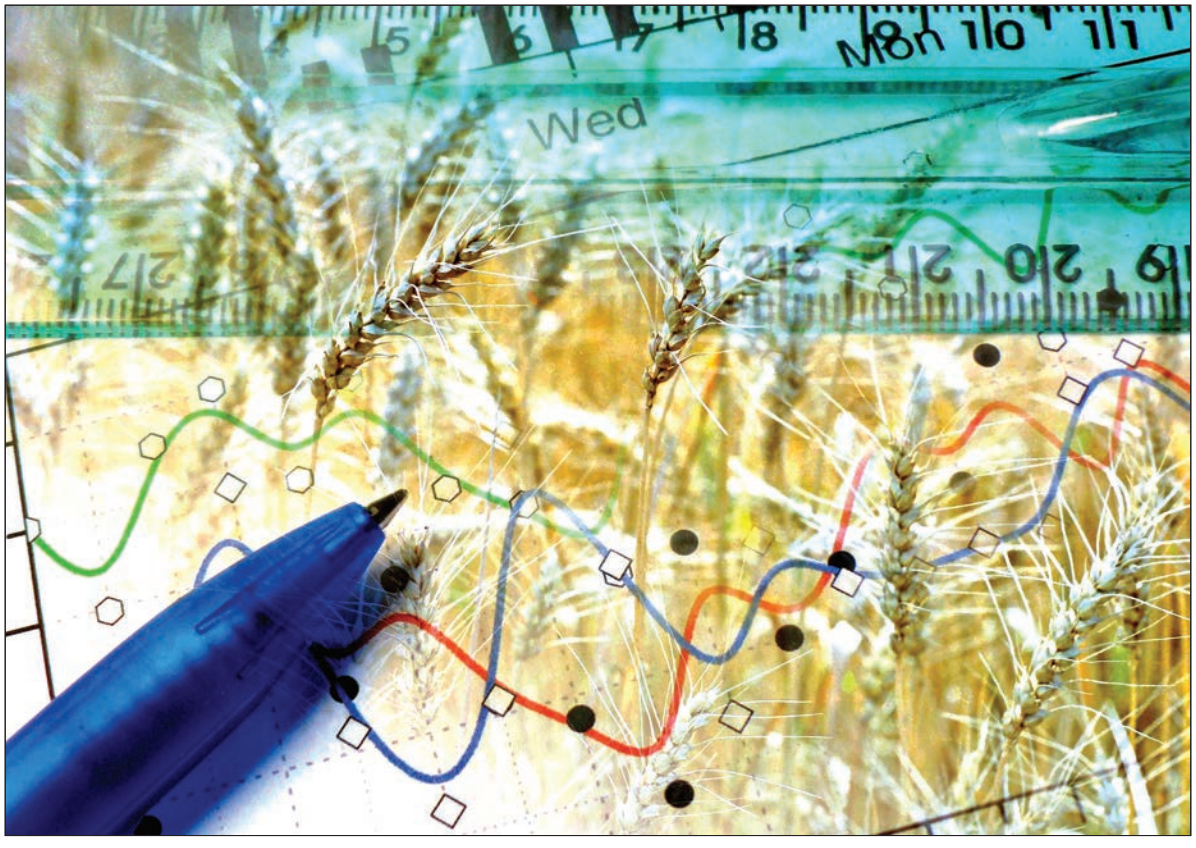

Trends in Agricultural Economics

ISSN 1994-7933

science alert

ANSInet
an open access publisher
http://ansinet.com

OPEN ACCESS Trends in Agricultural Economics

ISSN 1994-7933
DOI: 10.3923/tae.2016.29.44

Case Report
Determinants of Market Participation and Financial Profitability of Smallholder Dairy Farming: The Case of Bako Tibe, West Showa, Ethiopia

[1]Bultossa Terefe Willy and [2]Adeba Gemechu

[1]Department of Development Economics, Ambo University, Ethiopia
[2]Department of Agricultural Economics, College of Agriculture and Veterinary Medicine, Jimma University, Ethiopia

Abstract

Ethiopia's economy primarily depends on agriculture. The sector is dominantly run by smallholder farmers and contributes to about 50% of GDP and provides employment for about 83% of the total population. Dairy farming agriculture is considered important for stimulating growth, economic development, food security and poverty reduction. As a remedy, this study was initiated with the objectives of determining factors affecting dairy market participation and financial profitability of dairy farmers in Bako Tibe. Data came from the survey of 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, tobit model was used in investigating factors affecting decision on volume of dairy sales. Total revenue less total variable costs and OLS were used in examining financial profitability of the dairy farmers. Results show that farm household's market participation decision is affected by household demographic and socio-economic characteristics and transaction costs represented by distance to market and urban centers. Volume sale of dairy is affected by intellectual capital, transaction cost represented by distance to district capital and markets. Financial profitability is affected by distance from market, extension visit, education level of the household head, number of milking cows owned and family size. 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 should be established 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.

Key words: Dairy market participation, financial profitability, maximum likelihood estimation, logit and tobit models

Received: March 22, 2016 Accepted: May 11, 2016 Published: June 15, 2016

Citation: Bultossa Terefe Willy and Adeba Gemechu, 2016. Determinants of market participation and financial profitability of smallholder dairy farming: The case of Bako Tibe, West Showa, Ethiopia. Trends Agric. Econ., 9: 29-44.

Corresponding Author: Adeba Gemechu, Department of Agricultural Economics, College of Agriculture and Veterinary Medicine, Jimma University, Ethiopia

Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

The majority of the world's estimated 1.3 billion poor people live in developing countries where they depend directly or indirectly on livestock for their livelihoods (World Bank, 2008; FAO., 2006). Globally, livestock contributes about 40% to the agricultural Gross Domestic Product (GDP) and constitutes about 30% of the agricultural GDP in the developing world (World Bank, 2009). These estimates highlight the important contribution of livestock to sustainable agricultural development. The contribution of livestock to the world's food supply, family nutrition, incomes, employment, soil fertility, livelihoods, transport and sustainable agricultural production continues to be a subject of significant review and debate. Furthermore, estimates show that globally, livestock provide animal traction to almost a quarter of the total area under crop production (Devendra and Sevilla, 2002). Livestock also provide a safety net in times of need in the form of liquid assets and a strategy of diversification for food production (Franzel and Wambugu, 2007). All these reviews and studies thus, far have shown that livestock play multiple roles in the livelihoods of people in developing communities, especially the poor.

Agriculture is the mainstay of the Africa's 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% of the population and generates 50% of the GDP. According to CSA (1995), about 72% of farm households cultivate holdings of less than 1 ha and the average land holding size is 0.8 ha. 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) and declining agricultural productivity and inadequate market participation of producers (World Bank, 1991) are few of the factors underlie this trend.

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 (Yigezu, 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.

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) (Yigezu, 2003).

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. 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.

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 Anteneh, 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 Anteneh, 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, nearer the market the lesser would be transportation charges and the lesser would be loss due to spoilage.

In this study, the determinants of small holder dairy farmer's market participation and their financial profitability will be examined in 5 communities in Bako Tibe area, in West Showa Administrative Zone, Oromia Regional State, about 250 km West of Addis Ababa. The area and its environs have potential for both crop and livestock production which are mainly undertaken by smallholder semi subsistence farmers. 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 (Bako Tibe District Agricultural and Rural Development Office). There are also a growing number of commercial farms in the area.

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, 1972). Various factors could limit the diary farmer's participation in the market and their financial returns. These factors may originate in technical barriers including lack of market information, structural elements and government programmes and policies. Costs of marketing are usually high due to poorly developed physical and institutional facilities, absence of marketing services such as standardization, market information, financing arrangement, storage, transportation and processing etc. This would otherwise result in high risk of marketing and high barriers to growth, poorly motivated producers and inadequate marketing institutions. It could also be due to farmer's poor management practices. Identifying the key factors influencing smallholder's market participation and profitability is important to develop policies and institutions which support smallholder dairy farmers. However, currently such information is lacking for Bako Tibe area. Moreover, the rural and the peri urban area of Bako Tibe district have high potential of livestock production but in the districts capital there is a chronic shortage of dairy products. In this regard, it is imperative to investigate the problem and search for the solutions and recommendations. Above all, why chronic shortage of dairy products in the capital city of the district revels? While there is a great potential of dairy production in the area? Especially, in the rural areas? Answering this question is the research agenda of this study.

The major objective of the study was to determine factors affecting market participation and financial profitability of smallholder dairy farmers in Bako Tibe.

The specific objectives of this study are:

- To identify factors influencing market participation of smallholder dairy farmers
- To analyse the financial profitability of smallholder dairy farming
- To come up with some policy recommendations related to smallholder dairy farming for policy makers

MATERIALS AND METHODS

Study area: Bako Tibe district is found in West Shewa Administrative Zone, Oromia Regional State, about 250 km West of Addis Ababa, at latitude of 9.12° and at a longitude of 37.05°. Bako Tibe district is with an area of about 644.7 km^2 of which about 54.25, 23.98, 5.12 and 16.65% ha is under crop, pasture, forest and infrastructure or for other use, respectively. 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.

Sampling procedure: 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. In the second stage, 5 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 studies, a total of 90 dairy farming households were selected randomly using probability proportional to sample size sampling technique from the list prepared. Table 1 shows the brief. 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 5 km from the district capital and Dambi Dima and Dembi Gobu are in the vicinity of the town within 5 km radius. Within the maximum distance of 15 km apart. Tibe district has the potential for both crop and livestock production, which is mainly undertaken by

Table 1: Dairy marketing participants by sex of household head

	Participants		Non-participants		Total	
Sex	No.	%	No.	%	No.	%
Female	4	9.09	9	19.5	13	14.5
Male	40	90.1	37	80.5	77	85.5
Total	44	100	46	100	90	100

Dairy market participating households have more family members than non dairy market participating households

smallholder farmers. There are also a relatively growing number of commercial farms and agro-processing industries operating in the area. The district is ideal to investigate the relationship between rural and urban markets, the marketing problems and constraints of the smallholder dairy farmers. Moreover, the logistics problem of the studies, such as research fund, availability of means of transport, homogeneity of the dairy farmers and objective of finishing the thesis study in 1 year were important factors in choosing the district and the kebeles (PAs).

In order to examine the sales patterns and marketing behaviour of the different categories of producers, additional criteria were employed. The criteria behind the selection of peasant associations were distance to market and district capital and criterion adopted behind the selection of sample households was producers with some form of dairy products. Rural kebeles were classified according to their distance from Bako town, the 1st group being those within 5 km of Bako town and 2nd those beyond 5 km. The maximum was 15 km from the town. Using concentric circle the number of kebeles in the 1st and 2nd group were 2 and 3, respectively. The sampling frame of Dambi Dima, Dembi Gobu, Bachara, Bari Abo and Gajo Kuyi were identified. Three stage sampling technique was employed; first Bako Tibe district was purposively selected. Second peasant associations were randomly selected and then dairy producing farmers were determined and registered in lists. Through proportional probability, reasonable and representing dairy producing households from Dambi Dima, Dembi Gobu, Bachara, Bari Abo and Gajo Kuyi were selected from the registered lists of dairy producers.

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. Detailed dairy enterprise data were also collected which allow the analysis of the financial profitability of dairy production.

The target population was defined as all households having lactating cows in 5 peasant associations (kebeles) found in the 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.

Methods of data collection: Structured questionnaire were developed for field data collection. However, this study 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.

Key informants were also interviewed to collect other relevant information on other market actors like livestock and dairy traders, extension agents and researchers. 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. The author himself, some cooperating socio-economic researchers from Bako Agricultural Mechanization Research Centre, PA managers, DAs and some other enumerators conducted the survey during the months of May and June, 2013. 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 preceding the survey to make the training practical.

Methods of data analysis

Market participation: 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 discriminant function, logistic distribution function (logit) and normal distribution function (probit). These functions are used to approximate mathematical relationship between explanatory variables and dependent dummy variable, which is always assigned qualitative values (Gujarati, 1988; Maddala, 1992).

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

$$P_i(y=1) = \frac{1}{1+e^{-zi}} = \frac{e^{zi}}{1+e^{zi}}$$

Where:

P_i = Probability of participating in the market for the ith dairy producer and ranges from 0-1

e^{zi} = Stands for irrational number for the power z_i

Z_i = Function of a number of explanatory variables, which is also expressed as:

$$Zi = B_0+B_1X_1+B_2X_2+...+B_nX_n$$

where, X_1, X_2,…, X_n are explanatory variables, β_o is the intercept and β_1, β_2, …, β_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).

$$Pi = \frac{1}{1+e^{-(B_0+B_1X1i+B_2X_{2i}+.....+B_nX_{ni})}}$$

If Pi is the probability of market participation decision then (1- pi) is otherwise:

Now $\frac{Pi}{1-Pi}$ 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.

Factors affecting sales volume of dairy sale: A tobit model was used in analysing factors affecting sales volume of dairy products. The key aspect of using the tobit model is the use of latent quantities of marketable surplus of non-participating households. The dependent variable takes on positive and zero values. When a zero value is observed, it is assumed that the household in question, rather than possessing an excess of the marketable product and actually has the demand for the commodity (that is a negative supply) (Lapar *et al.*, 2002). Hence, sales quantities are left censored at 0 and tobit model is also known as censored regression model. Following Tobin (1958), this model is expressed as:

$$Y^* = B_0' \sum B'_i X_i + e_i \text{ and } e_i \text{ is } N \sim (0, \sigma^2)$$

where, Y_i^* is latent dependent variable representing quantities of dairy supplied to the market by farm households which is observed, y*>0 unobserved otherwise and X_i is a set of explanatory variables which are categorized into resources, the household socio-economic characteristics and travel time or distance to dairy product market or district capital. The detailed description of variables is given.

The β_0 represents the constant term, X_1 denotes number of household members, X_2 is experience in dairy production, X_3 represents educational level of household head, X_4 is educational level of the spouse, X_5 is number of extension visits, X_6 is number of lactating local bred dairy cows, X_7 is number of lactating cross bred dairy cows, X_8 is distance from the nearest market, X_9 is distance from the district capital, X_{10} is amount of loan received last year, X_{11} is financial income from non dairy sources/off-farm income/, X_{12} is amount of grain production last year and X_{13} is sex of the household.

The β_1, β_2, β_3, ⋯, β_{13} represents parameters to be estimated and e_i represents the disturbance term.

The model parameters are estimated by maximizing the tobit likelihood function of the following form:

$$L = \prod_{y^*>0} \frac{1}{\delta} f\left(\frac{Y-\beta_i X_i}{\delta}\right) \prod_{y^*\le 0} F\left(\frac{-\beta i Xi}{\delta}\right)$$

where, F (z) is the cumulative standard normal distribution function and f (z) is the value of the derivative of the normal curve at a given point, z is the Z-score for the area under normal curve, β is a vector of tobit maximum likelihood estimate and δ is the standard error of the error term. $\prod_{y^*>0}$ means the product over those i for which y*>0 and $\prod_{y^*\le 0}$ means the product over those i for which $y_i^* \le 0$.

The marginal effect of an explanatory variable on the expected value of the dependent variable among the whole sample was expressed by the following formula:

$$F(Z)\beta = \beta\varphi\left(\chi', \frac{\beta}{\delta}\right)$$

where, Y_i is dependent variable, X_i is a vector of independent variable, β is a vector of tobit maximum likelihood estimate and F (z) is the cumulative standard normal distribution function.

The change in the volume of dairy products sale with respect to change in explanatory variables among the participating households under Citrus Paribus assumption will be given by:

$$\left[\partial E \frac{(Y/Y^*>0)}{\partial X_i} = \beta\left[1 - Z\frac{f(z)}{F(Z)} - \left[\frac{f(z)}{F(Z)}\right]^2\right]\right.$$

Market participation and sales volume decision of smallholders: 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 2 outcomes, yes (1) or no (0). The use of ordinary least square technique for such variables poses inference problems and 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). A tobit procedure was employed in identifying factors affecting volume of sales decision of dairy products. The logic behind the use of the tobit model is covariates affecting market participation decision of the farmers might be different from covariates affecting sales volume decision of the dairy farmers and the magnitudes of the effects of parameter estimates is also different from that of logit model (Lapar *et al*., 2002).

The market participation of the smallholder dairy farmers with dairy products (milk, butter and cheese) used logit model. A tobit model was used to analyze the relative importance of different determinants of volume of butter sale. Dependent variable in logit model was sale of any form of dairy products and is dichotomous variable, sale or no sale (sale = 1 and no sale = 0).

Financial profitability analysis: To undertake the financial profitability analysis of the dairy farmers and the gross margin, which is given as the total revenue from dairy products sales mines total variable cost of production of a given dairy product were used (Mendoza and Rosegrant, 1995). According to Ahmad *et al.* (2005) the gross margin was used because of its accuracy in estimating financial profitability.

$$GM = TR\text{-}TVC$$

where, GM is gross margin for ith dairy product, TR is total revenue of ith product from dairy products sale and TVC is total variable cost of production of ith dairy product.

Hence:

- Gross margin of milk = Total revenue from sale of milk-Total cost of milk production
- Gross margin of butter = Total revenue from sale of butter-Total cost of butter production
- Gross margin of cheese = Total revenue from sale of cheese-Total cost of cheese production

RESULTS AND DISCUSSION

The descriptive analysis were done to describe the general characteristics of sample farm households. The econometric

analysis was done to identify factors that affect farm household's decision to participate in dairy market and to determine the extents of market participation. A product-focused method of investigation was made of milk, butter and cheese either as finished products or intermediate ones. These 3 products were chosen because they were the 3 most important traded dairy products in the district. Butter was used for household consumption and cosmetics, milk and cheese were used as food only.

Characteristics of dairy market participants and non-participants: Table 1 shows, 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. About 9% of the households participating the market were female headed. Among market participants of the sample 40 (90.1%) were found to be male headed household market participants. From Table 1 total female headed households in the sample were 13 (14.5%) and total numbers of male headed households in the sample as a whole were found to be 77 (85.5%).

Table 2 shows that dairy market participating households have more family members than non dairy market participating households. Human capital was measured by educational level of household head and spouse. Dairy market participating households have relatively 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 got 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 works 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 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, informal lenders such as farmers and traders if collateral are available. Micro credit is typically short-term loan

Table 2: Differences between market participants and non-participants

	Participants			Non-participants			Whole sample		
Variables	Yes = 44 Mean	Minimum	Maximum	No = 46 Mean	Minimum	Maximum	N = 90 Mean	Minimum	Maximum
Demographic characteristics									
No. of household members	8.15 (2.1)*	3	12	6.81 (1.4)	4	10	7.42 (1.88)	3	16
Intellectual capital									
Experience in dairy production (years)	15.47 (5.9)	8	30	16.7 (12.75)	5	65	16.15 (10.2)	5	65
Years of schooling of the household head	1.97 (1.3)	0	10+2	1.95 (0.98)	0	10	1.96 (1.13)	0	10+2
Years of schooling of spouse	1.7 (0.7)	0	10	1.62 (0.64)	0	8	1.66 (0.68)	0	8
Extension No. visits received per year	1.85 (0.41)	0	3	1.25 (0.24)	0	2	2.5 (0.87)	0	3
Distance/return time									
Distance from the nearest main market	4.25 (2.06)	2	12	4.97 (2.26)	2	13	4.57 (2.45)	2	13
Distance from district capital	4.97 (3.18)	2	12	7.97 (2.53)	2	13	6.34 (3.2)	2	15
Wealth and financial sources									
No. of milking local breed cows	2.45 (1.45)	1	15	1.85 (1.23)	1	5	2.12 (1.37)	1	15
Total grain produced last year per household	37.95 (23.2)	10	115	26.9 (30.8)	6	120	31.92 (28)	6	120
Amount of loan received last year (Birr)	1902.5 (2141.7)	0	5000	1514.6 (2045.9)	0	5400	1690.9 (2086.9)	0	5400
Financial income from different sources	3378.0 (6954)	0	32000	1552.0 (1857)	0	6000	2382.0 (4937)	0	32000

*Standard deviations are in parenthesis

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, because of the risk involved, it was very restricted in amount and involve restrictive conditions in terms of re-payment and interest. Informal lenders, such as usurers in rural areas charge more than 50% 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 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, 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 of surplus milk and other dairy derivatives.

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.

Financial profitability of smallholders in dairy marketing: A common means of measuring financial profitability of dairy farmers is to examine total gross margin of production of the dairy product and total variable cost of production of the given dairy product. This can be determined by subtracting total cost of production (variable cost) of a product from total revenue received from sale of a product.

Table 3 shows that production of any dairy product at farm gate level is profitable. Moreover, production of butter is the most profitable one, hence, 89.50% gross margin is made by butter production and marketing. The 2nd most profitable product is production and marketing of milk. Hence, it produces about 65.30% gross margin. The 3rd profitable production and marketing was production and marketing of irgo as it produces about 59.45% gross margin. Production and marketing of cheese produced about 42.50% of gross margin at farm gate level and stood 4th in profitability analysis.

Table 4 shows that dairy production and marketing at retail level or at urban/district capital is more profitable than at farm gate level. A farmer producing and marketing butter can make gross margin of about 91%, a farmer producing and marketing milk can make gross margin of about 66.9%, a farmer producing and marketing of irgo can make a gross margin of about 55.5% and a farmer producing and marketing of cheese can make a gross margin of about 45%. In general, producing and marketing of dairy products by small farmers can produce a significant return and profit to the dairy farmers and dairy market participants.

Table 3: Dairy producers gross margin at farm gate level

Dairy products	Quantity produced	Unit price	Total value of production (b×c)	Unit production cost	Total production cost (e×b)	Gross margin (d-f)	Percentage of gross margin (g×100/d)
a	b	c	d	e	f	g	h
Milk (L)	1573.5	10	15,735	3.47	5460.05	10,274.95	65.30
Butter (kg)	117.75	60	7,065	6.30	741.85	6,323.15	89.50
Cheese (kg)	1226	8	9,808	4.60	5639.60	4168.40	42.50
Irgo (L)	202	9	1,818	3.65	737.30	1080.70	59.45

Table 4: Dairy producers gross margin at retail (when sold at Bako town) level

Dairy products	Quantity produced	Unit price	Total value of production (c×b)	Unit production cost	Total production cost (e×b)	Gross margin (d-f)	Percentage of gross margin (g×100/d)
a	b	c	d	e	f	g	h
Milk (L)	1573.50	12	18882	3.97	6246.80	12635.2	66.91
Butter (kg)	117.75	80	9420	7.35	865.45	8554.55	90.80
Cheese (kg)	1226.00	9	11034	4.95	6068.70	4965.3	45
Irgo (L)	202.00	10	2020	4.45	898.90	1121.10	55.5

Small-scale dairy processing and marketing individuals and coops in the district received further boost of prices for dairy products. The dairy industry has seen some changes due to the emergence of small-scale dairy producing urban and peri urban households, few small scale milk processing and marketing dairy cooperative which participate both in formal and informal markets such as Bako small-scale dairy producers, marketing cooperatives get better financial share and profit from the dairy production and marketing (Table 5).

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 and lack of tradition in dairy marketing. Table 6 shows that 18 (20%), 20 (22.2%) and 23 (25.5%) 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, 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. A distance has relatively minimum effect on butter and cheese sales because of reduced volume and less 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 crossbred.

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

Table 5: Farmer's price and consumer's price during the sample survey

	Unit price	
Variables	Farmers price	Retail price
Milk (L)	10	12
Butter (kg)	60	80
Cheese (kg)	8	9
Irgo (L)	9	10

Table 6: Problems of dairy marketing of smallholders by commodity type

	Milk		Butter		Cheese	
Marketing problem	No.	%	No.	%	No.	%
No problem	2	2.2	1	1.1	5	5.5
Far from market or town	20	22.2	10	11.1	12	13.3
Lack of feed	25	27.7	25	27.7	25	27.7
Low production	18	20	20	22.2	23	25.5
No tradition of selling dairy products	8	8.8	9	10	9	10
Livestock disease	17	18.8	25	27.7	16	17.7
Total	90	100	90	100	90	100

situation reinforces seasonality and price volatility like reduced supply and associated high price in dry season as opposed to wet season.

Factors affecting dairy market participation of households: The various goodness of fits measures were employed to check and validate that the model fits the data well. Table 7 shows that 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 hypothesis 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 dairy market participant's and non dairy market participant's category by the model. Generally, the model correctly predicted about 80% of the overall sample cases.

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. For instance from 172.2 ha of total land the respondents own only 24.5 ha (14%) marginal and unproductive land was allocated 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 respondents own local dairy cows only. Hence, the numbers of local milking dairy cows owned significantly affect the market participation of the household (5% level of significance) for the particular study area. This was in line with the findings of Negassa (2009).

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 and significantly affected smallholder dairy market participation at 10% significant level, this is mainly because large households with greater members tend to consume much of dairy products than participating in the dairy 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

Table 7: Logit results of factors influencing dairy market participation

Variables (x)	Coefficients (β)	Standard error (SEβ)	Significance level (p-value)	Odds ratio (expβ)	Wald statistics (WX^2)
Family size	-0.69	0.19	0.0502*	0.50	-1.87
Sex of household head	0.99	6.38	0.6750	2.70	0.42
Grain production	-0.05	0.07	0.5190	0.95	-0.64
Education level of household head	0.46	1.07	0.4980	1.58	0.68
Education level of spouse	-0.54	0.75	0.6760	0.58	-0.42
Extension visits made	5.883	8.83	0.0170***	3.59	-2.75
Distance from nearest market	-1.30	0.13	0.0060***	0.27	-2.75
Distance from the district capital	0.46	0.55	0.1840	1.59	1.33
Financial income from different sources	-0.001	0.0003	0.6270	1.00	-0.49
Grain production	0.005	0.05	0.8990	1.00	0.13
No. of local dairy cows	1.14	1.71	0.0360**	3.13	2.09
Amount of loan received	0.01	0.05	0.2390	1.00	1.18
Constant	5.07	4.07	0.2140	3.44	1.24

***,**,*Significant at 1, 5 and 10 probability level, respectively LR chi-square (χ^2) (12) = 98, overall%: 79.20, No. of observation: 90, prob>chi^2: 0.000, log likelihood: -13.1398

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. Similar result was found by Azage *et al.* (1995). Distance to district capital has positive coefficients but not significant. However, distance to the nearest dairy market has negative coefficient and significant at 1% probability level. This result was consistent with other studies by Bedassa (2002). The district capital has no significant effect on market participation position of the household since, the dairy producing households sell their dairy products in the nearby markets.

Rural households who have sufficient per capita grain production shun the idea of market participation. 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 human 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 year 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 and significantly affects dairy market participation at 10% level of significant suggesting that exposure to extension service exerts a positive influence on market participation and this is consistent with expectation. The same result was reported by Emana (2000).

Sensitivity analysis of dairy market participation: Market participation of dairy producers cannot be equally affected by all explanatory variables. To rank these variables in terms of their relative importance in improving market participation decision, one needs to define a "Typical farmer" in terms of the most frequent values of explanatory variables, discrete variables and mean values of the continuous variables. After estimating the parameters βi and identifying significant variables, it is possible to know the effect of change in any of the significant explanatory variables on the probabilities (Maddala, 1992).

Considering the existence of all variables in the model, dummy variables were given alternatively (0, 1) and continuous ones are at their mean. The relative importance of variables can be measured by examining elasticity's of these variables that would result from change of values of variables. The education level of household head and distance to district capital has positive marginal effect and the remaining explanatory variables with negative marginal effect. The relative importance of significant dummy variable can be examined by removing the variable while that of significant continuous variables can be examined by proportional increase of the value of the variable under consideration.

Factors influencing volume of dairy sales: Table 8 shows the tobit results of factors influencing farm household's volume

Table 8: Tobit results of factors influencing farm household's volume of dairy sales

Variables	Coefficients	Standard error	t-value	Significance level
Family size	-0.0343	0.0065	2.46	0.4250
Educational level of spouse	0.2631	0.1100	2.40	0.0190**
Educational level of household head	0.0463	0.0796	0.58	0.5620
Grain production	0.0161	0.0066	2.46	0.0160**
Extension visits made	0.3874	0.1797	2.16	0.0340**
Distance from nearest market	-0.0750	0.0261	-2.87	0.0050***
Distance from the district capital	0.0019	0.0290	0.07	0.9460
Financial income from different sources	-0.00001	0.00002	-0.67	0.5010
Amount of loan received	26806	0.0004	0.06	0.9500
Sex of the household head	0.2651	0.02491	0.64	0.2910
Grain production	0.0023	0.0037	1.06	0.5270
No. of local dairy cows	0.3138	0.0527	5.95	0.0000***
Constant	-0.9730	0.4959	-1.96	0.0530**
$R^2 = 0.63$	$\delta = 1.28$			
Chi-square = 66	f(z) = 0.120			
Log likelihood = -69	F(z) = 0.338			
n = 90				

***Significant at 0.01 probability level, **Significant at 0.05 probability level

of dairy sales, the volume of dairy sales is expected to be affected by various continuous and discrete independent variables. Explanatory power of the model is given by pseudo R^2 that is 51.3%. This is low but reasonable given the small sample size. However, it also indicates possible non-inclusion of other relevant variables. Of the total 90 observations, 46 were left censored at less or equal to zero and with 44 uncensored observations. The appropriate model for estimation under this condition was tobit model. Households first make discrete decision to sell or not to sell. Then they decide how much to sell.

The dependent variable in the tobit equation was volume of dairy sales such as butter and milk. Observed samples of farm household selling milk were few. Volume of milk sold, converted into butter equivalent. The set of covariates used were household demographic characteristics, transactions cost represented by distance to market and district capital, physical and financial wealth and human capital represented by education of household head and spouse and number of extension visits received by dairy farm households during the year (Table 7).

Demographic characteristic believed to affect volume decision of dairy was number of household members. Farm households with more number of household members believed to have more labor to participate in economic transactions. The effect of number of household members on volume sale of dairy was positive but insignificant. Sex of the household head has important influence on household volume sale of dairy. Of the total 90 sample households, 77 (85.56%) were male headed and the rest 13 (14.44%) were female headed. From the study the female headed households have better predisposition to entry into dairy market and volume supply.

Human capital hypothesised to affect the volume decision of dairy sale is educational level of household head and spouse and number of extension visits. This stock level may be related in a contradictory way when other employment opportunities are available and was no prior belief about the likely sign of education. Human capital of the household expressed as educational level of the household head and spouse had positive coefficients. Education of the spouse household was significant at 5% level of significant while education of the house head was insignificant. Extension visit on the other hand was consistent with a priori expectation and exhibited a positive coefficient and significant at 5% significant level (Table 7).

The priori expectation was that transaction costs are likely to play a major role impeding volume of dairy sale and it was assumed that transactions cost increase with greater distance to market and district capital and which causes surplus to decline. In the absence of precise information concerning the values of these costs 2 proxies were used instead return time from the market and the district capital. Return time from the nearest dairy market had negative coefficient and significant at 1% probability level on the volume of dairy sale while return time from the district capital had positive coefficient and insignificant. Farm households located close to urban center (District Capital) benefiting in 2 ways; besides the reduced transactions cost imitates the success of institutions found in the town. The possibility that the behaviour and

characteristics of one's neighbours have an effect on one's behaviour has received growing attention among economists (Ludwig *et al*., 2000).

Physical capital variables expected to exert a positive impact on volume decision of dairy were number of dairy cows and type of dairy breed, such as local and crossbred dairy cows. The effect of number of dairy cows was significant at 1% significant level. This is because households in the study area owned a number of local milking cows as compared to very few milking cross breeds owned. The effect of crossbred dairy cows was positive and insignificant.

Financial capital such as loan (credit) and income from different sources other than dairy were expected to exert a positive impact on volume sales of dairy. Thus, the effect of these covariates was positive and insignificant hence, very few households revived loan preceding the survey.

The priori expectation was that households with surplus and sufficient crop production tend to participate less in dairy market and poor households with less per capita grain production sell dairy products and allocate much of the income for the purchase of grain at favourable terms of trade. Grain production per household exhibited positive coefficient as expected and was insignificant.

Households with surplus grains production use grains as cash crops to cover expenses for household needs and consume larger volume of dairy products, this partly explains income elasticity of dairy consumption. Marginal and food insecure farm households more participate in dairy marketing because dairying is the source of year round income and has favorable terms of trade when exchanged with energy rich grains. Their opportunity cost of labor of those households in participating dairy market is also low because of reduced land and subsequent reduced farm activity.

Sensitivity analysis of sales volume decision of dairy products: Table 9 shows the effect of marginal changes in explanatory variable on volume of dairy sale among the participating sample of farm households. While, keeping the other explanatory variables at their mean values.

$$y = \text{Fitted values (predict)} = 0.22285109$$

The marginal effect of explanatory variables on the volume of dairy sale was computed from tobit model. The explanatory variables, such as, educational level of spouse, educational level of household head, extension visit, loan obtained, grain production, sex of household head, experience in dairy farm, return time from district capital and milking dairy cows had positive marginal effect on volumes of dairy sale. The remaining explanatory variables; return time from the nearest market, family size and off-farm income had negative marginal effect on volume of dairy sale.

Factors affecting financial profitability and gross margin: Table 10 shows the regression output of variables on gross margin was shown, as it was expected family size is significantly and negatively affects the gross margin of small holder dairy farmers at 5% significant level. This is mainly, even though, as family size increases the work force of the small holders increases. Family size in the study area showed negative relationship, because large family size in the area consumes larger amount of dairy products. Hence, this cases the reduction in gross margin. Schooling of the household head affected the gross margin significantly and positively at 5% significant level. This was as per expectation. Return time from the nearest dairy market affected gross margin negatively with 1% significant level. This is again as per expected, hence as return time from the nearest dairy market increases gross margin will decrease. Extension service as expected significantly and positively affects gross margin at 1% significant level. Milking cows owned as expected significantly and positively affects gross margin at 1% significance level.

Table 9: Marginal effects after tobit

Variables	dy/dx	Standard error	P>|z|	Mean value of independent variables
Experience in dairy production	0.0161927	0.00658	0.014	20
Family size	-0.0343801	0.04284	0.422	7.14444
Educational level of head	0.0463524	0.07963	0.422	2
Educational level of spouse	0.2631113	0.07963	0.017	1.51111
Distance from nearest market	-0.0750396	0.02617	0.004	7.84444
Distance from the district capital	0.0019771	0.02906	0.946	8.3
Extension visits made	0.3874501	0.17979	0.031	0.577778
Amount of loan received	2.6806	0.00004	0.950	1177.22
No. of local dairy cows	0.3138953	0.05278	0.000	2.23333
Financial income from different sources	-0.0000144	0.00002	0.502	2077.22
Grain production	0.0023863	0.00375	0.525	32.5378
Sex of household	0.2651206	0.24914	0.287	0.844444

Table 10: Regrassion output of variables on gross margin

Gross margin	Coefficient	Standard error	t	Significant level	95% confidence	Interval
Sex of the household head	-65.24479	48.4343	-1.35	0.182	-161.6898	31.20023
Experience in dairy production	0.5527465	1.476688	0.37	0.709	-2.387714	3.493207
Family size	-17.20516	8.925142	-1.93	0.050**	-34.98039	0.5640665
Educational level of spouse	6.63716	25.61091	0.26	0.796	-44.36067	57.63499
Schooling of head	31.86798	17.99828	1.77	0.050**	-3.971164	67.70713
Dairy market	-50.17266	5.039836	-8.45	0.000***	-62.00038	-38.34493
Distance from the district capital	6.463542	6.717818	0.96	0.339	-6.913343	19.84043
Extension service	201.3117	38.74866	5.20	0.000***	124.1555	278.4722
Amount of loan received	0.0123931	0.0098975	1.25	0.214	-0.0073153	0.0321015
Milking cows owned	52.78789	11.68192	4.52	0.000***	29.52621	76.04956
Financial income from different sources	0.0018217	0.0049542	0.37	0.714	-0.008433	0.0116867
Grain production	-0.4680866	0.7733495	-0.61	0.547	-2.008022	1.071849
Constant	479.8152	110.9931	4.32	0.000***	258.7997	700.8307

***Significant at 0.01 probability level, **Significant at 0.05 probability level

CONCLUSION AND RECOMMENDATION

Descriptive analyses of farm household's socio-economic characteristics showed that most of the smallholder farm households faced economic difficulties that were expressed through market participation decision is that affected by household demographic and socio-economic characteristics and transaction costs represented by distance to market and urban centers. Volume sale of dairy is affected by intellectual capital, transaction cost represented by distance to district capital and markets. Financial profitability is affected by distance from market, extension visit, education level of the household head, number of milking cows owned and family size.

The findings of this study would imply the need for neutralizing the disparity between prospects for transformation and the existing deficiencies. Therefore, it requires targeting on improving the performance of each group of farm households through differential capacity development programs instead of implementing a one size fits all policy options that at present fail to take into account the reality on the ground and the context of most of the farm households. The Ethiopian smallholder farmer's determining factors affecting market participation and financial profitability of smallholder dairy farmers of which the most important include the following.

Results pertaining to 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.

Cooperative 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 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 improves dairy sales volume and increases financial profitability. Market extension services rendered to smallholder should be relevant and enough. However, with major thrust of extension agencies on production techniques and 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. Marketing extension 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. Dairy marketing and processing activities are predominantly the concern and tasks of ladies and women in the household in the district. Trained and educated ladies are found to participate in dairy market. Extension and training programmes in dairy market ought to be designed primarily in such a way to target and enlighten these sectors of the society.

Marketing is a multi stage 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.

Given the complexity of dairy farming, strategies to develop agriculture through high value diary farming market information systems are thus crucial.

ACKNOWLEDGMENTS

The author thanks the farmers of the study area for the devotion of their time in answering the lengthy questionnaires and giving me hospitality.

REFERENCES

Ahmad, B., S. Hassan and K. Bakhsh, 2005. Factors affecting yield and profitability of carrot in two districts of Punjab. Int. J. Agric. Biol., 7: 794-798.

Aldrich, J.H. and F.D. Nelson, 1984. Linear Probability, Logit and Probit Models (Quantitative Applications in the Social Sciences). Sage Publications, Beverly Hills, CA.

Azage, T., A. Lahlou-Kassi and E. Mukassa-Mugrwa, 1995. Biotechnology in animal production. Proceedings of the 2nd Annual Conference on Development Opportunities in Livestock Agriculture, May 26-27, 1993, Addis Ababa, Ethiopia, pp: 49-80.

Bedassa, B., 2002. Analysis of factors affecting the adoption of crossbred dairy cows in the central Highlands of Ethiopia. M.Sc. Thesis, School of Graduate Studies of Haramaya University, Ethiopia.

CSA., 1995. Statistical Abstract 1995. Central Statistical Authority, Addis Ababa, Ethiopia.

Debrah, S. and B. Anteneh, 1991. Dairy marketing in Ethiopia: Markets of first sale and producer's marketing patterns. ILCA Research Report 19, ILCA (International Livestock Center for Africa), Addis Ababa, Ethiopia, pp: 1-21. http://pdf.usaid.gov/pdf_docs/PNABH771.pdf

Devendra, C. and C.C. Sevilla, 2002. Availability and use of feed resources in crop-animal systems in Asia. Agric. Syst., 71: 59-73.

Emana, B., 2000. The role of new varities and chemical fertilizer under risk: The case of smallholders in Eastern Oromia, Ethiopia. Ph.D. Thesis, University of Hannover, Shaker Verlung, Germany.

FAO., 2006. Livestock's Long Shadow: Environmental Issues and Options. Food and Agriculture Organization, Rome, Italy, ISBN-13: 978-9251055717, Pages: 414.

Franzel, S. and C. Wambugu, 2007. The Uptake of Fodder Shrubs Among Smallholders in East Africa: Key Elements that Facilitate Widespread Adoption. In: Forages: A Pathway to Prosperity for Smallholder Farmers, Hare, M.D. and K. Wongpichet (Eds.). Ubon Ratchathani University, Thailand, pp: 203-222.

Gujarati, D.N., 1988. Basic Econometrics. 2nd Edn., McGraw Hill, New York, ISBN: 9780070251885, Pages: 705.

Holloway, G., C. Nicholson, C. Delgado, S. Staal and S. Ehui, 2000. How to make milk market: A case study from Ethiopian high lands. Socio-Economics and Policy Research Working Paper 28, International Livestock Research Institute, Nairobi, Kenya, pp: 1-28.

Hosmer, D.W. and S. Lemeshow, 1989. Applied Logistic Regression. Willey Inter Science Publication, New York, ISBN: 9780471615538, Pages: 307.

Jabbar, M.A., E. Tambi and G. Mullins, 1997. A methodology for characterizing dairy marketing systems. Market Oriented Smallholder Dairying Research Working Document No. 3, International Livestock Research Institute, Nairobi, Kenya, pp: 1-62.

Jones, W.O., 1972. Marketing Staple Foods in Tropical Africa. Cornell University Press, London.

Lapar, M.L., G. Holloway and S. Ehui, 2002. Policy options promoting market participation of smallholder livestock producers: A case study from Philippines. Socio-Economics and Policy Research Working Paper 47, International Livestock Research Institute, Nairobi, Kebya, pp: 1-27.

Liao, T.F., 1994. Interpreting Probability Models: Logit, Probit and Other Generalized Linear Models (Quantitative Applications in the Social Sciences). 1st Edn., SAGE Publications, California, USA., ISBN-13: 978-0803949997, Pages: 96.

Ludwig, J., G.J. Duncan and J.C. Pinkston, 2000. Neighborhood effects on economic self-sufficiency: Evidence from a randomized housing-mobility experiment. Georgetown University, Washington, DC., pp: 34.

Maddala, G., 1992. Introduction to Econometrics. 2nd Edn., Macmillan, New York, USA., Pages: 663.

Mendoza, M.S. and M. Rosegrant, 1995. Pricing behavior in Philippines corn market: Implication for food marketing efficiency. Research Report No. 101, International Food Policy Research Institute, Washington, DC., pp: 1-84.

Negassa, A., 2009. Improving smallholder farmers marketed supply and market access for dairy products in Arsi zone, Ethiopia. Research Report No. 21, International Livestock Research Institute, Addis Ababa, Ethiopia, pp: 1-109.

Tobin, J., 1958. Estimation of relationships for limited dependent variables. Econometrica, 26: 24-36.

Tsehay, R., 1998. Prospects of Ethiopian milk development. Proceedings of the Role of Village Milk Cooperatives in Milk Development: Prospects for Improving Milk in Ethiopia, April 22-24, 1998, Addis Ababa, Ethiopia, pp: 149-159.

World Bank, 1989. Sub-Saharan Africa: From Crisis to Sustainable Growth: A Long Term Perspective Study. World Bank, Washington, DC., ISBN: 9780821313497, Pages: 278.

World Bank, 1991. Poverty and Hunger: Issues and Options for Food Security in Developing Countries. World Bank, Washington DC., USA., pp: 82.

World Bank, 2002. World development report 2002: Building institutions for markets. World Bank, Washington, DC., pp: 262.

World Bank, 2008. World Development Report 2008. The World Bank, Washington, DC., USA.

World Bank, 2009. World Development Report 2008. The World Bank, Washington, DC., USA.

Yigezu, Z., 2003. Challenges and opportunities of livestock marketing in Ethiopia. Proceedings of the 10th Annual Conference of the Ethiopian Society of Animal Production, August 21-23, 2003, Addis Ababa, Ethiopia, pp: 48-58.