

Determinants of Market Participation Performance among Poultry Product Producers: The Case of Lemo District of Hadiya Zone, Southern Ethiopia

Nuri Lefebo Toramo (PhD)
Assistant professor, Wachemo University, Ethiopia

Abstract

In the study area, poultry products have been perceived to have high market value. Despite poultry products market value, determinants of poultry products market participation has not been studied and quantified. Therefore, this paper aims to assess determinants of market participation performance among poultry producers. The data were generated by individual interview and group discussion using pre tested semi structured questionnaires and checklist. Heckman two stage econometric model was used to investigate factors affecting production and market participation of poultry products and volume of production and market supply. The volume of poultry products produced was found to be the most important and significant variable influencing the decision to participate in poultry product market positively. However, distance from the market and the level of education affected poultry product market participation negatively. Moreover, the volume of poultry products produced and market price information are the significant determinant factors of the quantity of poultry products supplied positively. However, distance from the development center and education level was found to be negatively related. The channel analysis indicated a very short route as compared to other agricultural commodities. The main market participants for poultry market were found to be farmer traders, urban retailers and super markets. Besides mini markets, all actors involved in poultry marketing were market participants for egg also. The commercial behavior of farmers can be enhanced by the policy makers acting on those factors which influence market performance and availing timely market price information.

Keywords: poultry producers, Heckman two-stage model, market participation, Ethiopia.

1. INTRODUCTION

Livestock plays an important role in Africa and contribute on average 35 up to 80 percent of agricultural GDP in some sub-Saharan Africa countries. It is also estimated that more than 70 percent of the rural poor depend on livestock as a component of their livelihoods (FAO, 2000). Ethiopia has the largest livestock resource in the African countries. It has an estimated 42 million cattle, 15 million sheep, 14 million goats, and 7 million pack animals, 56 million poultry birds which exists in private holdings (CSA, 2007). Of the total chicken population in Ethiopia, local chicken constitutes about 94% of the total poultry population (CSA, 2007).

In developing countries, many rural households keep poultry in their farmyard. Poultry keeping that is practiced by rural households using family labor is referred to as village poultry keeping. This practice is also called rural poultry or rural family poultry. In most developing countries, village poultry makes up the largest proportion of the national poultry population (Sonaiya *et al.*, 1999; Gueye, 2000). In Ethiopia, rural poultry represents a significant part of the rural economy in particular and of the national economy in general. Besides the provision of employment and easily disposable income for small-scale farmers, rural poultry integrates very well into other farming activities as it requires relatively little time and investment (Hailemariam *et al.*, 2006).

Poultry are important providers of eggs and meat as well as being valued in religious and cultural life (Hailemariam *et al.*, 2006). Despite this, per capita chicken meat consumption in the country is reported to be about 2.85 kg per annum (Alemu and Tadele, 1997). Chicken meat consumption is more common in urban areas than in rural areas. The poor rural farmers produce chickens and sell them to earn cash that is required for various household expenses. There is a growing demand for chicken meat in urban areas due to substantial increase in the price of beef and mutton. Therefore, in the near future, chicken meat production is likely to play an increasing role in supplying animal protein for human consumption in the country. Chicken meat is relatively cheap and affordable source of animal protein (Alemu and Tadele, 1997). However, at home and restaurants chicken dishes are more expensive than other dishes constituting beef and mutton probably due to the way chicken dishes are prepared.

In the study district, in Lemo, poultry production is widely practiced by rural smallholder farmers. Individual households keep few flocks of chickens at home with minimum management and inputs. This type of production is the dominant poultry production system and the dominant supplier to the market. In urban and peri-urban areas, modern small and large scale poultry farms are currently flourishing. Some of the farms were established to produce eggs for commercial purposes and such farms dispose culled chickens (layers) through local markets. there are farms, which supply chicken and eggs to the vicinity and the Addis Ababa market, mostly to restaurants and super markets.

In the study area, the production of poultry is constrained by so many natural and socio economic factors. As a result, the variation in its supply on rural and urban market is considerable. Further more poultry marketing channels and their characteristics have not yet been studied and analyzed for different parts of the country, especially Lemo district in Hadiya zone, which has a huge potential in developing household and commercial poultry keeping.

In order to have a proper functioning marketing forces for economic development, it requires a critical evaluation of the existing marketing system, introduction of appropriate marketing policies and procedures with the aim of conceiving and formulating practically workable solutions to the marketing problems. Introduction of appropriate marketing policies and procedures calls for an understanding of whether the system is performing well, identification of constraints and problems that require solutions. To ascertain whether these policies and procedures are able to promote efficiency or equity, there is a need to evaluate and control the existing marketing system (Harrison *et al.*, 1974 cited in Alemayehu, 1985). Consequently, a detailed knowledge of the markets and marketing system is extremely relevant (Goletti and Tsigas, 1995). Aklilu (2007) also emphasized that poultry research and development is not only about animal scientists finding technical solutions but also it involves addressing livelihood issues which require social science oriented studies. This study has the purpose of investigating the poultry marketing channels and factors affecting poultry supply. This helps in reducing the information gap on the subject and contributes to understand the marketing system to design appropriate strategies to develop the sub sector.

2. LITERATURE REVIEW

Poultry Production Systems

Poultry production systems in Ethiopia show a clear distinction between traditional, low input systems on the one hand and modern production systems using relatively advanced technology on the other (Alemu, 1995).

Village Chicken Production System

Farmyard poultry production in Ethiopia is practiced by virtually every rural family other than the nomadic populations Alemu (1995). According to Sonaiya and Swan (2004) the definition of village or family poultry production system is an enterprise or subsystem producing eggs and meat. Village chicken production systems are characterized as (a) mostly an indigenous integral part of the farming system with short life cycle and quick turn over (b) low-inputs production systems with accessible at both inter household and intra household levels (c) a means of converting unusable protein to high quality proteins.

The most dominating poultry production system in rural areas of Africa is extensive system based on the local indigenous types and relying on scavenging feeding systems. The term village chicken describes scavenging-chicken because it reflects the effect of the village socio-economic, biophysical-environments, the production and health status of chicken. The human settlement pattern, communal housing of chicken, exchange of live chicken and chicken products affect production performances, breeding pattern and disease epidemiological status of village chickens Kitanyi (1998). Sonaiya (1990) and Sonaiya and Swan, (2004) classified village chicken into 3 different systems like the free-range system (poultry are roosted on trees at night), backyard (poultry are confined at night), small scale intensive systems (poultry are enclosed during the day in a very limited scavenger resources) depending on resources such as housing, feed and health care.

The village chicken production system in Ethiopia followed the primitive type with 5-20 birds per households, simple rearing in backyard with inadequate housing, feeding and health care. Such production systems may result in slow growing, and poor layers of small sized eggs. Village chickens however are ideal mothers, good sitters, hatch their own eggs, excellent foragers and have immunities to resist common poultry diseases. These traits are of great importance as the farmers cannot purchase expensive concentrate feeds and incubators, which at the moment are considered as necessary for raising exotic breeds (Tadelle, 1996 and Amsalu, 2003).

The first critical step for rural poultry production development is the encouragement and support of farmers to change their traditional production systems. Selection of pilot-farmers as model as to be given extension services they can have multiplier effect on the neighboring farmers and villages Sonaiya and Swan (2004). Barua and Yashinbura (1997) from Bangladesh stated that rural poultry rearing is an extremely cost effective enterprise for the farmers because there is little or no financial inputs. A study made in some South Asian countries indicated that although women carry out the leading role in the activity related to livestock and poultry rearing, they gain less access to training programs on poultry production improvement techniques than men. As a result, an attempt to improve productivity in rural poultry farming could not be possible. The role of village leadership in rural areas is also important and if the leadership is innovative and risk taking, it is easier for extension agencies to make technological improvement in rural poultry production (Prabakaran, 2003).

According to reports of Sonaiya *et al.* (1999) and Tadelle *et al.* (2003), village households in tropics like Ethiopia keep their chicken for purposes other than for reproduction, sale and consumption. They keep for religious factors, gifts, for ceremonies and chicken are given to show a good relationship or to say thanks for

favor. The plumage color, sex, comp-type, feather cover and age are very important for religious factors as to the commitment of an individual for a particular spiritual being or cosmic forces.

Modern Poultry Production System

Modern poultry production started in Ethiopia about 30 years ago, mainly in colleges and research stations. The activities of these institutions focused on the introduction of exotic breeds and their distribution to farmers along with appropriate management, feeding, housing and health care packages. There are a few private modern production farms around Addis Ababa city. Some state-run poultry multiplication centres have been established, they are about seven in number whose objective is to distribute high-grade improved exotic breeds of chickens to farmers through out the country. Though the contribution of the commercial intensive poultry farms to the national GDP is insignificant, their role from the point of introducing the exotic breeds in the country could be very high (Tadelle *et al.*, 2003).

Contrary to the backyard farming, the system in large and small-scale intensive farms is mainly dependent on imported exotic breed that requires high input in terms of feed, housing and sanitation. ELFORA, Alema and Genesis Farms are the three most important large scale farms in Ethiopia, all located in Debre Zeit, Oromiya Regional state. ELFORA annually delivers around 420,000 chickens and over 34 million eggs to the markets in Addis Ababa. Alema Farm is the second a huge enterprise delivering nearly half a million broilers to Addis Ababa market every year. It has its own parent broiler stock from Holland; feed processing plant, hatchery, slaughtering, cold storage and transport facility at its sites of operation. Genesis farm is the third most important private poultry enterprise with over 10,000 layers and its own parent layer stock and hatchery (MoARD, 2005).

The Role of Poultry Production

Poultry production in Ethiopia makes a significant contribution to the national economy in general and the rural economy in particular, representing 98.5% and 99.2% respectively, of the national egg and poultry meat out puts (AACMC, 1984), with an annual output of 72,300 metric tones of meat and 78,000 metric tones of eggs (ILCA, 1993). Despite the huge population, the national income derived from this sector of farming is extremely low. In expressing the contribution of village chicken, Tadelle and Alemu (1998) indicated that in a country like Ethiopia, chicken keeping could have a tremendous contribution to meet the animal protein requirement of the people. The per capita egg and chicken meat consumption in Ethiopia was reported to be about 57 eggs and 2.85 kg of chicken meat per annum (Alemu, 1987) particularly in poor households both poultry meat and eggs are affordable sources of protein and cash income. Rearing chickens have several advantages; it fits quite well to the condition of poor households. Due to their requirement of small feed, space and the low cost of the animal make poultry rearing a suitable activity for the poor. Poultry products are highly market-able and poultry rearing as a business has high turnover rates. However, as reported by Kenea *et al.* (2003) efficient marketing system is one major component to increase village chicken contribution to the rural household economy.

Although local chickens appear very hardy and extremely well adapted to the local environmental conditions such as heat, cold, rain and periodic feed shortages, the birds have low body weight, low egg production potential and slower growth rate. Brannang and Pearson (1990) reported 1.5 kg for the indigenous cockerel and 1.2 kg for the hen body weight. Also the egg productivity is reported to be as low as 30-60 eggs per year. Despite the low meat and egg production potential of the local chickens, the product (chicken meat and eggs) is preferred over exotic chickens and is considered as delicious by the local people. Furthermore, poultry is an ideal livestock for smallholders because of the small individual requirement for feed, water and other production inputs. This is possibly the reason why the rural poor farmers have persistently kept these birds over the years. The productivity of scavenging poultry has always remained poor due to numerous constraints. These include extremely high mortality due to diseases and predation, poor feeding, poor housing and marketing constraints (Mukiibi- Muka, 1991). By and large, indigenous chickens (where they still exist) are important reservoir of genetic resources that may be used in the future to produce hybrid birds that can better adapt to the environments where they are kept (Kusina and Kusina, 1999). Besides, chickens have an important role in increasing household food security and income, as well as increasing gender equity. The management of chickens can easily be combined with other activities because of the proximity of the chickens to homesteads. Chicken products are among the few agricultural products directly accessible to women in rural areas. Increased food production from chickens will improve household food security. Chicken production is not strongly linked to land resource, which is one of the main production constraints among the disadvantaged members of the community (Bradley, 1992).

It has also been observed that poultry are low on resource demand as compared to other livestock production system (Katelaars *et al.*, 1992). Therefore, in heavily populated areas where there is difficulty to sustain agronomic activities, subsistence poultry can form the best alternative for income generation and, especially smallholder poultry provide a good opportunity to address poverty alleviation. Many rural households continue to raise indigenous breeds in their backyard in most developing countries. The backyard poultry units, though not the main income generator for rural producers, are called 'Walking banks' because their products are sold to meet emergency expenses. Furthermore, they contribute substantially to the family's food and nutrition

(Balakrishnan, 2004). In the near future, it is predicted that there will be a greatly increased and continuing demand for protein foods for human consumption in most developing countries (Delgado *et al.*, 1999). According to Alemu (1995) and Tadelles and Ogle (1996) poultry production as practiced in Ethiopian villages, is based on low inputs and outputs and is part of a system which has come to be known as balanced farming. Moreover, the rearing of poultry is one of the most appropriate activities for rural women and for landless and farmers whom it provides an income. It also generates employment opportunities for the poor and at the same time increases the overall supply of high quality animal protein to the community. This is particularly true in Ethiopia because there are few alternative animal protein sources available to the population, and no cultural or religious taboos of any kind relating to the consumption of eggs and poultry meat, in contrast to pig meat. Furthermore, poultry are the only affordable animals to be slaughtered for consumption for the resource-poor farmers. Unfortunately, traditional ways of poultry production in the country are characterized by small flocks with (7-8) mature birds, minimal inputs, low outputs and periodic devastation of the flocks by disease (Tadelles, 2003).

Moreover, the practice of planning and developing small-scale poultry production in Ethiopia is beset by many problems. Apart from the practical problems encountered by the farming community and conceptual problems visualized by professionals in the field, policy makers, extension workers, researchers and private investors have limitation of information on the poultry husbandry practices and productivity of chickens in the different regions of the country. For this reason, the mode of production of the peasants in the rural area of the country is subsistence oriented (Fikre, 2001).

Market Supply

Commercialization of agriculture is widely recognized as central to rural development and poverty alleviation, yet in many developing countries the process has stagnated (Dixon *et al.*, 2001; World Bank, 2005). Sluggish response to policies favoring commercial crop production has been explained by factors including input and financial market imperfections, high transaction costs, poor infrastructure, and risk aversion of farmers (Dorward *et al.*, 1998; World Bank, 2005). Another possible contributor to disappointing supply response that may interact with other factors is the role of heterogeneous incentives, resources, and preferences within households. Both the feasibility and desirability of commercialization depend in part on the distribution benefits within the household. Where preferences and incentives differ within households, intra-household conflicts could inhibit commercialization and other forms of agricultural intensification. In such contexts, commercialization may require institutional innovations to ensure consistent benefits across men and women.

Empirical studies of supply relationships for farm products indicate that changes in product prices typically (but not always) explain a relatively small proportion of the total variation in output that has occurred over a period of years. The weather and pest influence short run changes in output, while the long run changes in supply are attributable to factors like improvement in technology, which results in higher yields. The principal causes of shifts in the supply are changes in input prices, and changes in returns from commodities that compete for the same resources. Changes in technology that influence both yields and costs of production /efficiency/, changes in the prices of joint products, changes in the level of price/yield risk faced by producer, and institutional constraints such as acreage control programs also shift (Tomek and Robinson, 1990).

Most studies of supply response in Ethiopia use aggregate time series data, and estimate export supply response for coffee (Dercon and Ayalew, 1995) or supply response of food grains (Abebe, 1998). Recent analysis is making use of the available farm-level data from the Ethiopian Rural Household Surveys, adding to the small number of studies of supply response in sub-Saharan Africa using farm-level data (Savadozo *et al.*, 1995). Abrar *et al.* (2004a) use farm-level data to analyze aggregate agricultural supply response and find that total output is not particularly responsive to input prices. In particular, they note very low responsiveness of output and of fertilizer use to fertilizer price, and argue that policies to promote fertilizer use have been ineffective. Abrar *et al.* (2004b) conduct a farm-level analysis of the influences on supply response of peasant farmers, distinguishing between types of crops and agro-climatic regions. They find that although farmers are responsive to prices, non price factors such as rainfall, access to good quality land, and access to markets tend to be the major factors for most crops in most regions

Marketing Margin

A marketing margin may be defined alternatively as a difference between the price paid by consumers and that obtained by producers or; the price of a collection of marketing services that is, the outcome of the demand for and the supply of each service (Tomek and Robinson, 1990). The size of market margins is largely dependent upon a combination of (1) the quality and quantity of marketing services provided; (2) the cost of providing such services; and (3) the efficiency with which they are undertaken and priced (Scarborough and Kydd, 1992). For instance, a big margin may result in little or no profit or even a loss for the seller involved depending upon the marketing costs as well as on the selling and buying prices (Mendoza, 1991). However, under competitive conditions, the size of market margins would be the outcome of the supply and demand for marketing services, and they would be equal to the minimum costs of service provision plus "normal" profit (Scarborough and Kydd,

1992; Mendoza, 1991). Therefore, analysing market margins is an important means of assessing the efficiency of price formation in and transmission through the system (Scarborough and Kydd, 1992).

3. METHODOLOGY

3.1. Description of the Study Area

Lemo is one of the 10 rural Districts of Hadiya Administrative Zone in Southern Ethiopia. It is bordered on the south by the Kembata Tembaro Zone, on the southwest by Duna and Soro Districts, on the west by Gomibora District, on the northwest by Misha District, on the north by Gurage Zone, on the northeast by Ana Lemo District, and on the southeast by Shashogo District. It is located some 230 km south of Addis Ababa and 175 km west of Hawassa town. There are a total of 33 *kebeles* in the District. Rural towns in the District are Belesa and Lisana. It has a total land of 34,973 hectare. The town of Hosanna is surrounded by Lemo District. Based on the 2007 Census conducted by the CSA, the District has a total population of 118,594, of whom 58,666 were men and 59,928 were women; 2,049 or 1.73 percent of its population were urban dwellers. However, based on 2012/13 annual household survey of the District, it has a total population of 150,719, of whom 74,574 were men and 76,145 were women.

Livestock production is an integral part of the production system. Production of cattle, sheep, goat and poultry is a very common practice and there is an existing market-oriented production system. There is also a fast growing smallholder dairy production system with a strong milk marketing cooperatives which involves over 800 smallholder dairy farmers. Honey production is another occupation of farmers in specific sites of the Lemo district. There are a number of farmers' service cooperatives in the district and they have established a strong cooperative union. Depending on the agro-ecology, there are low, medium to high potential areas in the Lemo district Like the other parts of rural Ethiopia, poultry keeping is practiced using family labor. It is estimated that around 212,450 poultry population is found in the Lemo district.

Sampling Techniques and Procedures

A two-stage sampling technique was used to select the sample respondents. In the first stage, four *kebeles* were purposefully selected out of the total 45 rural *kebeles* on the basis of their relative distance to the main market of Hossana and importance of poultry in consultation with the experts of the agricultural and rural development office in the district. The four *kebeles* selected were Ambicho Gode, Jawe, Dubancho and Shurmo. In the second stage, 120 farmers were selected using proportion to size random sampling technique (Table 1). Representative sample size was determined using the formula which is developed by Yamane (1967):
$$n = \frac{N}{1+N(e)^2}$$

Where, n is sample size, N is target population and e is level of precision, in this case it is 9%.

Table 1. Number of households and sample size

<i>Kebele</i>	Total number of households	Sampled households
Ambicho Gode	889	32
Jawe	904	32
Dubancho	650	23
Shurmo	922	33
Total	3365	120

Source: survey result, 2018

It is estimated that about 50 poultry and egg traders appear at the peak market events like holidays in the main lemo district market of Hossana. On ordinary market days from twenty to forty five traders come to the market. For this study, ten traders, who were randomly selected, were interviewed. Rapid Market Appraisal (RMA) was also employed to understand the overall picture of the supply and marketing activities and also market actors in the study areas. For this purpose, checklists were developed and used in the process.

Data Sources and Methods of Data Collection: In this study, both primary and secondary data sources were used to gather necessary data regarding Determinants of market participation performance among poultry product producers. The data used for this study were collected from a sample farmers and traders using pre-tested questionnaire. Information pertaining to respondents, socio-economic characteristics and institutional situations etc. were obtained. Secondary data were obtained from published and unpublished documents of different organizations

Methods of Data Analysis: Descriptive statistics like means, frequencies, percentages, maximum, minimum, and range were used to describe the descriptive result while The Heckman two-stage selection model was used to determine factors affecting the market participation performance of poultry product producers.

Specification of the model: Specification of the Heckman two-step procedure, which is written in terms of the probability of poultry product market participation (Y_{1i}), and marketed surplus (Y_{2i}) is:

The participation/the binary probit model is specified as:

$$Y_{li}^* = X_{li}\beta_{li} + \varepsilon_i \quad i = 1, 2, \dots, n$$

$Y_{li} = 1$ if $Y_{li}^* > 0$ and $Y_{li} = 0$ if $Y_{li}^* \leq 0$, Where Y_{li} is the probability of poultry product producers market participation; which is a dummy variable assuming the value of 1 for market participants and 0 otherwise. Y_{li}^* is a latent variable, X_{li} are the variables determining participation in the probit model; β_{li} are unknown parameters to be estimated in the probit regression model; ε_i is random error term.

Then the parameters can consistently be estimated by OLS over n observations reporting values for Y_{2i} by including an estimate of the inverse Mills ratios denoting λ_i as an additional regressor from the selection equation. More precisely, the observation equation is specified as:

$$Y_{2i} = X_{2i}\beta_{2i} + \mu_i\lambda_i + \eta_i$$

where Y_{2i} is the quantity produced and sold in the second step; X_{2i} are the explanatory variables determining the quantity marketed; β_{2i} are unknown parameters that shows estimated in the quantity marketed ; μ_i is a parameter that shows the impact of selectivity bias on the quantity marketed; η_i is the error term.

$$\lambda_i = \frac{f(X_1\beta_1)}{1 - f(X_1\beta_1)}$$

$f(X\beta)$ is density function and $1-f(X_1\beta_1)$ is distribution function

Hypothesis and Definition of Variables

The potential variables, which are supposed to influence poultry market participation and quantity of poultry supply, are hypothesized as follows:

Dependent Variables

Poultry production participation decision (POLKEEPG): The dummy participation decision variable is the dependent variable that is regressed in the first stage of the Heckman two stage estimation procedures. For the respondents who participate in poultry keeping = 1, and = 0 for the respondents who did not participate in 2018.

Poultry sales participation decision (POLSALESPART): The dummy participation decision variable is the dependent variable that is regressed in the first stage of the Heckman two stage estimation procedures. For the respondents who participate in poultry product market = 1, and = 0 for the respondents who did not participate in 2018.

Poultry production index (POLSSINDX): It is a continuous variable which represents dependent variable; the actual production of poultry and egg by farm household which is selected for regression analysis takes on positive value. Poultry supply index is formulated by converting the egg amount in terms of bird equivalent using the Hossana market average price for the year 2018.

Poultry sale index (POLSLDINDX): It is a continuous dependent variable, representing the actual supply of poultry and egg by farm household to the market in the year 2018. It is formulated by converting the egg amount in terms of bird equivalent using the Hossana market average price for the year 2018.

Independent Variables

Access to the market (DISTMKT): It is a continuous variable measured in kilometer a farmer travels to sell the product to the market. If the farmer is located in a village far away from the market, he/she has limited access to the market and vice versa. The closer to the market the lesser would be the transportation cost and time spent. Therefore, it is hypothesized that this variable is negatively related to market participation and marketable surplus. In a study made by Aklilu (2007) on village poultry in Ethiopia, distance to markets influenced negatively flock size and poultry marketing.

Distance from the development center (DISTDVT): It is a continuous variable measured in kilometer where the location of the development center is situated. The nearer is the development center, the easier is for farmers to request advise from the extension agent and vice versa. It is expected therefore to have negative value against poultry keeping, participation and both the production and sales levels.

Age of household head (AGE): It is a continuous variable and measured in years. Age is a proxy measure of farming experience of household. Aged households are believed to be wise in resource use, and it is expected to have either positive or negative because experienced farmers make their participation decisions based on their previous experience on risk in production.

Sex of household head (SEX): This is a dummy variable representing the sex of the household head. Chickens in traditional village poultry systems are owned and managed by women (Spradbrow, 1994). Since being household head give decision making power, Woman headed households would tend to participate in the

production and marketing of poultry. **Size of poultry herd (POLSSINDX):** It is a continuous variable. A marginal increase in poultry production has obvious and significant effect in volume of poultry product supply. The number of poultry kept is expected to have positive relation to market participation and marketable surplus. In this variable also the index is formulated by converting the egg amount in terms of bird equivalent using the Hossana market average price for the year 2007. Wolday (1994) observed that output of food grains (wheat *teff* and maize) has positive effect on quantity supplied to the market.

Size of land holding (LANDHOLD): This is the total land holding measured in hectare, which is continuous variable. Land is a major asset in rural Ethiopia. It can be taken as a proxy for wealth level. A household with large land holdings has a better capacity to afford spending in poultry production than otherwise. Thus, increase in size of land is expected to have direct positive influence on poultry keeping, market participation and marketable surplus.

Size of land for homestead (HOMSTED): This is the homestead land holding measured in hectare, which is continuous variable. If the producer has large homestead land size he would have a potential to keep more poultry. Thus, increase in size of homestead land size is expected to have direct positive influence on both production and marketing of the products.

Family size (FAMSIZ): It is a continuous variable in adult units. Since production of poultry involves usually age groups greater than 10, members of households less than 10 years are disregarded. Family size is expected to have positive impact on poultry production and marketing.

Education level of household head (EDULEV): It is a dummy variable and refers to the formal schooling of a respondent during the survey period. Those household heads who had formal education determines their readiness to accept new ideas and innovations, and easy to get supply, demand and price information and this enhances farmers' willingness to participate in production and marketing of poultry. Therefore, education was hypothesized to positively influence production and marketing of the product. Holloway *et.al.* (1999) argued that education had positive significant effect on quantity of milk marketed in Ethiopian highlands.

Extension contact (EXTADV): A dummy variable representing extension service as a source of information on technology. Those farmers who have contact with extension workers are more likely to know the advantage of poultry production. Therefore, contact with extension agent is assumed to have direct relation with volume of production and marketable surplus. A study made by Rehima (2007) showed that pepper producing farmers with an extension contact had positive and significant effect on quantity of pepper marketed.

Credit Access (CREDACCS): This is a dummy variable, which indicates credit taken for poultry production. Black and Knutson (1985) Texas survey showed credit users showing better production and market participation among cooperative members Access to credit would enhance the financial capacity of the farmer to purchase the bird. Therefore, it is hypothesized that access to credit would have positive influence on level of production and sales.

Market information (MKTPRCINFO): It is a dummy variable. Farmers marketing decisions are based on market price information, and poorly integrated markets may convey inaccurate price information, leading to inefficient product movement. Therefore, it is hypothesized that market information is positively related to volume of production and sales. In his study of household food marketing behavior, Goetz (1992) found that better information, significantly raised the probability of market participation for potential selling households.

Price of egg (PEGG): It is a continuous variable measured by annual average price of egg the household sold. When egg price is high in the market, farmers would be interested to produce and supply more. Therefore price is expected to have positive relation with level of production and sales. The study of Goetz (1992) on household marketing behavior in Sub-Saharan Africa found a significant positive relationship between grain price and the probability of quantities sold.

Livestock size (TLU): Continuous variable indicating total livestock holding of the household in TLU. Livestock is an asset indicating both wealth and status of the household. Households with high TLU have the interest and experience to take care of livestock products for the sake of both household consumption and market. Hence, this variable is expected to have positive effect both in production and marketing.

3. Results and Discussion

3.1. Descriptive statistics results

Out of the 120 sample respondents 98 (82%) were found to keep poultry while the rest 22(18%) don't keep. Not all poultry keepers are sellers. Out of the 98 keepers, 88 (90%) were found to participate in sales.

Demographic Characteristics of Sample Households

The demographic characteristics of farmers defined in terms of sex, education level, age and family size are presented in Table 2. It is also found that of the total respondents, 79.2 percent are married, 4.2 percent single, 9.1 percent divorced and 7.5 percent are widowed. From the randomly selected households, 96 were male headed and the rest 24 were found female headed. Orthodox Christianity is the dominant religion of which 96.7 percent of the respondents are affiliated with. The educational background of the sample household head is

believed to be an important feature that determines the readiness of household head to accept new ideas and innovations. There exists somewhat low level of literacy among the sample respondents with a majority of about 38.3% illiterate and 35.8% capable of reading and writing. The chi-square test indicates that there is a significant difference between the keeper and non keeper groups at 5% significance level in their education.

The average age of the sample households was 48. The mean age of keeper farmers was 47 and that of non keepers was 54. The independent sample t-test revealed that there is difference at 5% level of significance on mean age of farmers in the two groups.

Table 2. Respondents' demographic characteristics of sample farmers (% and average)

List	Poultry keeping status		X ² /t-value
	Keepers	Non Keepers	
Sex			
Male	76	20	
Female	22	2	2.41
Total	98	22	
Educational level			
Illiterate	38	2	
Read and Write	28	4	
Grade 1-4	2	2	8.51**
Grade 5-8	20	4	
Grade 9-12	10	10	
Family size	6.31	5.44	
	(2.62)	(2.51)	-0.56
Age of household head (year)	48.23	58.88	
	(16.63)	(17.34)	2.41**

Source: Survey result, 2018

** significant at less than 5% , Figures in parenthesis indicate standard deviation

Table 3 depicts that the average years of farming experience for total sample households were 31 years. We can observe also that Bird keepers have a better experience and annual average income from non farm activities. On the contrary, non bird keepers have a better experience and annual average income from farm. The independent sample t-test revealed that there was difference at 10% level of significance on the mean years of non farming experience.

Table 3. Farm experience and income of farmers

List	Poultry keeping status		t-value
	Keepers	Non Keepers	
Farm experience (Years)	31	28	
	(14.1)	(15.5)	0.75
Annual Farm income (Birr)	9245	7342	
	(7753)	(6357)	0.71
Non farm experience (years)	3	1	
	(5.7)	(2.3)	-1.7*
Annual Non farm income (Birr)	693	238	
	(5441)	(562)	1.5

* significant at less than 10% , Figures in parenthesis indicate standard deviation

Source: survey result, 2018

Resource Ownership

Resource ownership is characterized in terms of livestock, oxen, grass roofed house, iron sheet house, landholdings and homestead area. These are indicated in Table 4 below. The livestock species found in the study area are cattle, goat, sheep, donkey, mule, horse, poultry, and bee colony. Livestock are kept both for generating income and traction power. To assess the livestock holding of each household, the Tropical Livestock unit (TLU) per household was calculated.

Table 4. Average values of major resource ownership of sample households

Factor	Poultry keeping status		t-value
	Keepers	Non Keepers	
Tropical Livestock Unit (TLU)	3.37 (2.97)	2.90 (2.39)	-0.74
OXEN	2.00 (1.64)	1.83 (1.43)	-0.48
Grass roofed house ownership in number	0.94 (0.68)	0.88 (0.45)	0.92
Iron sheet house ownership in number	1.00 (0.69)	1.10 (0.92)	0.12
Landholdings (hectar)	1.74 (1.03)	1.83 (0.83)	0.38
Homestead (hectar)	0.18 (0.09)	0.17 (0.1)	-0.34

Source: survey result, 2018

Figures in parenthesis indicate standard deviation

As can be observed from the above table poultry keepers households are having a better proportion of TLU and Oxen. Besides, keepers had greater mean homestead area than non keepers, which may also be a reason that encouraged them to engage in the specific sector.

Access to Services

It is well understood that access to different services contributes affirmatively to increase production. In this study, farmers were asked about their access to extension, credit, information, and health services. It was found in the RMA that the district office is not giving a properly planned extension package for poultry. According to the survey result, 68.3% of the respondents mentioned that they never heard any extension effort regarding poultry. The rest said they have heard from the extension agent or asked him/her when they want to. The main issue of the extension advice was focused on production and health. More than eighty percent of poultry keepers perceive Newcastle as the most prevalent disease. About 88 percent of poultry keepers said they didn't get any veterinary services. Poultry keeping doesn't require huge capital. In the undertaken survey, 80.8% of the households said they didn't need credit. Only 18.3% with credit need took some credit amount. On average, farmers took birr 745 for this purpose. Over half of the beneficiaries got the credit from their respective cooperatives and the rest from micro finance institutes in the area.

Characteristic of Poultry Production

Poultry production in Ethiopia is a part time business. Not all farmers possess birds in their holdings. The survey result shows that out of the 120 sampled farmers 80% keep birds and the rest don't engage in the activity at least in the study period because there is a tendency to participate in one season and exit from the business in the next. In the group discussion undertaken with farmers, it is mentioned that it is the responsibility of the women to take care of poultry from the production up to marketing level. The income earned out of it is meant for some consumption expenses. Those farmers who reported to have owned poultry were asked the purpose of their production. Of those respondents 81.3% said they keep poultry for both egg and meat while the rest 18.7% said for egg only. This shows that there is no intention of poultry production for the sake of only meat.

Out of the bird keeping farmers only 9.6% of them keep exotic breeds and all of them hold local breed chickens. The annual average productivity of egg per hen was found to be 92 eggs. From the total sample the average number of hen kept was 7 birds per household with average production of 644 eggs per year and household. Farmers prefer to keep local breeds over exotic ones for different reasons. Local breeds are said to be disease resistant and require little input to survive. The usual practice of farmers is to purchase birds at the time when there are less disease prevalence and abundant post harvest grain remnants which is the first quarter of the year. For this reason the price of local laying hen increases in those months. On the other hand at the time when the rainy season starts, it is said that there is wide spread occurrence of disease, therefore farmers intend not to hold poultry in their farm yard.

The major feeding practice is scavenging. They also supplement by feeding maize and wheat. It is found that 11.5% of the farmers base their feeding on scavenging only while 55.2% and 33.3% supplement their birds with maize and wheat, respectively. Farmers were asked to mention the most prevalent disease in their area. Out of the respondents 80.2% said Newcastle "*fengil*" and the rest 19.8% associate the prevalence rate with other diseases.

Results of the Econometric Model

Determinants of Market Supply

As discussed briefly in the methodology part, farmers face with two types of participation decision. They first decide either to participate in poultry keeping or not and they decide how much to produce. There is also another

type of decision making either to participate in marketing or not and if so how much marketable surplus. Therefore in order to address the third objective, a Heckman two stage selection model is utilized. Out of the total sampled farmers only some portion of them around 80% are engaged in poultry keeping. So there is a need to have a model minimizing the selection bias between keepers and non keepers.

The potential variables expected to influence production participation and which were included in the estimate of the participation equation were age of the respondent, sex of the respondent, family size, education level, distance from the development center, land holding, homestead area and tropical livestock unit. These variables were entered in the Heckman first stage probit model estimation and the results of the model estimation are set out in Table 5. The Probit model was significant with a χ^2 -value of 19.5 and correctly predicted 84% of the observed outcomes. Out of the eight explanatory variables hypothesized to explain farmers production participation decision, it is found that age, size of the homestead, sex and family size affect their decision at 1%, 5% and 10% significance level.

Poultry keeping is mainly considered to be the task of the female and the benefit generated out of it is assumed to be of her for household petty expenses. Since being household head give more power to decide on what to produce, female household heads are inclined to participate more on poultry keeping. If the household head is female the probability of keeping poultry would increase by 16.5% Poultry keeping is considered to be a risky business since sporadic disease out breaks destroy almost all the stock of birds. Aged farmers seem unwilling to take the risks involved. The marginal effect result show us that as age of the house hold head increases by a year the probability that he would participate in poultry keeping decreases by 0.8%. As the family size increases, there will be extra labor force for the family to broaden its income source by participating in keeping birds. An increase in the family size by one person would increase the probability of poultry keeping by 3.3% Usually birds in the Ethiopian farming community are kept around the homestead. There fore, the higher the size of the home stead, the better the opportunity to keep birds. The marginal effect result indicates that an increase of homestead size by one *kert* would increase the probability of poultry keeping by 23.9%.

Table 5. Estimation result of the Binary Probit model and it's Marginal Effect for determinants of poultry production

Variables	coefficients	t-ratio	Marginal Effect
CONSTANT	0.655	1.052	0.165
DISTDVT	0.153	1.300	0.038
SEX	0.853	1.924*	0.165
AGE	-0.033	-2.923***	-0.008
EDULEV	-0.134	-0.429	-0.033
FAMSIZ	0.133	1.836*	0.033
LANDHOLD	-0.040	-0.739	-0.010
HOMSTED	0.953	2.066**	0.239
TLU	0.052	1.133	0.013

Log-likelihood function -50.31 Chi-squared 19.5

Prediction Success 84.2% , *** , ** and * indicate statistical significance at 1%, 5% and 10% respectively

Source: own computation, 2018

In the second stage of the Heckman Model estimation, determinants of poultry production was hypothesized to be distance from the development center, sex of the household head, education level of the household head, family size, landholding ,homestead area ,price of egg, extension contact, credit access, market information, tropical livestock unit and age of the household head. Out of these twelve explanatory variables, age, education level, area of homestead, price of egg, access to market information and inverse Mill's Ratio (LMBDA) had significant effect on quantity of poultry product produced. The value of the F-test, 15.55 for the selection model was highly significant and the adjusted R^2 was 61.4% (Table 6).

Table 6. OLS estimation result of the intensity of poultry production

Variables	coefficients	t-ratio
CONSTANT	-0.488	-0.048
DISTDVT	0.579	0.592
SEX	4.391	1.334
AGE	-0.232	-2.330**
EDULEV	13.628	5.198***
FAMSIZ	1.006	1.633
LANDHOLD	-0.370	-0.853
HOMSTED	9.907	2.485**
PRCEGG	21.916	3.509***
EXTADV	1.191	0.364
CREDACCS	-2.933	-0.803
MKTPRCIN	6.779	2.398**
TLU	0.332	0.919
LAMBDA	12.740	4.878***

R-squared = 0.656 Adjusted R-squared = 0.614 Log Likelihood = -468.3 Number of observations 120, source: own computation, 2018

The result indicated that age of the household head was found to be negatively related to volume of poultry production. On the other hand, education level of the household head was found to have a positive relation with volume of poultry production. As stated a priori, the more homestead area a farmer has the more able is to keep birds. When the price of eggs increases, farmers would increase their participation in poultry keeping. Farmers may decide to keep birds when egg fetches a better price buying layer bird from the market. Those farmers with a better access to market information are found to positively influence the volume of production. The significance level of the inverse Mill's Ratio (LMBDA) indicates that in Heckman two-stage model, the correction for selectivity bias is significant.

To meet the third objective comprehensively, we have to run a second Heckman Model to identify factors influencing farmers sales participation decision and the volume of sales. Out of the 120 sampled farmers 98 were found to be poultry keepers. The issue is to consider those keeper households separately and determine the determining factors for market participation and level of sales. The potential variables expected to influence market participation and which were included in the estimate of the participation equation were distance to the market, age of the respondent, sex of the respondent, family size, education level, distance from the development center, land holding, homestead area, volume of production level and tropical livestock unit. These variables were entered in the Heckman first stage probit model estimation and the results of the model estimation are depicted in Table 7. The Probit model was highly significant with a χ^2 -value of 23.94 and correctly predicted 92.7% of the observed outcomes.

Table 7. Estimates of poultry market participation selection model and their Marginal Effect.

Variables	coefficients	t-ratio	Marginal Effect
CONSTANT	2.276	1.654	0.115
DISTMKT	-0.194	-1.877*	-0.009
DISTDVT	-0.245	-1.371	-0.012
SEX	0.522	0.635	0.02
AGE	-0.009	-0.475	-0.0005
EDULEV	-1.279	-2.101**	-0.072
FAMSIZ	0.117	0.994	0.006
LANDHOLD	0.022	0.229	0.001
HOMSTED	-0.504	-0.640	0.115
TLU	0.002	0.024	0.000
POLSSIND	0.051	2.416**	0.003

Log-likelihood function -20.1 Chi-squared 23.94

Prediction Success 92.7% ** and * indicate statistical significance at 5% and 10% respectively

Source: own computation, 2018

Out of the explanatory variables hypothesized to explain farmer's market participation decision, it is found that distance to the market at 10% significance level, education level and volume of poultry production at 5% significance level are found to be influencing farmer's market participation. As hypothesized, distance to the market had negative influence to market participation. Eggs are products with limited shelf life. There is a need to frequently supply to the market. The nearer a farmer is to the market, the easier for him to take his products to the market. The marginal effect also indicates that, when the household is located one more kilometer away from

the market his probability of market participation decrease by 0.9%. Education level has shown negative relationship with sales participation. This can be explained by the fact that literate farmers decided the poultry products to be allocated for home consumption to fulfill the household's protein requirement. The marginal effect indicates that when the household head is literate his probability of market participation decreases by 7.2%. The other significant variable is volume of poultry production. As expected the higher the production level the higher the probability of participating in marketing of his products. The marginal effect result shows that a unit increase in poultry product would result a 0.3% increase in the probability of market participation.

Table 8. OLS estimation of the intensity of market participation

Variables	coefficients	t-ratio
CONSTANT	-6.088	-1.272
DISTMKT	0.120	0.566
DISTDVT	-0.848	-1.700*
SEX	1.826	1.199
AGE	0.032	0.601
EDULEV	-3.715	-2.876***
FAMSIZ	0.068	0.235
LANDHOLD	-0.063	-0.319
HOMSTED	-1.571	-0.819
PRCEGG	-1.901	-0.526
EXTADV	1.502	1.057
CREDACCS	0.462	0.301
MKTPRCIN	2.331	1.880*
POLSSIND	0.675	17.915*
TLU	0.171	1.028
LAMBDA	10.617	6.789*

R-squared = 0.872 Adjusted R-squared = 0.848 Log Likelihood = -286.96*** and * show the values statistically significant at 1%, and 10% respectively

Source: Own computation, 2018

The OLS regression result indicated that (Table 8) distance from the development center, market price information, poultry production index and the inverse Mill's Ratio (LAMBDA) were found to be significant at 10% significance level. On the other hand education level was found to be significant at 1% significance level. When farmers are proximate to development center, they would get to know the better management of production and hence raise income from sales of their products. As hypothesized the distance from development center had negative implication in volume of sales. Those farmers with better market information are in a better position to supply their surplus production to the market. Obviously, farmers with high volume of production would supply to the market than those with lesser production levels. As mentioned in the first probit model, literate farmers showed negative relation with market participation and volume of sales indicating their tendency to consume at home. The significant state of the inverse Mill's Ratio indicates that in Heckman two-stage model, the correction for selectivity bias is significant.

Conclusion and Recommendation

The existence of efficient marketing system would help farmers make the right decision of what, how much and when to produce. Competitive markets are considered to be the most efficient market structures. Poultry marketing system is characterized by many suppliers (farmers) and considerable number of buyers. A single or few buyers did not dominate the markets studied.

The result of the study indicated that female headed households tend to be involved in poultry keeping than otherwise. Development efforts focusing on poultry will have a positive implication in raising the income source of women. Since the homestead area is a significant factor, research on technologies which focus on less costly and semi intensive sheltering mechanisms with little space requirement and protective against predators may have a positive impact in encouraging small holder farmers in poultry keeping. The disease risk aversion behavior of experienced farmers is to be avoided by minimizing the disease prevalence. Hence, efforts should be made in alleviating the occurrence of disease by an appropriate animal production extension packages envisaged. Since the level of education influenced the supply level positively, small scale farmer focused trainings on modern management practices should be designed. The availability of timely information on market price of poultry products is found to have a positive implication on the level of poultry production. Hence, measure should be taken to avail market information to farmers.

Market participation of small scale farmers is found to be influenced by the volume of poultry product produced positively and distance from the market and the level of education of the household head negatively. The volume of sales of poultry product level is affected by volume of poultry product produced and education

level of the household head in similar way like market participation. On the other hand access to market information has positive effect on level of sales while distance from the development center has negative relation. Extension activities on the production and marketing of poultry and its products should be given emphasis. Research and development efforts should focus on less costly technologies to simplify the storing and transporting mechanisms of small scale farmers. The negative relation of market participation level of education level might be associated with the households' decision to use poultry products to fulfill the protein requirement of the household. The commercial behavior of farmers would be enhanced by the availability of timely market price information.

REFERENCES

- Aklilu Hailemichael (2007). Village poultry in Ethiopia: Socio-technical analysis and learning with farmers. A PhD Thesis Presented to Wageningen University. pp
- Amsalu Asefa (2003). Practical poultry training manual (unpublished). Amhara Region Agricultural Research Institute, Kombolcha Poultry Research and Multiplication Center.
- Andargachew Kebede (1990). Sheep marketing in central highlands, Unpublished MSc Thesis presented To Alemaya University
- Asgedom, A.H. (2000). Modeling impact analysis in village poultry production systems. M.Sc Thesis Wageningen University, Wageningen. 123p.
- Ayele Gebremariam and Hillman, M. (1975). A Report on the Central Highlands Livestock Survey prepared for the Project Office of the Livestock and Meat Board. Unpublished Addis Ababa.
- Balakrishnan, V. (2004). Developments in the Indian feed and poultry industry and formulation of ration based on local resources. Animal production and Health. FAO, Rome, 2004. Pub. No. p. 215.
- Brannang, E. and S. Persso (1990). Ethiopian Animal Husbandry Uppsala, Sweden, p127.
- CSA (Central statistics agency of Ethiopia) (2006). Agricultural sample survey 2005/06: Report on livestock and livestock characteristics (Private peasant Holding) Volume II, Statistical Bulletin 361. Addis Ababa, Ethiopia.
- Delgado, C., M. Rosegrant, H. Steinfeld, S. Ehui, and C. Courbois (1999). Livestock to 2020; The next Food Revolution. Food, Agriculture and the Environment Discussion paper 28. Washington, DC, International Food policy Research Institute. 57-59pp.
- Demby, J.H. and F.F. Cunningham (1980). Factors affecting composition of chicken meat. A Literature review. World Poultry Science Journal, 36: 25-67.
- Eleni Z. Gebre-Medhin (2001) The Role of Intermediaries in Enhancing Market Efficiency in the Ethiopian Grain Market, Unpublished MA Thesis submitted to Addis Ababa University.
- Fikre Abera (2001). Baseline data on chicken population, productivity, husbandry, feeding, breeding health care, marketing and constraints in four-peasant association in Ambo Wereda. pp. 73-89. Proceedings of the 9th Annual Conference of the Ethiopian Society of Animal Production 30-31 August 2001, Addis Ababa, Ethiopia.
- Goetz, S. J. (1992). A Selectivity model of household food marketing behavior in Sub-Saharan Africa. *Amr. J. of Agric. Economics*. 74(2): 444-52.
- Goletti, F. and C. Tsigas, E., (1995). Analysing Market Integration, London
- Greene, W.H. (2003). Econometric Analysis, 5th Edition. Prentice Hall. Inc, London. 1026p. Gueye, E.H., 2000. The role of family poultry in poverty alleviation, food security and the promotion of gender equality in rural Africa. *Outlook on Agriculture* 29(2): 129-136.
- Gujarati, D.N. (2003). Basic Econometrics. 4th Edition. McGraw-Hill, New York.
- Hailemariam T., Legesse. D., Alemu. Y. and Nigussie D. (2006). Determinants of adoption poultry technologies: Double hurdle approach. *Animal and livestock center* 3(18). Debre Zeit Agricultural Research Center, Ethiopia.
- Heckman, J.J. (1979). Sample selection bias as a specification error, *Econometrica*. 47, 153-161.
- Kohl, R.L. and Uhl, J.N. (1985). Marketing of Agricultural Product, 5th Edition, Collier Macmillan, USA. 624p.
- Rehima Musema (2007). Analysis of red pepper marketing: the case of Alaba and Silitie in SNNPRS of Ethiopia. Unpublished MSc Thesis Presented to School of Graduate Studies of Haramaya University. 153p.
- Tadelle Dessie and Alemu Yami (1998). Rural women and poultry production in Ethiopia. Pp 85-94. Proceeding of 6th Annual Conferences of Ethiopian Society of Animal Production (ESAP). Addis Ababa Ethiopia 14-15 May, 1998.
- Tekalign Tsigae, (1988). An economic analysis of livestock marketing: The case of cattle marketing along the trade route from Bale (Arsi) to Addis Ababa, Unpublished M.Sc. thesis. Addis Ababa University.
- Wolday Amha (1994). Food Grain Marketing Development in Ethiopia after Reform 1990. A Case Study of Alaba Siraro. The PhD Dissertation Presented to Verlag Koster University. Berlin 293p.