Key Factors Affecting Market Participation of Small Dairy Farmers: the Case of Bako Tibe District, West Showa Zone, Oromia, Ethiopia

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Key Factors Affecting Market Participation of Small Dairy Farmers:-

The Case of Bako Tibe District, West Showa Zone, Oromia, Ethiopia

Abstract

The study was initiated with the objectives of determining key factors affecting dairy market participation of small holder dairy farmers in Bako Tibe district, west showa zone, Oromia, Ethiopia. Data came from the survey of small holder dairy producing households and from secondary sources such as District Agricultural office, Bako Agricultural and Mechanization Research Centres and the like. Maximum Likelihood Estimation procedure such as logit model was employed in identifying factors affecting decision to sell dairy products. Market participation decision is affected by household demographic and socio-economic characteristics and transaction costs represented by distance to market and urban centres. Family size, Extension service, Distance to the nearest market and number of Milking cows owned significantly affect dairy market participation of small holder farmers. The results suggest that production and marketable surplus should be improved through introduction of improved technologies and adequate marketing infrastructure like roads and transport facilities between rural and urban areas in the district to support enhanced market participation. With the aim of reducing transactions cost adequate marketing link should be established between the rural producer and urban consumer through institutional arrangements, such as dairy cooperatives. Relaxing the criteria required in obtaining bank and micro credit and forming a well functioning urban and rural financial system would enable resource poor farm households to participate in dairy market and improve its supply of dairy products to the urban consumers.

Keywords: Smallholders; Determinants; logit; Dairy Marketing; Participation; Oromia; Ethiopia.
1. Introduction

Globally, livestock contributes about 40 percent to the agricultural gross domestic product (GDP) and constitutes about 30 percent of the agricultural GDP in the developing world (World Bank, 2009).

Agriculture is the mainstay of the Africans economy. Foreign exchange earnings, industry inputs and domestic consumption are from this sector. Most of the population are engaged in agricultural activity and earn their livelihood from the sector. In Ethiopia, agriculture provides employment to about 80 percent of the population, and generates 50 percent of the GDP. According to CSA (1995), about 72 percent of farm households cultivate holdings of less than 1 hectare and the average land holding size is 0.8 hectare. Moreover, the highlands of Ethiopia are one of the densely populated and poorest regions in the world with per capita income of US$ 110 (World Bank, 2002). Like in many developing countries, poverty, food insecurity and poor nutrition are persistent problems especially among the rural population predominantly dependent on low productive semi–subsistence farming. Population growth (World Bank, 1989; Cleaver and Gotz, 1994), and declining agricultural productivity and inadequate market participation of producers (World Bank, 1991) are few of the factors underlie this trend.

Agriculture has a substantial contribution to Ethiopian economy in terms of generating employment opportunity, product contribution, market contribution, factor contribution, balance of payment contribution, welfare contribution, environmental contribution, etc. Moreover, the country does have huge potential for agricultural development in general and livestock subsector in particular. Wide agro ecological zone which can support large varieties of staple crops growth; increasing demand for food grain from domestic and international market and relatively cheap and easily accessible agricultural inputs can be considered as some of the potential for sub sector development.

Countries that are currently enjoying the highest standard of living are those that have a well–developed animal agriculture as demand for animal products increases with economic development. In the Ethiopian context, despite the huge potential the country has to produce milk and milk products, there is a chronic shortage of the product in most part of the country. This arises mainly from insufficient production coupled with inhibitive cultural taboos related to consumption and absence of proper processing and marketing (Zegeye, 2003). Therefore,
improving livestock productivity and their respective marketing activities may improve the sector’s contribution to the GDP and improves the live standards of the nation.

The low marketable output generates limitations to explore distant but rewarding markets due to high transaction costs arising from transportation and high opportunity cost of labor involved. Again dependable marketing system is not yet developed to market milk and milk products. Producers and consumers are spatially separated; most farmers are found in the rural areas while consumers or profitable market is found in urban areas. Most of the milk supply is distributed from producer to consumer through informal means in both rural and urban areas. The informal market involves direct delivery of fresh milk by producers to consumers in the immediate neighbourhoods. Market infrastructures and marketing facilities are not well developed in the country. This, in turn, reduces incentives to participate in economic transactions and results in subsistence rather than market-oriented production systems. Therefore, improving the position of smallholders to actively engage in the market is one of the most important development challenges.

This study sought to determine the key socio-economic factors influencing dairy market participation of small holders in Bako Tibe district. This was done using the logit model. The findings of this study are expected to inform policymakers on appropriate strategies to increase dairy market participation of small holders in order to improve productivity and increase household income from dairy products sell.

Although, Bako Tibe District has great potential for both production of crop and livestock, there is chronic shortage of milk and milk products around Bako town, the capital of the district. Hence it was required to investigate the situation. The results of this study would be useful for the government or policy makers, donors or NGOs, producers and marketing middlemen for their respective decisions.
2. Literature Review

In Ethiopia, fresh milk sales by smallholder farmers are important only when they are close to formal milk marketing facilities, such as government enterprise or milk groups. Results from a sample of farmers in Northern Shewa in 1986 estimated that 96% of the marketable milk was sold to the Dairy Development Enterprise (Debrah and Berhanu, 1991).

Farmers far from such formal marketing outlets prefer to produce other dairy products instead, such as cooking butter and cottage cheese. The vast majority of milk produced outside urban centres in Ethiopia is processed into dairy products by the households, and sold to traders or other households in local markets (Debrah and Berhanu, 1991).

The major portion of the milk comes from small dairy farmers with few milk animals located in the rural areas. What is produced on the animal farm has to reach the market, and the nearer the market the lesser would be the transportation charges and the lesser would be loss due to spoilage.

Enhancing the ability of smallholder dairy farmers to participate in the market and improve their financial profitability is one of the most pressing development challenges. (Jones, 1998).

Dairying is a means of providing an additional source of employment and income to small and marginal farmers. The smallholder farmers produce about 93% of dairy products (Tsehay, 1998). It is only small quantity of this production that is marketed in the form of liquid milk; the larger volume is processed into different dairy products for home consumption and sales. Large scale marketing and processing of milk is limited to the area around Addis Ababa, which is the Addis Ababa milk shed. It appears that butter dominates dairy marketing, and the transaction in the form of raw milk is limited around major urban centres. There are a few milk-processing plants in Ethiopia. The processed products of these plants are pasteurised fluid milk, table butter, and hard cheese, yoghurt and ayib (cottage cheese) (Zegeye, 2003).

Field surveys have shown that many potential liquid milk-marketing households are hours distant away from any milk group. Setting up new groups would clearly reduce the travel time to group,
and the actual number of households that would benefit depends on local population densities. It is also important to keep newly emerging milk groups small and geographically limited to ensure proximity and avoid large groups that would tend to increase average travel times (Holloway et al., 2000). Another study showed that the creation of new market outlet for fluid milk brought major improvements in the production, marketing and consumption behaviour of smallholder households. The new marketing outlet may also promote involvement in more intensive dairying (Nicholson et al., 2000).

Co-operatives, by providing bulking and bargaining services, increase outlet market access and help farmers avoid the hazard of being encumbered with a perishable product with no rural demand (Jaffee, 1994). In short, participatory co-operatives are very helpful in overcoming access barriers to assets, information, services, and the markets within which small-holders wish to produce high-value items (Jaffee, 1994).

There is very good market prospect for increased production of dairy products through scaling-up. Analysis of consumer patterns of purchase and consumption of dairy products points to good prospects for expanding the market for dairy products. This is because the current per capita consumption of dairy products is very low and the consumers think their current level of consumption is inadequate and are interested to increase their level of consumption provided that the dairy products are available at affordable prices. In general, the demand for dairy and dairy products is unsatisfied locally and there are also clear regional and national market opportunities (Asfaw, 2009). Dairy farm generates regular income for the farm households. The milk from dairy production also provides a highly nutritious food for all age groups of farm household members and particularly for infants and lactating mothers thus reducing the problem of malnutrition among rural households (Asfaw, 2009).

The value of livestock meat, milk, hides and skins, eggs and wool, currently account for 28% of agricultural GDP, and contributes 12-16% of the total Gross Domestic Product of the country (MEDaC 1998; AAPBMDA 1999). The sector also accounts for 12-15% of total export earnings, the second in order of importance (MEDaC 1998; FAO 1999). Livestock’s share of agricultural GDP increases to about 35% when the value of non–monetary transactions, such as animal traction, transport and manure are included and the sector also employs about one third of the country’s rural population (EARO, 2000).
3. Research Methodology

3.1. Description of the Study Area

Bako Tibe district is found in West Shewa Administrative Zone, Oromia Regional State, Ethiopia, about 250 km west of Addis Ababa, capital of Ethiopia at latitude of 9.12° and at a longitude of 37.05°.

Bako Tibe District is with an area of about 644.7 km² of which about 54.25% ha is under crop, about 23.98% ha is under pasture, about 5.12% ha is under forest and about 16.65% ha is for Infrastructure or for other uses. (Bako Tibe District Agricultural office, 2012 & Bako Tibe District Livestock Resource Development and Health Office, 2013). The district borders east Wollega in The West, Horroguduru Wollega in North, Chaliya District in the East and Biloboshe distirict (East Wollega zone) in the south. Government and community owned forests are also available. Reserves, vervet, monkey, baboon, warthog, hippopotamus, leopard, duiker, colobus monkey, Bush buck, spotted hyena and civet cats are some of wild animals found dispersedly in the District.

Based on the 2007 census, the district’s population was estimated to be 133,799 of which 21.15% was urban and 78.85% lives in rural areas. The age groups 0 -14 years, 15-64 years and above 64 years constituted 42.2%, 52.3% and 4.0% of the population, respectively (CSA, 2007). Rivers in the district include Gibe, Robi, Abuko, Mara and other 7 Major rivers as well as several seasonal streams are flowing through the district. There is no lake in the district. Rendzinas, Haplic and Luvic phaeozems (4.0%), chromic and Orphic Luvisols (14.9%), Dystric Nitosols (60.2%), and Chromic and Pellic Vertisols (20.9%) are the major soil types found in the district.

There are about 127,615 cattle, 3,438 sheep, 11,600 goats, 9,709 horses, 9,200 donkeys, 4,668 mules and 8,033 Poultry in the district. Commonly Prevalent livestock diseases are:- Rypanosomiasis, Anthrax, Black leg and pasteurelosis (Bako Tibe District Agricultural Office, 2012 & Bako Tibe District Livestock Resource Development and Health Office, 2013).

Climatically, the district is classified into high land (12%), midland (35%) and lowland (53%) zones. Most of the areas in the district range in altitude between 1600 m.a.s.l. And 2870
The vast area of the district receives rainfall between 1000 mm and 1500 mm. The annual mean temperature ranges between 13.2 °c - 32°c. (Bako Tibe District Agricultural office, 2012 & Bako Tibe District Livestock Resource Development and Health Office, 2013). The area receives maximum rainfall in the months of July and August.

FIGURE 1:- MAP OF WEST SOWA ZONE and BAKO TIBE DISTRICT (The Study area)

3.2. Sampling Procedure, Choice of the District and Peasant Associations

A three-stage sampling technique was employed to select sample respondents. In the first Stage, Bako Tibe district was purposively selected for the study, because of the fact that there is a great potential of livestock and dairy farm in the area (BDOA, 2015).

In the second stage five dairy farming PAs were randomly selected. Lastly the list of dairy farming farmers having lactating cows at that time was prepared. Given the limited resource and time at the disposal of the researcher, a total of 90 dairy farming households were selected randomly using probability proportional to sample size sampling technique from the list prepared. The PAs were Dambi Dima, Dembi Gobu, Bachara Odaa Gibee, Bari Abo and Gajo Kuyi. Bachara Odaa Gibee, Bari Abo and Gajo Kuyi are beyond 5kms from the district capital and Dambi Dima and Dembi Gobu are in the vicinity of the town within 5kms radius. Within the maximum distance of 15 kms apart. The district is ideal to investigate the relationship between rural and urban markets. The logistics problem of the researcher, such as research fund, availability of means of transport and homogeneity of the dairy farmers were important factors in choosing the kebeles (PAs).
Using concentric circle the number of kebeles in the first and second group were 2 and 3, respectively. The sampling frame of, Dambi Dima, Dembi Gobu, Bachara, Bari Abo and Gajo Kuyi were identified.

3.3. Types and Sources of Data

Both secondary and primary data were used for the study. Primary data were collected on market participation, asset ownership of farm household, transaction costs, distance to market, barriers to entry and exit, education and experience, and other socio-economic characteristics of the dairy farming households. Other data, like market information system, exchange arrangement, system of processing, storage, production, consumption, transport, infrastructure development, incentives and disincentives and credit facilities towards dairy marketing, were also collected using structured questionnaire.

The target population was defined as all households having lactating cows in five peasant associations (kebeles) found in Bako Tibe at the time of survey. Informants were individual farmers (dairy producers), private traders, and dairy marketing cooperative. Other organizations which directly or indirectly involved in dairy production or marketing, were also used as sources of data.

Secondary data were collected from Bako District office of Agriculture, CSA, Bako Agricultural Research Center, Bako Agricultural Mechanization Research Centre and Bako District Agency of Livestock and Animal Healthy.

3.4. Methods of Data Collection

Structured questionnaire were developed for field data collection. However, this approach was not without disadvantages mainly because respondents become bored with long interview/questionnaire/ resulting in poor data quality and unwillingness to cooperate in subsequent surveys, omission of relevant information due to overloading the survey instrument, and inefficient use of resources when analysis eventually makes use of only a fraction of the data collected (Jabbar et al., 1997). Information collected was relevant and useful in answering specific questions.
A series of discussions were held with the chairmen and elders in the kebeles to explain the purpose of the study. Following the discussion, list of households whose cows were lactating at the time of the survey were collected and prepared. Through random sampling technique using household list prepared on kebele basis 90 farmers were randomly selected. Five dairy producers from each peasant association were additionally selected as reserves to replace peasants who might not appear for the interviews or who might refuse the request (Fig 2).

Key informants were also interviewed to collect other relevant information on other market actors like livestock and dairy traders, extension agents, researchers, etc., A market survey was carried out to obtain information on prices to know the direction of dairy products flow and market conduct. Also, different types of data was collected from concerned organizations and individuals involved in the sector. Preceding the survey adequate taring on the questionnaire and ways of collecting the data was given by the author himself. Moreover sample questionnaire was conducted to make the training practical. The author himself, some cooperating socioeconomic researchers from Bako Agricultural Mechanization Research Centre, PA managers and DAs conducted the survey during the months of May and June 2015 which is the ending of the dry season and the beginning of wet season (Fig.3).

3.5. Factors hypothesized to influence Dairy Market Participation of small Holders

The study assumed that dairy market participation of small holders was influenced by farm and farmer characteristics and institutional support factors. Therefore, the data collected through the structured interview schedule were farm, farmer and institutional characteristics. Questions about farm and farmer characteristics included issues such as experience in dairy farming, education level, gender, off farm income, distance to the market, distance to district capital, Lactating Dairy cows owned and institutional characteristics captured extension services, credit and training.

**Lactating Dairy cows owned:** The variable is expected to have a positive contribution in market participation of smallholder farmers. A marginal increase in dairy production has obvious and significant effect in motivating market participation. Production beyond consumption has two fates based on various reasons; either sold as fluid milk or processed into different dairy derivatives. The processed part of the product may be used for home consumption or sales.
Production in turn varies directly with the number of crossbred and other lactating dairy cows. As the number of cows increases, production also increases and the percentage share of consumption declines and sales increases. Adoption of technology, such as crossbred dairy cows, improves the milk yield, through increased milk yield per lactation, increased lactation length, yield per day and short dry period. Some field studies have shown that the policy relevant variables having the greatest impact on farmer participation in liquid milk markets are lactating cow numbers, the number of cows kept affects marketable surplus through both total production and the marginal costs of production (Holloway et al., 2000). Thus, marketable surplus subsequently participation and sales increase with lactating dairy cow’s production.

**Distance to market:** Distance to market is measured in estimated kilometres. The closer the market is the lesser would be the transportation charges, reduced transaction costs, reduced trekking time, reduced loss due to spoilage, and reduced other marketing costs, better access to market information and facilities. This improves return to labour and capital and increase farm gate price and the incentives to participate in economic transaction and dairy marketing will increase.

**Distance to district capital:** Most of dairy production is found in rural areas while the demand and profitable market is found in the district capital and urban centers. Even though there are nearby local markets. These are markets such as Jaree, Shoboka, Tibe, etc. The closer the urban centre the lesser would be transaction and marketing costs. Distance to urban centres is a proxy to transactions cost which negatively affect participation and sales volume decision of dairy products. Small-scale dairy producers face many hidden costs that make it difficult for them to gain access to markets and among the barriers are transactions cost (Staal et al., 1997)

**Education of the household head:** Intellectual capital or education, measured in terms of formal schooling of the household head, is assumed to have positive effect on the market participation and sales decision. Sometimes, however, because of cultural and socio-economic characteristics education has opportunity costs in alternative enterprises (Lapar et al., 2002). So it is not possible to have a definite expectation of the effect of education on market participation.

**Education of spouse:** Intellectual capital or education, measured in terms of formal schooling of spouse, is assumed to have positive effect on the market participation and sales decision.
However, like education of household head education of spouse can have opportunity costs in alternative enterprises and not possible to have a priori expectation.

**Experience in dairy farming:** This variable is measured in terms of the number of years of dairying of the household head; it is expected to have a positive effect on market participation and sales volume.

**Age of the household head:** Is measured in terms of number of years of the household head, aged households are believed to be wise in resource allocation and use, and it is expected to have a positive effect on participation decision and sales volume of dairy products.

**Sex of the household head:** In mixed farming system, both men and women take part in livestock management. Generally, women contribute more labour input in areas of feeding, cleaning of barns, milking, butter and cheese making and sale of milk and other products. However, obstacles, such as lack of capital and access to institutional credit, competing use of time, and access to extension service, may affect women’s participation and efficiency in ruminant livestock production (Tanga et al., 2000). Therefore, it is not possible to tell a priori about the likely sign of the coefficient of sex, in market participation and sales volume.

**Number of household members:** Family size measured in terms of adult equivalent (Strock, 1991) was included in the model as a variable explaining variation in market participation. Families with more household members tend to have more labour. Production in general and marketable surplus in particular is a function of labour. Thus, family size is expected to have positive impact on market participation but larger family size requires larger amounts for consumption, reducing marketable surplus on the other hand.

**Financial income from non-dairy Sources /Off-farm income/:** These are originating from off-farm activities and different forms of remittances obtained by household head, spouse and other household members. Through improving liquidity, this income makes the household more able to expand production and/or purchase from market. It also strengthens the household position in coping with different forms of risks and enters into economic transactions.
**Amount of loan received**: Amount of loan received has similar impact with financial income from different sources in improving market participation decision and sales volume of the farm households. Dairy income is continuous so families may not face problem in loan repayment.

**Number of extension visits**: The number of visits made by extension agent in the year measures the variable. Number of extension visits improves the household’s intellectual capitals, which improves dairy production and divert product resources to market such as different forms of dairy products. These dairy products would otherwise be consumed by the household or wasted. Therefore, number of extension visits has direct influence on market participation and sales volume. Studies have shown that visits by extension agent improve participation and volume decision of dairy sale (Holloway et al., 2000).

**Grain production**: In subsistence smallholder farming, production of grain is mostly meant for household consumption. Grain is sold when it is only surplus or beyond the consumption need of the household. On the other hand, when the household is deficit in grain production, it must either borrow or buy through money secured from different sources. Families who are deficit in grain production should likely participate in the dairy market and allocate much of the income for the purchase of grain. High protein dairy products are often sold to buy high-energy grains at favourable terms of trade (Kerven, 1987; Grandin, 1988). Livestock keepers also exchange high value commodities like meat and milk products for cheaper and larger quantities of food, such as cereals (Bouis and Haddad, 1990).

### 3.6. Methods of Data Analysis

#### 3.6.1. Dairy Market participation of Small Holders

It was assumed that smallholder farmers who produced milk and other dairy products for various reasons may or may not participate in dairy products marketing, i.e., May sale or not sale. This dependent variable is discrete consisting of two outcomes, yes or no. The use of Ordinary Least Square technique for such variables poses inference problems, and thus not appropriate for investigating dichotomous or otherwise limited dependent variables. In such circumstances, maximum likelihood estimation procedures such as logit or probit models are generally more efficient (Gujarati, 1988).

The models, that include a yes or no type dependent variable, are called dichotomous or dummy variable regression models in which determinants of an event happening or not happening will be identified. These include the linear probability function, linear discriminate function, logistic...
distribution function (logit), and normal distribution function (probit). These functions are used to approximate the mathematical relationship between explanatory variables and dependent dummy variable, which is always, assigned qualitative values (Gujarati, 1988; Maddala, 1992; Feder et al., 1985; Pindyck and Rubinfeld, 1981).

The major point that distinguishes these functions from the linear regression model is that the outcome variable in these functions is binary or dichotomous (Hosmer and Lemeshow, 1989). Besides, the difference between logistic and linear regression is reflected both in the choice of parametric model and in the assumptions.

The logit and probit models are comparable, the main difference being that the logistic function has slightly flatter tails that is, the normal curve under logit function approaches the axes more quickly than in the case of probit function. Ignoring minor differences, Liao (1994), Gujarati, (1988), Pindyck and Rubinfeld (1981) pointed out that probit and logit models are quite similar. They usually generate predicted probabilities that are almost identical, though the logit model is preferred over the probit model (Aldrich and Nelson, 1984; Pindyck and Rubinfeld, 1981).

Following Liao (1994) Gujarati (1988) and Aldrich and Nelson (1984), the logistic distribution for the market participation decision was expressed as;

\[
P_i (y = 1) = \frac{1}{1 + e^{-zi}} = \frac{e^{zi}}{1 + e^{zi}} \tag{1}
\]

Where \( P_i \) is the probability of participating in the market for the \( i \)th dairy producer and ranges from 0 to 1.

\( e^{zi} \): Stands for irrational number \( e \) for the power \( zi \).

\( Z_i \) is a function of a number of explanatory variables, which is also expressed as;

\[
Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_n X_n \tag{2}
\]

Where \( X_1, X_2, ..., X_n \) are explanatory variables and \( \beta_0 \) is the intercept, \( \beta_1, \beta_2, ..., \beta_n \) are parameters (slopes) to be estimated.

The interpretation of logistic regression coefficients (\( B_i \)) is considered by using odds ratio and the natural log of the odds ratio (Liao, 1994). The odds value gives the expected change in the odds ratio of being increase versus non-increase in market participation per unit change in an
explanatory variable. The logistic regression slope, the coefficient, is interpreted as the change in the natural log of the odds ratio associated with a unit change in the independent variable \(X_i\).

\[
P_i = \frac{1}{1 + e^{-(B_0 + B_1X_{1i} + B_2X_{2i} + \ldots + B_nX_{ni})}}
\]

If \(P_i\) is the probability of market participation decision then \((1 - p_i)\) is otherwise.

Now \(\frac{P_i}{1 - P_i}\) is simply the odds ratio in favour of market participation.

It is the ratio of the probability that dairy producer would participate in the market to the ratio he/she would not.

Before taking the selected variable into the model, it is imperative to check for the existence of multicollinearity among the continuous variables and verify the degree of association among discrete variables. Variance Inflation Factors (VIF \(X_j\)) technique was employed using stata 10 and or spss 20 software to detect the problem of multicollinearity among continuous variables. Large VIF are indicators of multicollinearity and those explanatory variables with VIF >10 will be excluded from the regression analysis (Maddala, 1988).

\[
VIF (X_j) = \left(1 - R_j^2 \right)^{-1} \text{ or } 1/1-R^2
\]

Where, \(R^2\) is the coefficient of multiple determinations when the variable \(X_j\) is regressed on the other explanatory variables. There was no problem of multicollinearity.

Similarly, there may also be interaction between two qualitative variables, which can lead to the problem of high association. To detect the problem, the contingency coefficients were computed from the survey data and contingency coefficient greater than 0.75 is indication of multicollinearity among qualitative variables.

\[
C = \sqrt{\frac{\chi^2}{N + \chi^2}}
\]

Where, \(C\) is contingency coefficient, \(\chi^2\) is chi-square test and \(N\) is total sample size.
4. Results and Discussions

A product–focused method of investigation was made of milk, butter and cheese either as finished products or intermediate ones. These three products were chosen because they were the three most important traded dairy products in the district. Butter was used for household consumption and cosmetics, while milk and cheese were used as food only.

4.1. General Characteristics of Dairy Producers

From a total of 90 dairy producing sample households, 44 (48.8%) were market participants as they sold some forms of dairy product at the time of the survey, while the rest 46 (51.2%) did not participate in the sale of any dairy products. The market participating households by sex were female 4 (9.09%) and male 40 (90.1%). Total female households in the sample were 13 (14.5%) and total numbers of male households in the sample as a whole were found to be 77 (85.5%). This implies that majority of women in the sample were married and was not the household head.

Dairy market participating households have more family members than non dairy market participating households. Intellectual capital was measured by educational level of household head and spouse; dairy market participating households relatively have better education level than non dairy market participating households. Dairy market participating households have got better extension visit than non-participating households. Market participating households were found to be less experienced in dairy production and get more regular extension visit. This is mainly because aged and experienced farmers are more adhered to traditional and cultural taboos. The younger and less experienced dairy farmers participate in dairy marketing than the older ones.

Travel times and distances from the household to the market and district capital both have lower values for participating households. Market participating households were relatively closer to market and district capital.

Poor smallholder farmers do engage in non-farm activities such as daily labourer, petty trade, dairy trade, selling of tea and local alcoholic drinks, and other non-farm activities than rich
households. This is mainly because inadequate land leaves them with surplus labour. The financial income received from non farm income was higher for dairy market participating households than non participating households.

Dairy market Participating households had also better access to credit and participate in credit than non-participants. The problem, however, was that the credit system was not well developed, the commercial banks are predominantly state owned, private banks are not eager and willing to finance agriculture in general and dairy production in particular because of the associated high risk in dairy production and marketing activity. They find the risk too high and ask for collateral that peasant farmers lack. Therefore, money to finance dairy sector is hardly available from financial institutions except very few.

Credit was primarily obtained from micro credit institutions, and informal lenders such as farmers and traders if collateral are available. Micro credit is typically short-term loan that can help in financing working capital, but not investment capital required to improve market participation. Informal credit from conventional lenders was often quick and less difficult to obtain, but because of the risk involved, it was very restricted in amount, and involve restrictive conditions in terms of repayment and interest. Informal lenders, such as usurers in rural areas charge more than 50 percent annual interest rate on loans. This high cost of borrowing was due to shortages of credit facilities, which in turn reduces the size of working capital. Besides abnormally high interest rate of these loans, opportunity costs of rural households are also high as they are supposed to sell dairy products to pay back the loans quickly.

Credit from family or friends (love capital), bears often no-interest, are also a significant source of finance. Fifteen percent (15%) of the sample households obtained credit from family and friends while 23.3% received from financial institutions in the survey year.

Livestock in the area are kept mainly for draught power. Milk production is only secondary. Dairying is used in the district to diversify operations and provide a continuous income especially for the poor. In the district, it is woman who decides how much to milk and how much to sale and children before school mostly perform the herding. Women who have exclusive right over income from dairy when the income is not significant sell surplus milk and other dairy derivatives (fig.4).
Table 3, Differences between market participants and non-participants

<table>
<thead>
<tr>
<th>Variables</th>
<th>Participants</th>
<th>Non-Participants</th>
<th>Whole Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes=44</td>
<td>No=46</td>
<td>N=90</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>Min Max</td>
<td>Mean Min Max</td>
</tr>
<tr>
<td>Demographic Characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of household members</td>
<td>8.15(2.1)</td>
<td>3 12</td>
<td>6.81(1.4)</td>
</tr>
<tr>
<td>Intellectual Capital</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experience in dairy production (yrs)</td>
<td>15.47(5.9)</td>
<td>8 30</td>
<td>16.7(12.75)</td>
</tr>
<tr>
<td>Years of schooling of the household head</td>
<td>1.97(1.3)</td>
<td>0 10+2</td>
<td>1.95(.98)</td>
</tr>
<tr>
<td>Years of schooling of spouse</td>
<td>1.7(.7)</td>
<td>0 10</td>
<td>1.62(.64)</td>
</tr>
<tr>
<td>Number of extension visits received/ year</td>
<td>1.85(.41)</td>
<td>0 3</td>
<td>1.25(.24)</td>
</tr>
<tr>
<td>Distance /Return time/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance from the nearest main market</td>
<td>4.25(2.06)</td>
<td>2 12</td>
<td>4.97(2.26)</td>
</tr>
<tr>
<td>Distance from district capital</td>
<td>4.97(3.18)</td>
<td>2 12</td>
<td>7.97(2.53)</td>
</tr>
<tr>
<td>Wealth and Financial Sources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Milking local breed cows</td>
<td>2.45(1.45)</td>
<td>1 15</td>
<td>1.85(1.23)</td>
</tr>
<tr>
<td>Total grain produced last year/household</td>
<td>37.95(23.2)</td>
<td>10 115</td>
<td>26.9(30.8)</td>
</tr>
<tr>
<td>Amount of loan received last year (Birr)</td>
<td>1902.5(214)</td>
<td>0 5000</td>
<td>1514.6(2045.9)</td>
</tr>
<tr>
<td>Financial income from different sources</td>
<td>3378(6954)</td>
<td>0 32000</td>
<td>1552(1857)</td>
</tr>
</tbody>
</table>

Source: Field survey output, June 2015, Standard deviations are in parenthesis

Market-oriented households keep few crossbred animals. Keeping crossbred dairy cows increases income from dairy as expected and brings financial obligations to the household
because of credit during initial purchase of the animals and high feed and management demand. In this case, men try to control the income from dairy to settle financial obligations and try to meet the expenditure of feed and other expenses. Because of the relatively smaller processed production of butter, cheese and yoghurt from milk of crossbred dairy cows, households tend to sell liquid milk without processing it into these dairy derivatives. In the particular study area very few dairy farmers own milking cross dairy cows, while the majority dairy farmers owns local dairy milking cows.

4.2. Characteristics by sample location

Sample households in Danbi dima, Bachara Odaa Gibee, Bari Abo and Gajo Kuyi had no crossbreed dairy cows and none of them sold liquid milk but sold dairy products such as butter and cheese, which have better shelf life preceding the survey. The volume of sale of butter and cheese per household was also relatively higher for Dambi Dima, Bachara and Gajo Kuyi farmers. Here the effect of distance can be clearly demonstrated in dairy market participation and volume of sales. In the rural areas of the district far from urban centre where there was little or no saving and accumulation of capital, the existing cultural and traditional taboos were inhibitive of selling of dairy products (locally called “the whites of cows”). Much of the product consumed during cultural and religious celebration and the remaining is freely given to near-by farmers and relatives for free. Those households were aged or had more experience in dairying and better per capita grain production. Households that were far from the district capital were more bound to their cultures and traditions than households close to urban centres.

Table 4: Distance from Nearest Market and District Capital

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nearest milk and other dairy product market (kms)</td>
<td>90</td>
<td>2.00</td>
<td>13.00</td>
<td>4.57</td>
<td>2.45</td>
</tr>
<tr>
<td>District Capital (kms)</td>
<td>90</td>
<td>2.00</td>
<td>15.00</td>
<td>6.34</td>
<td>3.19</td>
</tr>
</tbody>
</table>

Source: Survey result, June 2015
Most markets in the district are only regularly held, the average distance for the nearest main
markets for the sample, as a whole was about 5 kilometres. As indicated in table 4 above. This distance was as high as 15 kilometres for Bachara Oda Gibe, Bari Abo and Gajo Kuyi kebeles, where it takes on average, almost more than five hours return time. Dembi Gobu and Dambi Dima kebeles were located close to district capital and main market as compared to the other kebeles, it takes nearly two hours of return time from the district and nearest main market. The longer distance implies that people less often go to market and more time was required to get to market.

4.3. Forms of dairy sale by households

The most marketable product both in rural and urban areas was butter. Of the total 48.8% of market participating households, 38% participated in butter sale, 7.8% participated in selling milk and 3% participated in cheese sale, spatially the sale of cheese and milk were restricted to urban and peri urban areas while the sale of butter were undertaken anywhere in the district, even though the majority of the product were taken to urban markets. As depicted in table 6, households have a tendency of selling one dairy product at a time. Many households participate in selling butter and market participating farm households tend to sell one type of dairy product at a time. Equal number of sample households sold milk and cheese. Better combination was observed between butter and cheese. The combination of milk with other dairy products was weak and this shows that milk-selling households try to specialize in selling milk.

4.4. Uses of income from dairy

Many households in the study area are not market oriented and much of dairy product is, therefore, allocated for household consumption. Large amount of dairy products especially butter is used during cultural and religious festivals as cosmetics and preparation of varieties of cultural foods. Only little surplus left is taken to the market to meet different financial obligations of the households.

Dairy income is used to cover expenditures on replacement of stock and farm inputs, students’ school material, purchase of other foods and coffee, health expenditure (for both cattle and human) table 7 shows the detail. More than 16.7% of the sample households allocate their
income to cover student expenses as their first priority. Around 5.6%, 4.4% and 7.8% of the households allocate income from dairy for the purchase of different kinds of food items and coffee in their first, second and third expenditure respectively. The main advantage of selling dairy products for buying grain was the favorable terms of trade as observed by Kerven (1987) and Grandin (1988). This was also true for the study area, and one kilogram of butter was traded on average for 20kg of different grains. It was like bringing dairy products especially butter in a small packet (pocket) and taking grains in a basket. There were better terms of trade right after crop harvest which had been continuously reducing till the next crop harvest. Terms of trade deteriorates in summer when prices of crops escalating and opposite movement of prices of dairy products. Therefore, trading dairy products for grain and other foods far more support poor people in the district. Again selling dairy products for grain during periods of food shortage improves food security of the poor because of its favorable terms of trade and continuous income. The maximum expenditure from dairy income was observed for replacement of old stock and buying of different inputs such as fertilizer and improved seeds. Hence, 56.7%, 12.2% and 10.0% was indicated first, second and third priority of expense respectively. The second maximum expense from dairy income was observed for purchase of student’s material and the third maximum expenditure were observed as health expenditure for both human and livestock prevention and treatments.

Crossbreed dairy cows require better management, inputs and conditions as compared to local cows. Few households who keep crossbreed dairy cows spent relatively much of their income for the purchase of feed, different forms of roughages and concentrates, and for other management expenses than the owners of local dairy cows.

Sample households produced 1573.5 litres of milk per week. Most of the milk produced, about 1235 litres (78.5%), was processed into butter and 32 litres (2.05%) was sold in liquid form (table 8). The remaining 203.10 litres (12.9%) was consumed in the household in liquid milk form, and 42 litres (16.55%) was processed into yoghurt and cheese.

Dairy products in the hands of market participating and non-participating farm households had different uses. Both of the group let the calf to suckle and then what were milked was allocated for different purposes. Non-participating households use dairy products in a variety of ways. Depending on the households’ preferences, consumption was either in the form of liquid milk or
processed into different dairy derivatives, then as cooking butter and cosmetics. Market-participating households besides consuming some milk at the household allocated some amount of dairy products for sale in different forms. These households also consumed and sold dairy products of different forms, non-participating households prefer to consume processed dairy products 371 litres (73%) and unprocessed milk 137 (23%).

Dairy products with market participating households move through longer marketing chains. This is the result of additional activities performed by dairy producers and value adding functions (processing, transporting and storage) of marketing middlemen in terms of form, time and place.

4.6. Problems of smallholders in dairy marketing

Because of inherent physical and chemical properties of different dairy products related to sale and other external problems these products have different sales problems. Generally, as explained by respondents, the major constraints in dairy production and marketing in the district were low marketable surplus, remoteness from markets and urban centres, lack of tradition in dairy marketing. As indicated in table 9, 22(36.1%), 39(63.9%) and 40(65.6%) of the respondents prioritised low volume of production as a major constraint in milk, butter and cheese marketing respectively. Low production itself seems to be the result of the reduced per capita natural pasture due to increasing demand for land for crop production and increasing population. Again, the majority of dairy cows are indigenous animals, which have low milk production performance.

The low marketable surplus imposes limitation on exploring distant but rewarding and lucrative markets. Consequently, processed dairy products, which have lower volume and perishable nature, such as butter and cheese, were sold within the villages where market outlets and producers bargaining power were limited.

Remoteness coupled with high perishable and bulky natures of liquid milk have important effects on market participation decision and its volume of sales. Some respondents, 20(22.22%), indicated that because of their long distance from markets and major urban centres, they were unable to participate in the milk markets. This has restricted their participation in spatial
arbitrage and profitable transaction. This reduced market involvement in turn is expected to lead into reduced dairy production and low farm income. Distances has relatively minimum effect on butter and cheese sales because of reduced volume and perish ability.

Sales of cattle in general and dairy cows in particular were very low. Most households were reluctant to sell or cull poor performing dairy cows. Only 20 (22.22%) and 3 (3.3%) of the sample households sold livestock and dairy cows, respectively, in the year preceding the survey.

Increasing dairy production through the increase in the number of poor performing dairy cows is very limited because of the continuously decreasing pasture and forage. Overstocking the land with livestock degrades the land and further diminishes fodder and pasture supply. Increase in the dairy production, therefore, should be achieved through the adoption of high yielding dairy cows which can be both local and crossbreed.

Market infrastructure tends to be deficient in the district. Even though, there was a good beginning. There is lack of appropriate roads, communication means, and electricity and there is also lack of appropriate storage for perishable dairy products. This resulted into significant deterioration costs. As the consequence, market supply heavily depends on quantities produced alone and not adjusted from stock. This situation reinforces seasonality and price volatility like reduced supply and associated high price in dry season as opposed to wet season.

4.7. Livestock extension services

Market extension was a peripheral issue in the extension scenario in the district. Market extension was not given the attention it deserves. Extension services, therefore, was concerned mostly with livestock production, natural resource conservation, crop production and health. In this regard the respondents replied that 77 (85.6%) have got the service. But none of the respondents replied that they have got dairy marketing extension services. Farm households replied that they were not getting enough and relevant market extension services. Some of them indicated that 13 (14.4%) they got no or insufficient extension services on either marketing of dairy products or other extension services in the year preceding the survey. The remaining got services related to livestock feed and health and look for services such as artificial insemination, provision of vaccine to prevent different animal diseases and treatment of different diseases for their cattle and with the aim of improving poor performing local dairy cows. Even though the service they got is not adequate
4.8. Econometric Analysis

4.8.1. Factors influencing farm households participation in dairy market

Participation in dairy market was defined as a variable taking the value of 1 for dairy market participants and 0 for non dairy market participants and used as a dependent variable. Market participation here means sale of any kind of dairy products mainly liquid milk, butter or cheese from own production. In order to explain farmers’ participation in dairy market, continuous and discrete variables were identified based on economic theories and the findings of different empirical studies and these variables are described in table 10.

Table 10: Definition of explanatory variables

<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>Type</th>
<th>Description</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grainprm</td>
<td>Continuous</td>
<td>Grain production</td>
<td>Quintals</td>
</tr>
<tr>
<td>Offarmincm</td>
<td>Continuous</td>
<td>Financial income from different sources</td>
<td>Birr</td>
</tr>
<tr>
<td>Amtloanrvd</td>
<td>Continuous</td>
<td>Amount of loan received</td>
<td>Birr</td>
</tr>
<tr>
<td>Schoolings</td>
<td>Continuous</td>
<td>Educational level of spouse</td>
<td>Years of schooling</td>
</tr>
<tr>
<td>Scoolingh</td>
<td>Continuous</td>
<td>Educational level of household head</td>
<td>Years of schooling</td>
</tr>
<tr>
<td>Dairyexp</td>
<td>Continuous</td>
<td>Experience in dairy production</td>
<td>Number of years</td>
</tr>
<tr>
<td>Extenserce</td>
<td>Discrete</td>
<td>Extension visits made</td>
<td>0=no, 1=yes</td>
</tr>
<tr>
<td>FAMSIZE</td>
<td>Continuous</td>
<td>Number of household members</td>
<td>Number</td>
</tr>
<tr>
<td>RETRNTMMRT</td>
<td>Continuous</td>
<td>Distance from nearest market</td>
<td>Kms</td>
</tr>
<tr>
<td>RETRNTMDISCAP</td>
<td>Continuous</td>
<td>Distance from the district capital</td>
<td>Kms</td>
</tr>
<tr>
<td>SexH</td>
<td>Discrete</td>
<td>Sex of the household head</td>
<td>0=female, 1=male</td>
</tr>
<tr>
<td>BREEDLOCAL</td>
<td>Continuous</td>
<td>Number of local dairy cows</td>
<td>Number</td>
</tr>
<tr>
<td>Crossbreds</td>
<td>Continuous</td>
<td>Number of cross dairy cows</td>
<td>Number</td>
</tr>
</tbody>
</table>

Source: Own computation, June 2015
Before running logistic regression and Tobit models both continuous and discrete explanatory variables were checked for existence of multicollinearity. Partial correlation coefficients and Variance Inflation Factor (VIF) for continuous variables and contingency coefficients for dummy variables (table 5) were computed to see the existence of multicollinearity among variables. There was no problem of multicollinearity among the variables that were used in the models.

4.9. Factors affecting dairy market participation of households

The household physical wealth affecting market participation decision is local bred and crossbreed dairy cows. As it was expected, they are posited to affect market participation decision positively. However, investment in high yielding exotic breeds or crossbred dairy cattle would also seem a difficult option because of high initial cost, limitation of feed and fodder and with the increasing population and demand to allocate more land for crop production, only small and marginal areas are left for pasture. This has resulted into an ever-decreasing pasture both in quality and quantity. Therefore, only few urban, peri urban and rural market oriented farmers possess crossbred dairy cows. The majority of them own local dairy cows only. Hence, the numbers of local milking cows significantly affect the market participation of the household for the particular study area.

Financial capital includes income from different sources such as off-farm activities of household head and spouse, remittances and income by other household members other than the household head and spouse. Financial capital from different sources was expected to affect market participation of households positively. Unfortunately, even though it is not significant, it is found to affect market participation of the farmer negatively. This indicates that such income was used for fulfilling other needs of the households and preferring the dairy products for processing into different dairy derivatives and using it for home consumption rather than selling it.

Family size or Household members represent labour resources and, hence, are posited to be directly related to engagement in production and marketing activities. In agricultural studies, it was shown that household members represent labour resources and directly influence market participation. In this particular case number of household members have negative coefficient,
this is mainly because large households with greater members tend to consume much of dairy products than participating in the market.

Transaction costs are hypothesized to impede market participation because they impose added cost burdens to the dairy marketing activities. Distance to market is considered as a proxy for transaction costs and is hypothesized to negatively affect market participation; that is, the farther away is a household from the market, the more difficult and costly it would be to get involved in the market. Consistent result was found in this study. Distance to district capital has positive coefficients. However, distance to the nearest market has negative coefficient and significant at 1% probability level. District capital has indirect effect on household output and also affects market participation position of the household. However, hence the dairy producing households sell their dairy products in the nearby markets it is not as such significant.

Rural households who have sufficient per capita grain production shun the idea of market participation altogether. Relatively wealthy households consume a high portion of milk extracted from cows with surplus turned to butter, which partly indicates that dairy consumption exhibits higher income elasticity of demand in the rural households. The dietary habits and cultural significance of milk and dairy products in the diet of the rural people in the district suggests that the demand for milk and dairy products increase with increase in income. It is not unusual to see these households waste substantial amount not being able to sell because of distance as well as cultural taboos. In such a situation, producers lose income and consumers are denied these products.

In this particular study, positive coefficient of grain production indicates direct relationship with dairy market participation decision. Relatively rich households, when they find grain production to be more profitable likely to engage in dairy marketing and other off-farm activities. This shows that under such undeveloped situations, specialization of relatively wealthy households in grain production may participate in dairy marketing. At the same time, poor households with limited per capita grain production try to diversify income source from farm and non-farm activities. The poor with limited per capita grain production is observed to participate in the dairy market more than the rich. The sales of dairy products mainly by smallholders in rural areas, therefore, may be regarded as a symptom of increasing poverty.
As it was expected most participating households in the sample have more than one dairy cow and as the number of dairy cows increases households are likely to participate in dairy marketing. The increasing number of quality local and crossbred dairy cows is an important policy relevant variable in stimulating the smallholder to market entry and benefit from economic transaction.

The priori expectation was that households with better intellectual capital stock would be positively related to market participation. However, the expectation may be reversed when there are competing and more remunerative employment opportunities available in the area that require skills that are enhanced by more education. In a similar study in Ethiopia (Holloway, et al. 2000) found that education of the household has negative coefficient and inverse relationship with market participation decision, which is contrary to the usual expectation. In the current investigation, the effect of intellectual capital is captured in the variables “education” (number of years of schooling of the household head and spouse) and “extension” (access to extension services). Education of the household head has positive coefficient and that of the spouse has negative coefficients respectively. In this study, most of the household heads are males, and educated males can understand the ongoing dairy market situations and positively influence the spouse to participate in dairy market.

The extension variable, on the other hand, has a positive coefficient, suggesting that exposure to extension service exerts a positive influence on market participation and this is consistent with expectation.

The log likelihood ratio test indicates that the explanatory power of the independent variables taken together was significant at less than 5% probability level. This indicates that the hypotheses that the coefficients except the intercept equal to zero rejected. The value of chi-square shows the goodness of the model at less than 5% probability level. The likelihood ratio index indicates that the logit model explains approximately 53% of the variation in the independent variable. Another measure of goodness of fit of the model is based on a scheme that classifies the predicted value of events as one if estimated probability of an event is equal or greater than 0.5 and 0 otherwise. From all sample farmers 79% were correctly predicted into market participants and non participants’ category by the model.
Table 11: Factors influencing dairy market participation (Logit output)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Standard error</th>
<th>Odds ratio</th>
<th>Wald statistics</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAMSIZE</td>
<td>-.69</td>
<td>.19</td>
<td>.50</td>
<td>-1.87</td>
<td>0.0502*</td>
</tr>
<tr>
<td>SexH</td>
<td>.99</td>
<td>6.38</td>
<td>2.70</td>
<td>0.42</td>
<td>0.6750</td>
</tr>
<tr>
<td>Dairyexp</td>
<td>-.05</td>
<td>.07</td>
<td>.95</td>
<td>-0.64</td>
<td>0.5190</td>
</tr>
<tr>
<td>EDUCATIONH</td>
<td>.46</td>
<td>1.07</td>
<td>1.58</td>
<td>0.68</td>
<td>0.4980</td>
</tr>
<tr>
<td>EDUCATIONS</td>
<td>-.54</td>
<td>.75</td>
<td>.58</td>
<td>-0.42</td>
<td>0.6760</td>
</tr>
<tr>
<td>Extenserce</td>
<td>5.883</td>
<td>8.83</td>
<td>3.59</td>
<td>-2.75</td>
<td>0.0170***</td>
</tr>
<tr>
<td>RETRNTMMRT</td>
<td>-1.30</td>
<td>.13</td>
<td>.27</td>
<td>-2.75</td>
<td>0.0060***</td>
</tr>
<tr>
<td>RETRNTMDISCAP</td>
<td>.46</td>
<td>.55</td>
<td>1.59</td>
<td>1.33</td>
<td>0.1840</td>
</tr>
<tr>
<td>Offarmincm</td>
<td>-.001</td>
<td>.0003</td>
<td>1.00</td>
<td>-0.49</td>
<td>0.6270</td>
</tr>
<tr>
<td>Grainprn</td>
<td>.005</td>
<td>.05</td>
<td>1.00</td>
<td>0.13</td>
<td>0.8990</td>
</tr>
<tr>
<td>Milcowshlocal</td>
<td>1.14</td>
<td>1.71</td>
<td>3.13</td>
<td>2.09</td>
<td>0.0360**</td>
</tr>
<tr>
<td>Amtloanrvd</td>
<td>.01</td>
<td>.05</td>
<td>1.00</td>
<td>1.18</td>
<td>0.2390</td>
</tr>
<tr>
<td>Constant</td>
<td>5.07</td>
<td>4.07</td>
<td>3.44</td>
<td>1.24</td>
<td>0.2140</td>
</tr>
</tbody>
</table>

***, **, * Significant at 1, 5 and 10 probability level, respectively.

LR Chi-square ($\chi^2$) (12) = 98

Overall percentage 79.20

Number of observation = 90

Prob > chi$^2$ = 0.000

Log likelihood = -13.1398

Source: Model output, June, 2015
5. Conclusions and Policy Implications

The study was initiated with the objectives of determining factors affecting market participation of small dairy farming households. Participation in dairy sale is a dichotomous dependent variable the Maximum Likelihood Estimation procedure of logit model was thus used in the study. Participation decision of the smallholder was significantly affected by extension service delivered, distance to the nearest market, family size and milking dairy cows owned.

Dairy market in the study area is characterized by the prevalence of un concentrated supplies. Products are supplied by a very few number of producers from different areas. At buyers’ level market is also un concentrated for butter and cheese. On the other hand, milk market at buyers’ level was weakly oligopolistic.

As it was calculated from the survey result, dairy producers participating in marketing of dairy products are more profitable when they sell at Bako town (the district capital) than when they sell at local villages markets, even though selling dairy products at both markets are profitable for dairy farmers. Moreover dairy farmers participating in dairy production and marketing are highly profitable.

Strategies that are of significant importance which are also policy relevant are provision of quality animals both local and crossbreed, which improve total production and subsequently marketable surplus. Dairy production especially in rural area is small to support an elaborated marketing system. The low marketable output generates limitations to explore distant but rewarding markets due to high transaction costs arising from transportation and high opportunity cost of labor involved in the sector.

Lack and shortage of animal feed and presence of different animal diseases were the problems reducing marketable surplus of dairy products in the study area. To alleviate this problem teaching the farming community in production and storing of different feeds for the time of feed shortage is indispensible. Provisions of animal health services to the dairy farming community are the other desiring attention.

Farness from district capital and market areas was one of the constraints to dairy marketing in the district, which resulted into inadequate marketing link between the rural producer and the urban
consumer. This missing link can be taken through institutional arrangement such as cooperative structures. Cooperatives can be very successful in dealing with both information asymmetries and easily attain competitive edge. They do this through collective action, pooling resources and lowering the unit cost of transactions.

Members should widely understand the cooperative and its objectives and established voluntarily without any form of external imposition. Once decision to adopt cooperative structure as a means of dairy development is taken, government policies may be used to support dairy cooperatives.

In the district collecting and transporting milk and its dairy derivatives from its production site to the consumption, from the production to the transformation unit or consumption zone is a challenge to the dairy marketing and development. Improved collection and reduction in milk wastage requires improved infrastructure and transportation means.

From results of the study provision of extension service improve dairy sales volume and dairy market participation. Agricultural market extension services rendered to smallholder should be relevant and enough. However, with major thrust of extension agencies on production techniques, marketing extension so far has not received the attention it deserves. Moreover, farmers have increasingly begun to perceive marketing rather than production as the major constraint to enhancing farm incomes. Agricultural marketing extension service was a peripheral issue in the extension scenario so will need to be brought to centre stage and production needs to be significantly dictated by market requirements. Another need is enlightening the producer seller on consumer preferences and to advise him on the proper methods of processing for marketing, storing, packaging, handling and transporting and to improve the quality of the produce to secure a better return from the firm.

Agricultural marketing is a multistage process. For the improvement and development of marketing structure, a coordinate approach aiming at removing all the weak links of the marketing channel is essential. A package of improved marketing services in the form of regulated markets, grading, weighing, storing, transporting and handling services need to be made available to ensure the producer a fair return from his production efforts and a better share in the price paid by the consumer. On the other hand ensure the consumer to get quality product in relation to the money outlay.
Financial capital, such as financial income from different sources and credit (loan) found to stimulate dairy market participation, financial profitability and volume decision. However, extension of bank credit is conditioned by the availability of collateral. Land ownership issues, traditional farming practices and lack of market access often prevent smallholder farmer from obtaining loan from banks. Therefore, increasing the dimension of access to credit and forming well functioning formal rural and urban financial systems are critical in influencing entry to the dairy marketing.

Acknowledgement

The author acknowledges all those who helped him in preparing this manuscript. Above all he thanks his God, who can do everything right at right time.
6. References


7. Annexes

Annex 1; Lists of Tables

Table 1: Lactating Cows owned and Sample size Determination

<table>
<thead>
<tr>
<th>Sampled PA</th>
<th>Number of HHs having Lactating cows per PA</th>
<th>Number of HHs selected</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachara</td>
<td>203</td>
<td>22</td>
<td>24.4</td>
</tr>
<tr>
<td>Bariab</td>
<td>202</td>
<td>21</td>
<td>23.3</td>
</tr>
<tr>
<td>Dambid</td>
<td>149</td>
<td>15</td>
<td>16.7</td>
</tr>
<tr>
<td>Dambig</td>
<td>118</td>
<td>15</td>
<td>16.7</td>
</tr>
<tr>
<td>Gajokuyi</td>
<td>161</td>
<td>17</td>
<td>18.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>833</strong></td>
<td><strong>90</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Source, own computation, June, 2015

Table 2: Dairy Marketing Participants by Sex of House hold

<table>
<thead>
<tr>
<th>sex</th>
<th>Participants (n)</th>
<th>%</th>
<th>Non Participants (n)</th>
<th>%</th>
<th>Total (n)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>4</td>
<td>9.09</td>
<td>9</td>
<td>19.5</td>
<td>13</td>
<td>14.5</td>
</tr>
<tr>
<td>Male</td>
<td>40</td>
<td>90.1</td>
<td>37</td>
<td>80.5</td>
<td>77</td>
<td>85.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>44</strong></td>
<td><strong>100</strong></td>
<td><strong>46</strong></td>
<td><strong>100</strong></td>
<td><strong>90</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: Output of the survey result, June 2015
### Table 5: Variance Inflation Factor (VIF) for continuous variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>VIF</th>
<th>1/VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>RETRNTMDIS~P</td>
<td>1.85</td>
<td>0.540502</td>
</tr>
<tr>
<td>RETRNTMMRT</td>
<td>1.70</td>
<td>0.586808</td>
</tr>
<tr>
<td>Grainprn</td>
<td>1.70</td>
<td>0.588431</td>
</tr>
<tr>
<td>Offarmincm</td>
<td>1.50</td>
<td>0.667534</td>
</tr>
<tr>
<td>Famsize</td>
<td>1.48</td>
<td>0.676170</td>
</tr>
<tr>
<td>Extenserce</td>
<td>1.37</td>
<td>0.731682</td>
</tr>
<tr>
<td>Dairyexp</td>
<td>1.17</td>
<td>0.855397</td>
</tr>
<tr>
<td>Milcowslocal</td>
<td>1.17</td>
<td>0.857705</td>
</tr>
<tr>
<td>Amtloanrvd</td>
<td>1.13</td>
<td>0.883422</td>
</tr>
<tr>
<td>Schoolings</td>
<td>1.16</td>
<td>0.864492</td>
</tr>
<tr>
<td>Scoolingh</td>
<td>1.32</td>
<td>0.759199</td>
</tr>
<tr>
<td><strong>Mean VIF</strong></td>
<td><strong>1.39</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Own Computation, June, 2015

### Table 6: Households selling different forms of dairy products

<table>
<thead>
<tr>
<th>Market participating households</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households selling butter</td>
<td>24</td>
<td>38</td>
</tr>
<tr>
<td>Households selling milk</td>
<td>4</td>
<td>7.8</td>
</tr>
<tr>
<td>Households selling cheese</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Households selling butter and cheese</td>
<td>6</td>
<td>6.6</td>
</tr>
<tr>
<td>Households selling butter and milk</td>
<td>3</td>
<td>3.3</td>
</tr>
<tr>
<td>Households selling milk and cheese</td>
<td>2</td>
<td>0.1</td>
</tr>
</tbody>
</table>
Households selling butter, cheese and milk 5 5.5

Source: Survey results, June 2015

Table 7: Percentage expenditure of income from dairy by sample households (percent)

<table>
<thead>
<tr>
<th>Expense category</th>
<th>Rated as first</th>
<th>Rated as second</th>
<th>Rated as third</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students’ materials</td>
<td>16.7</td>
<td>26.7</td>
<td>15.6</td>
</tr>
<tr>
<td>Other food and coffee</td>
<td>5.6</td>
<td>4.4</td>
<td>7.9</td>
</tr>
<tr>
<td>Buy grain</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>Soap and clothes</td>
<td>5.6</td>
<td>28.9</td>
<td>25.6</td>
</tr>
<tr>
<td>Health Expenditure</td>
<td>10.0</td>
<td>21.1</td>
<td>22.2</td>
</tr>
<tr>
<td>Cattle Replacement and inputs</td>
<td>56.7</td>
<td>12.2</td>
<td>10.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: Computed from survey data, June 2015

Table 8: Utilization of milk among sample farm households

<table>
<thead>
<tr>
<th>Dairy products</th>
<th>Litres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk for human consumption in the household</td>
<td>203.10</td>
<td>12.9</td>
</tr>
<tr>
<td>Milk sold</td>
<td>32</td>
<td>2.05</td>
</tr>
<tr>
<td>Milk processed into butter</td>
<td>1235</td>
<td>78.5</td>
</tr>
<tr>
<td>Milk processed into yoghurt &amp; cheese</td>
<td>103.4</td>
<td>6.55</td>
</tr>
<tr>
<td><strong>Total milk produced</strong></td>
<td><strong>1573.5</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: Computed from survey data, June 2015
Table 9: Problems of dairy marketing of smallholders by commodity type

<table>
<thead>
<tr>
<th>Marketing Problem</th>
<th>Milk</th>
<th>Butter</th>
<th>Cheese</th>
</tr>
</thead>
<tbody>
<tr>
<td>No problem</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Far from market or town</td>
<td>20</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Lack of feed</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Low production</td>
<td>18</td>
<td>20</td>
<td>23</td>
</tr>
<tr>
<td>No tradition of selling dairy products</td>
<td>8</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Livestock Disease</td>
<td>17</td>
<td>25</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>90</strong></td>
<td><strong>90</strong></td>
<td><strong>90</strong></td>
</tr>
</tbody>
</table>

Source: Survey results, June 2015
Annex 2;

Lists of Figures

Figure 2: Sample Photo showing taring and discussion with elders, PA managers and enumerators
Source: own Survey results, June 2015

Figure 3:-Sample photo showing interviewing the respondents
Source: own Survey results, June 2015

Figure 4: Photo showing some sample activities of children before school and women

Source: own Survey results, June 2015