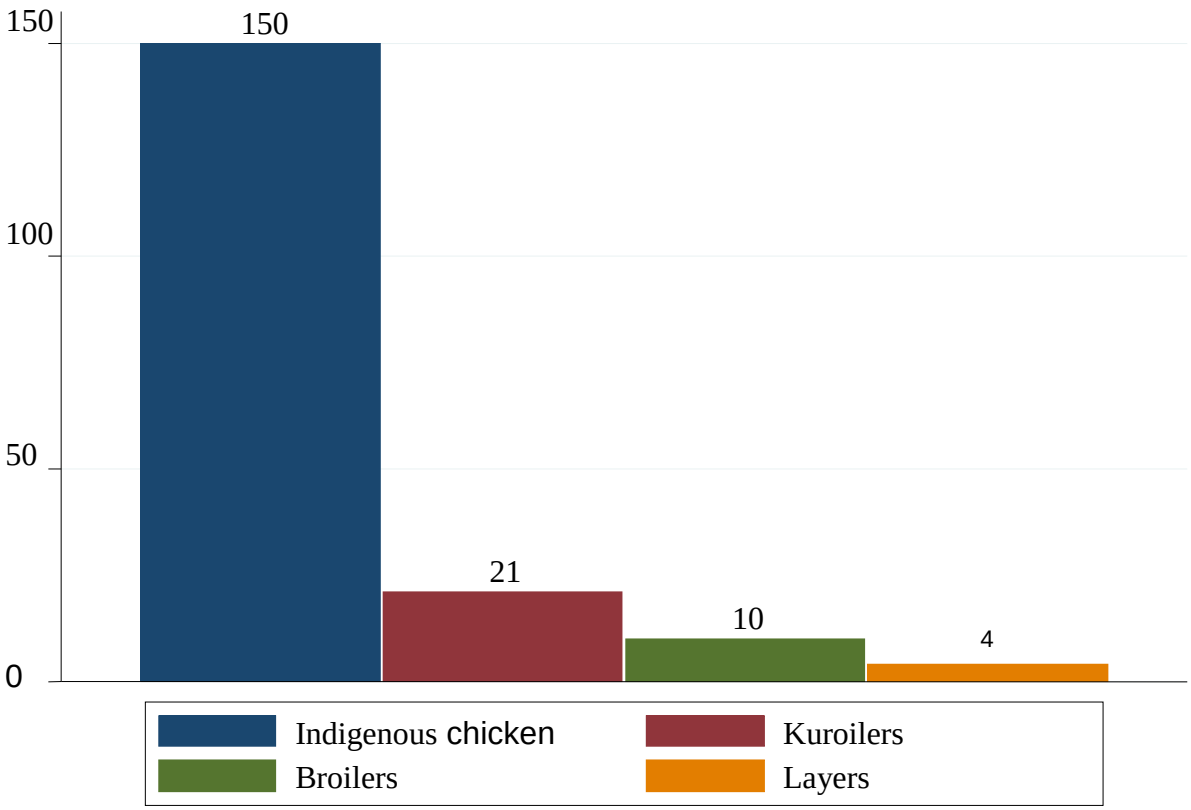


Figure 3 Graph of chicken type reared by farmers

The birds can also be left to scavenge on their own with little or at times no attention accorded to them as the farmers have other primary activities like crop production that they engage in. Most farmers let the indigenous chicken scavenge during the day and provide supplements for example maize, sorghum among others majorly during the harvest season. These supplements are majorly what remain during processing.

Table 6: Production characteristics of smallholder indigenous chicken farmers in Gulu district

Characteristics	Frequency	Percentages
System used in rearing indigenous chicken		
Free range	150	100
Provision of supplements (Yes)	142	94.67
Source of supplements		
Purchased	50	33.33
Produced on farm	139	92.67
Type of feeds provided from own production		
Maize grains	120	80
Sorghum	115	76.67
Millet	45	26.67
Form in which feed is given		
Whole grain	128	85.33
Crushed grain	25	17.24
Provision of water(Yes)	146	97.33
Kind of drinkers used		
Bell drinkers	8	5.33
Locally improvised	138	92

It's also observed in Table 6 that 94.67% of the farmers provided supplements to their indigenous chicken with 80% providing majorly maize as a supplement. This finding was in line with Mwalusanya *et al*. 2001 and Chemjor, 1998; where the food provided is insufficient for the birds to grow and therefore this accounts for the low

productivity of indigenous chicken even in this region. Majority of the farmers provided this maize as whole grain.

The majority (97%) of the farmers provided water to the indigenous chicken with 92% using locally improvised drinkers for example cut jerry cans and plates among other provisions. These drinkers are mostly placed under trees or under the verandah so that as birds scavenge, they are able to access the water.

The smallholder indigenous chicken farmers in Gulu district had limited access to veterinary services, (Table 7). Only 31% of the farmers vaccinated their chicken once in the chicken's lifetime. These vaccinations are usually done communally as farmers complained of the expensive vaccines if the birds are few. Only 13% of the farmers received diagnosis and medication from trained veterinary personnel. Expenditure on disease control is minimal and chick mortalities average 40-60% over the first 8 weeks.

Table 7: Veterinary services accessed by the indigenous chicken farmers

Veterinary services received	Frequency	Percentages
Vaccinations	46	30.67
Diagnosis and medication	20	13.33

The farmers faced a number of constraints but the greatest of all is disease incidence at 88%, which is responsible for the biggest percentage of mortality among the birds (Ondwassy *et al*., 1999; Moreki *et al*., 2010; Ondwassy *et al*., 1999). This is observed in Table 8. In Table 7 where only 46% of the farmers vaccinated their birds and this could have been a reason for the high disease incidences. They found out that disease

risks are high in free-range systems as birds are left to freely room and mix with other flock. This is recognized as a major constraint in smallholder indigenous chicken production.

Table 8: Production variables affecting the smallholder indigenous chicken farmers

Production Constraints	Frequency	Percentage
Disease	132	88
Theft	38	25.33
Predators	33	22
Housing	17	11
Feeding	33	22
Expensive drugs	16	10.67
Lack of extension	6	4
Inadequate capital	2	1.33

The constraint that was mentioned least (at only 1% of IC farmers) was inadequate capital. This was indeed not surprising since the farmers tend to let the indigenous chicken scavenge on their own with less feed supplements. If the supplements are provided at all, they are majorly from own production and may not provide the required nutrients. In addition to this, veterinary services like vaccination, which are supposed to act as a preventive measure for diseases and involved the farmer incurring costs are rarely carried out, as farmers believe that these birds are hardy and can survive on their own. Very little is incurred in medication and if provided, most farmers do not provide the adequate dose as they say the medications are too expensive. Therefore, the farmers lose many birds, which not only limit their participation in the market but also reduce the value of sales.

4.2 Comparison of characteristics between market participants and non-participants

The results for the participants and non-participants in the market and for the pooled sample are shown in Table 9. From the results, 126 were market participants while 24 were non-participants.

Table 9: Comparison of characteristics between indigenous chicken market participants and non-participants in Gulu District

Variable name	Mean		Mean difference	Pooled(N= 150)
	Market participants n=126	Non- participants n= 24		
Nonfarm income (UGX)	130,793.7 (15145.4)	49,541.67 (16620.50)	-81,251.9 (35523.94) **	117,793.30 (13206.92)
Distance off farm (KM)	11.51(7.9)	2.33(1.58)	-9.18(18.21)	10.05(6.66)
Flock size	12.01(0.60)	8.25(1.58)	-3.75(1.73) **	11.41(0.64)
Indigenous chicken trading experience (Years)	7.07(0.60)	7.14(2.40)	0.07(1.84)	7.09(0.67)
Education of Household Head (Years)	6.14(0.03)	5.74(0.56)	-0.42(0.78)	6.10(0.29)
Household-Size	6.71(0.20)	6.38(0.44)	-0.33(0.63)	6.65(0.23)
Age of Household Head (Years)	40.73(1.10)	38.60(1.15)	-2.06(2.97)	40.40(1.08)

Note: Numbers in parentheses are standard errors; ** imply significance at 5%

The other characteristics such as distance to the market, indigenous chicken trading, trading, education, household size and age were not significantly different for the market participants and non-participants. The average distance to the market for the pooled sample was 10.5 km while the mean flock sizes were 11chiken per household.

The average age of the farmers was 40 years with a household size of approximately 7 people in a household. The average years of education for the farmers were 6 years with trading experience of at least 11 years. These are represented in Table 9

Chi2 tests for both market participants and non-participants were also run and the results are reflected in Table 10.

Table 10: Chi2 results comparing market participants and non-participants

Variable	Chi 2 value
Number of extension visits	6.6993(0.082)*
Interaction with University	5.0139(0.025)**
HH_ Sex	2.0089(0.156)
Marital status	3.7462(0.290)
Business plan	0.3861(0.534)
Business registration	0.5831(0.445)

Note: Numbers in parentheses are standard errors; ** and * imply significance at 5% and 10% respectively

The chi2 results revealed that there was a significant difference in the number of extension visits (10%) and interaction with the university (5%). The market participants had more extension visits than the non-participants had and interacted with the university. The extension visits and interaction with the university is a way of information access and hence reduces information costs. Information costs are often considered fixed transaction costs that influence market entry decisions (e.g. Goetz, 1992, Omamo, 1998, and Vance and Geoghegan, 2004).There is no significant difference in the household sex, possession of a business plan and business registration status between market participants and non-participants.

In conclusion, the null hypothesis that there is no mean difference in variables between indigenous chicken market participants and non-participants is rejected for non-farm income and flock size. However, the same null hypothesis is not rejected for

the variables of distance to market, trading experience, education level, household size, and age.

4.3 Determinants of market participation decision by indigenous chicken farmers in Gulu District

Results of factors affecting market participation decision of indigenous chicken are presented in Table 11. Results show that; ownership of a bicycle, flock size, age, distance to the market significantly affected the households' decision to participate in the market.

Table 11: Results of the probit model for market participation by smallholder indigenous chicken farmers in Gulu district

Variable Name	Probit coefficients (N=150)	Marginal effects
Bicycle ownership	1.923(0.711) ***	0.138(0.511) ***
Car ownership	0.845(0.992)	0.096(0.112)
Motorcycle ownership	1.472(0.963) *	0.121(0.069) *
Indigenous chicken trading experience	0.046(0.027) *	0.006(0.003) *
Flock size	-0.104(0.064)	-0.013(0.008)
In distance to market	1.549(0.396) ***	0.191(0.073) ***
Log flock size	-15.536(7.487) *	-1.914(1.042) *
Dummy Laroo	0.162(0.882)	0.018(0.088)
Dummy Bobi	-0.952(0.429) **	-0.145(0.076) **
Age	-0.039(0.019) *	-0.005(0.002) *
HH _Size	0.004(0.071)	0.0003(0.007)
Education of HH	-0.091(0.065)	-0.008(0.006)
Nonfarm	3.65e-06(2.20e-06) *	3.40e-07(0.000) *
Log likelihood	-29.43	
Wald chi-square	261.74***	
Pseudo R^2	0.55	
Prob.>Chi^2	0.0000	

Note: Figures in parentheses are standard errors; ***, **, * imply significance at 1%, 5% and 10% respectively; Na = not applicable

All the variables assumed their predicted signs apart from age and distance to the market that assumed a negative sign instead of the predicted positive sign. Household size, education, ownership of a bicycle and experience in I.C trading did not

significantly affect the households' decision to participate in the market. From Appendix 2, the probit model fit the data well with a 92.67% correct prediction for both market participants and non-participants. The Wald test for the hypothesis that all regression coefficients are equal to 0 was highly rejected. It can also be observed that the likelihood ratio statistics as indicated by chi-square statistics are highly significant (1%), suggesting the model had a strong explanatory power.

Ownership of a bicycle was found to significantly affect market participation decision (1%). If a farmer owned bicycle, their probability of participating in the market was increased by 13.8%. The reason might have been the low transportation costs by the farmer in travelling to the market. This finding is consistent with the finding of Olwande and Mathenge (2010) that ownership of transport equipment was significantly associated with agricultural market participation among poor rural households in Kenya.

The distance to the preferred marketing channel was positively and, significantly correlated to the probability of selling indigenous chicken. Hence, the partial effect of a unit increase in distance on the conditional probability of selling indigenous chicken was 1.549. This means that with each unit increase (1 km) in distance, the probability to sell increased by 19.1%. Thus, this finding suggested that households, which are closer to market outlets, are less likely to sell their indigenous chicken than those households living further away are which contradicts the a priori expectations. The findings about the significant effect of distance to market in this study is not in tandem with empirical findings of Bartha and Bauer (2007); Gebremedhin *et al*., 2015. Fletschner and Zepeda (2002) also observed that farmers with access to village

market arrangements usually produce and sell more than their colleagues with no such opportunities sell.

The flock size was found to be significant (10%) in influencing the farmers' decision to participate in the market. Output was expected to positively influence the probability and the intensity of market participation. The more the output the more the farmer is able to generate marketable surplus for participation. The result is consistent with the findings of Negassa and Jabbar (2008) in the highlands of Ethiopia, and Bellemare and Barret (2007) for the pastoral regions of northern Kenya and southern Ethiopia

Bobi dummy for sub-county was found to negatively and significantly affect participation (5%). Being in Bobi would reduce the farmers' probability of participating in the market by 14.5%.

The variable age was found to negatively affect the decision to participate (10%) due to its marginal diminishing effect on production as it rises hence giving a confirmation to the lifecycle hypothesis. An increase in age by one year reduced the probability of participating in the market by 0.5%. The older part of the population found it hard to move to the market due to the relatively long distances to the market place if these people did not have the means of transport so they would end up selling at the farm gate, which offered very low prices, and therefore this discouraged them. On the other hand, Enete and Igbokwe (2009) argued that younger heads were more dynamic concerning adoption of innovations both in terms of those that would enhance their productivity and enhance their marketing at a reduced cost. Randela *et*

al. (2008) also observed that younger farmers were expected to be progressive, more receptive to new ideas and to better understand the benefits of agricultural commercialization.

In summary, the hypothesis that market participation decision of indigenous chicken farmers is influenced by: flock size, ownership of transport means, distance to the market, indigenous chicken trading experience, and other socio-economic factors is rejected for car ownership, dummy Laroo, education, and household size but the same hypothesis is not rejected for bicycle ownership, motorcycle ownership, flock size, distance to the market, indigenous chicken trading, non-farm income, age, and other socio-economic variables.

4.4 Factors affecting the value of poultry sales

Results of factors affecting the value of sales dependent on the first positive decision are presented in Table 12. The flock size, distance to the market, price of birds and age of the farmer were found to significantly affect the value of indigenous chicken sales.

The age of the household head was found to negatively and significantly, (10%) affect the value of poultry sales. Being older reduced the value of poultry sales by 858 UGX. This could have been because as the farmers' age increases, their ability to move to the market place decreased and most of them ended up selling at the farm gate where the price paid per bird is far lower than what could be offered at the market

Table 12: Results from the OLS regression of value of sales for indigenous chicken farmers in Gulu district

Variable Name	OLS-Regression	OLS-Regression (Robust standard errors)
Flock size	2290.6(728.9) ***	777.78
Laroo Dummy	-25934.6(18759.9)	19607.28
Bobi Dummy	-37029.5(20912.6) *	20736.91
HH _Female Dummy	-8042.4(12470.5)	13127.76
Sources _market info(radio)	-17085.4(14170.2)	14458.14
Sources _market info(peers)	20607.8(12029.9) *	11555.77
Sources _market info(traders)	3734.0(10900.9)	10455.77
Extension2	16942.1(11716.3)	10749.17
Distance to the market L	67142.1(22099.9) ***	23138.02
HH _ Size LL	-71194.3(82597.5)	79911.88
Price _Hens	2.41(0.89) ***	0.7422
Price _Cocks	4.18(0.68) ***	0.7420
Price _Growers	4.35(1.31) ***	1.448
Trading log	70250.01(221968.8)	168029.2
IC Trading experience log	158485.4(221968.8)	255019.2
Age of HH	-858.6(511.5) *	425.68
Education of HH	704.4(1617.2)	1594.2
HH _Size	2609.1(4619.8)	3520.59
Nonfarm Income	-0.06(0.39)	0.048
Market _dues	-6.1(9.81)	9.743
Invmills	22140.5(15376.9)	9793.89

Note: Figures in parentheses are standard errors; ***, **, * imply significance at 1%, 5% and 10% respectively; Na = not applicable

The price of Indigenous Chicken (hens, cocks and pullets) was found to positively and significantly (1%) affect the value of poultry sales. The results showed that a unit increase in the flock size (hens, cocks, and pullets) caused the value of sales to increase by 2.41, 4.18, and 4.35 UGX respectively. In a related study, Enete and Igbokwe (2009) found that price had an important influence on the level of farmers' market participation in cassava markets which is supported by economic theory that price induces increased supply. Omiti *et al*, (2009) also asserted that better output price was a key incentive for increased sales in the market.

Flock size and distance to the market was found to positively and significantly (1%) affect the value of poultry sales. That is for every unit increase in the flock size, the

value of poultry sales increased by 2,290.6 UGX. It was also observed that, the further the distance to the market the more the value of poultry sales increased. That is for each unit (1 km) increase in distance, the value of sales increased by 67,142 UGX. This could probably be due to larger flock sizes of I.C owned by farmers in the outcasts of town. This finding contradicts other studies such as Key *et al*. (2000), Makhura et al. (2001) that distance to the market negatively influences both the decision to participate in markets, and the proportion of output sold. Therefore, when the point of sale is far, it will be expected to negatively associate with the intensity of participation to households who sold in market centers.

Location in Bobi was found to negatively and significantly, (10%) affect the value of indigenous chicken sales. The value of sales of indigenous chicken for farmers in this sub-county was reduced by 37,029.5 UGX. This is because of the long distance to the main Gulu town market for those farmers located in Bobi sub-county. This long distance increases the transport costs and thus reduces the value of indigenous chicken sales.

Receiving information from the peer farmers positively and significantly (10%) increase the value of poultry sales 20607 UGX. While receiving information from traders though had a positive coefficient, did not significantly affect the value of poultry sales. This showed that the information received from fellow farmers could have been more informative than that from traders and the radio.

Education, household size, experience in trading and extension though not significant had a positive coefficient on the value of sales of indigenous chicken as predicted by

the a priori expectations. Finally, according to the model output, the IMR or selectivity bias correction factor was found to be positive, but had no statistical significance on the value of indigenous chicken sales. This therefore suggests that there were no unobserved factors that affected both probability of market participation and value of indigenous chicken sales by smallholder indigenous chicken farmers

The value of sales for indigenous chicken is influenced by age of household head, distance to the market, price, sex of household head, household size and other socio-economic variables is rejected for the variables household head female dummy, household size, and education level of household head, non-farm income, Laroo dummy, Extension visits, indigenous chicken trading experience. However, the same hypothesis is not rejected for age of household head, flock size, Extension, Laroo dummy, sources of market information radio and price.

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

Indigenous chicken play an important role in the livelihoods of the rural poor in developing countries. They act as a source of nutrition and supplement household incomes. Despite the tremendous market opportunities available for the farmers, there are still low levels of commercialization of the indigenous chicken. This study aimed at establishing the factors affecting market participation and the value of indigenous chicken sales in Gulu district.

A multi-stage sampling procedure at three levels involving a purposive selection of Laroo division, Unyama, Bobi Sub-counties and a random sample of 150 household respondents rearing indigenous chicken was implemented. The cross sectional data from the household survey were entered in SPSS and analyzed using STATA software to generate descriptive statistics of the socio-economic characteristics of the respondents. In addition, a two-stage Heckman model was used to model the decision to participate and determine the factors affecting the value of sales thereafter.

The descriptive statistics showed that there were 126 market participants and only 24 non- participants. Both the flock size and the non-farm income differed significantly between market participants and non-participants (5%). The participants had a larger flock size while non-participants had more income. The results further revealed that for the selection model market participation was significantly affected by the distance of the household to the market (1%), flock size (10%) and ownership of a bicycle

(1%). While in the outcome model; flock size, distance to the market and market price significantly, (1%) affected the indigenous chicken farmer's level of market participation. Therefore, creation of effective marketing systems of the indigenous chicken and provision of extension and veterinary services will not only increase the numbers being kept by the smallholder farmers but also the value of sales of indigenous chicken for the farmers that participate in the market.

5.2 Conclusion

Indigenous chicken production could be a significant livelihood activity for smallholder rural poor farmers in Gulu district. Traditional management systems were predominant with low productivity. Hence this production system can be categorized under low-input low output production system.

The results also show that market participation of indigenous chicken farmers is high with more than 80% of the population participating in the market. However indigenous chicken production still remains low with very low numbers of birds (Appendix 2) kept by farmers because most farmers are not yet aware of its profitability and as a result of this, the farmers give it less attention.

Age variable is also significant in determining the decision of households to participate in the market, but this shows a negative relationship with the participation decision and thus indicating diminishing marginal returns to participation. This is consistent with the life cycle hypothesis because as producers grow older, they experience increasing returns to participation because they establish contacts, gain experience, and cut down on search costs. However, as they grow older, and get past their active productive life, production reduces and so does market participation

Household income that can be seen as wealth has a positive significant effect on the decision of smallholder I.C farmers to participate in markets. Wealth helps farmers in breaking market entry barriers, as households must be above a minimum income threshold to participate in a market.

Results also revealed that once a smallholder farmer decides to enter the market to sell, household characteristics, and farmer endowments are the key factors that influence how much will be sold into the market. Factors such as distance to the market, flock size, price of birds, and information from peers were all found to positively and significantly affect the value of sales. While age and sub-county turned out to significantly in a negative way, influence the level of market participation in form of how much was sold.

5.3 Recommendations

5.3.1 Policy recommendations

Promotion of collective action among smallholder farmers through creation of farmer groups or cooperatives could help them attain the inputs and information needed to carryout production cheaply. This is because group membership is a proxy to social capital that helps farmers reduce transaction costs and is a good avenue for farmers to receive information.

Diversification of income sources is important. This helps the farmer to avoid costs that may arise in them trying to participate in the market. For example the farmer is able to pay for costs such as transport and also information search costs and hence can overcome the barriers to market entry that their counterparts with no other source of income. As if this is not enough, there is also need to not only focus on price

incentives but also turn focus to farmer characteristics as well as market access factors. Farmer characteristics are a necessity because the more birds a farmer has, the more the motivation to participate in the market but also the greater the value of sales the farmer would attain.

5.3.2 Research recommendations: Areas for further study

Research on value chain, profitability, and gender issues should be carried out for smallholder indigenous chicken farmers to establish how these affect production and marketing of indigenous chicken. Targeting specific segments in the value chain and establishing upgrading strategies for the indigenous chicken value chain could be an important aspect of making indigenous chicken more productive.

More research on the indigenous chicken is also required in order to improve the breed and make it more productive than it is now. Since flock, size is very crucial in not only influencing the farmers' decision to participate but also the value of sales if the farmer participated in the indigenous chicken markets.

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GULU UNIVERSITY

FACULTY OF AGRICULTURE AND ENVIRONMENT

DEPARTMENT OF RURAL DEVELOPMENT AND AGRI-BUSINESS

Determinants of market participation of Indigenous chicken farmers in Gulu District

Questionnaire Number……Name of interviewer……

I Akidi Irene Lynette, an MSc student in Agri-Enterprises Development at Gulu University am conducting a study focusing on indigenous chicken with the aim of establishing the factors affecting market participation of indigenous chicken farmers and the value of poultry sales in Gulu District. You have been selected to participate in this study and your responses will only be used for purposes of this study. I kindly request for your candid responses and i pledge to treat them with strict confidentiality and for academic purposes only

1. **SOCIO-ECONOMIC CHARACTERISTICS**

1.1 Name of Respondent: ……1.2 Marital status of respondent…….

1.3 Sex of respondent…….1.4 Parish……

1.3 Sub County: ……1.4 District: ……..

1.5 Age of household head…..…1.6 Sex of Household head……1.7 Household Size: …….

1.8 Years of education of household head……years

1.9 Trading Experience (Years)……..

1.10 Experience in Indigenous chicken Trading …….. (Years)

1.11 What primary activity are you engaged in? (A) Formal monthly salary (B) Private business (C) Others specify……...

1.12 What is your monthly non farm income……...

1.13 Business Registration status: (A) No formal Registration (B) Sole proprietor (C) Cooperative/ partnership (D) Company

1.14 What kind of business plan do you have? (A) No formal business plan (B) Written Business plan

1.15 Have you ever interacted with students or staff from Gulu University? (A)Yes (B) No

If yes, how many times? .....

1.16 A part from University staff and students, do you receive any other extension visits?

A) Yes B) No

If yes, how frequent are they? .....

1.17 Which kind of information have you received? (Please tick where appropriate)

Information about new market trends	**About market requirements (e.g. quality standards)**	**About new technologies and methods**	**Pests and diseases**	**About costs and prices**

1.18 Is this information relevant in any way to your indigenous chicken? (A) Yes (B) No

1.19 If yes, in what aspects? .....

2.0 PRODUCTION CHARACTERISTICS

2.1 What type of chicken do you rear? 1. Indigenous chicken 2. Broilers 3. Layers 4.kuroilers

2.2 If you rear indigenous chicken, what system are you using?

1. Free range system 2. Semi-intensive system 3. Deep litter system

2.3 How many IC do you have? .....

2.4 If you had chicken last year, how many were;

1. Cocks? .....

2. Hens? .....

2.5 Do you feed the IC on supplements? (A) Yes (B) No

2.6 If yes, what is the source of these supplements? (A) purchased (B) Produced on farm

2.7 Specify in the table below the feed type, quantity bought, price of feed

Feed type	**Quantity purchased**	**Price / kg**

2.8 What is the name and distance to where the feeds are purchased?

.....

2.9 If it's from own production what type of feeds are given?

……

And in what form are these provided? .....

2.10 Provision of water?

A. Yes B. No

2.11 If yes, what kind of drinkers do you use? …….

2.12 What problems do you face during your indigenous chicken production?

……

……

2.13 Do you receive any veterinary services on IC? (A)Yes (B) No

2.14 If yes, what sort of services?

2.15 If you carryout vaccinations, what is the frequency and cost of the vaccines? ……..

3.0 Market efficiency

3.1 Do you belong to a farmer group or cooperative?

3.2 If yes, what are the primary activities of the farmer group or cooperative? ……

……

…….

3.3 Did you sell IC in the last one year? (A)Yes (B) No

3.4 If yes, who makes the decisions to sell? .....

3.5 Who controls the proceeds from the sales? ……..

3.6 If No, what are the reasons?

……

……

……

……..

3.7 If yes, please specify in the table below the products sold, quantities and the respective unit prices

Indigenous Chicken and Chicken products sold	**Average Quantity sold within 1 year**	**Unit Price**

3.8 What was your selling point? (A) Farmstead (B) Off-farm

3.9 What is the price of IC and IC products sold at the farm gate?

IC or IC products	**Unit price**

3.10 If it were off farm what is the name and distance to the selling point? …….....

3.11What is the market dues charged at the market place? …….

3.12What means of transport did you use?

(A) Sell from home (B) Carry by hand (C) Bicycle (D) Bodaboda (E) vehicle

3.13 Do you own the above means of transport? A) Yes B) No

3.14 Rate the road condition to the selling point

(1) Excellent (2) Very good (3) Good (4) Poor (5) Very poor

3.15 Do you easily find buyers for your IC? A) Yes B) No

3.16 If no, what are the reasons……

3.17 What are the sources of market information for IC?

.....

.....

.....

3.18 In the table below, please rate the following information sources in marketing your IC

Peer farmers	**Traders**	**Extension agents**	**NGOs**	**Radio**	**University**	**Phones**

(Criteria: 0 = not useful, 1=little usefulness, 2 = moderately useful 3 = Useful 4. Very useful)

3.19 What is the nature of relationship between you and your buyer(s)

O Formal contract O or verbal agreement

O Buyer dictates the terms O or equal rights relationship

O You can easily find another buyer O or you are bound to a particular buyer (for various reasons)

O You are satisfied O or not satisfied with the business relationship

Thank you for your cooperation. God Bless You

Appendix 2: post estimation commands

Probit model for Sell_IC1, goodness-of-fit test

Number of observations = 150

Number of covariate patterns = 143

Pearson chi2 (126) = 261.74

Prob> chi2 = 0.0000

estatclassif test was also done to find out how well the predicted values fit the model and the results are also given below;

Probit model for Sell_IC1

	True		
Classified	D	~D	Total
+	122	7	129
-	4	17	21
Total	126	24	150

Classified + if predicted Pr (D) >= .5

True D defined as Sell_IC1! = 0

Sensitivity	Pr (+ |D)	96.83%
Specificity	Pr (- | ~D)	70.83%
Positive predictive value	Pr (D | +)	94.57%
Negative predictive value	Pr (~D| -)	80.95%

False + rate for true ~D	Pr (+|~D)	29.17%

False - rate for true D Pr (-| D) 3.17%

False + rate for classified + Pr (~D| +) 5.43%

False - rate for classified - Pr (D| -) 19.05%

Correctly classified 92.67%

Correlation tests

corr HH_Size Education Trading ICTrading Nonfarm Valueeggs valuecocks Valuehens Val

> uepullets numberofbirds

(obs=150)

| **HH_Size Educa~on Trading ICTra~ng Nonfarm Valuee~s valuec~s**

HH_Size | 1.0000

Education | -0.0664 1.0000

Trading | 0.2999 -0.0581 1.0000

ICTrading| 0.1528 0.0000 0.7861 1.0000

Nonfarm | -0.1625 0.1436 0.0031 0.1075 1.0000

Valueeggs | 0.0818 0.2011 0.0403 0.0324 0.1645 1.0000

valuecocks | -0.0480 0.0165 -0.0497 -0.0755 0.0802 -0.0923 1.0000

Valuehens | 0.0218 0.2378 0.0045 -0.0269 0.2305 -0.0333 0.4499

Valuepullets | 0.1509 -0.0417 0.1267 0.1000 0.2654 0.2044 -0.0779

numberofbi~s | 0.0336 0.0184 -0.0249 -0.0980 0.0195 -0.0365 0.3945

| Valueh~s Valuep~s number~s

----------+----------

...Valuehens | 1.0000

Valuepullets | 0.0315 1.0000

numberofbi~s | 0.0471 -0.0145 1.0000