Macrothink Institute™

World Journal of Business and Management
ISSN 2377-4622
2017, Vol. 3, No. 2

Determinants of Milk Value Addition by Farm Households in Jimma Zone of Southwestern Ethiopia

Benyam Tadesse (Corresponding author)

Department of Agricultural Economics, Mizan- Tepi University

PO Box 260, Mizan Aman, Ethiopia

Tel: 251-935-938-317 E-mail: tadessebenyam7@gmail.com

Zekarias Shumeta

Department of Agricultural Economics and Extension, Jimma University

PO Box 378, Jimma, Ethiopia

Tel: 251-911-963-885 E-mail: zekishum@yahoo.com

Taye Tolemariam

Department of Animal Science, Jimma University

PO Box 378, Jimma, Ethiopia

Tele: 251-911-241-915 E-mail: taye.tolemariam@ju.edu.et

Received: October 10, 2017 Accepted: October 23, 2017 Published: October 25, 2017

doi:10.5296/wjbm.v3i2.12061 URL: http://dx.doi.org/10.5296/wjbm.v3i12.12061

Abstract

Value addition has a particular importance for dairy producers in that it enables processing into some less perishable products like butter and local cheese. The study was undertaken with the objective of identifying determinants of milk value addition by farm households in Jimma zone of southwestern Ethiopia. Using survey data from 238 dairy households and Tobit regression model, determinants of participation decision and level of participation were analyzed. The result indicated that age, education level of household head, number of children under age of six, access to labour force and extended shelf life were found to be determinant of participation in milk value addition. The finding implies that paying special attention for aged households will have positive effect on participation decision and expanding rural education and arranging mechanism for experience sharing among experienced and younger farmers would have a positive effect. Therefore expanding rural

education and arranging social events to share experience among dairy farmers should be encouraged to enhance dairy value addition and providing training on proper management and utilization of labour force and on the way of adding value on their product by extending their shelf life without compromising the quality of the product is important for milk producers.

Keywords: Farm households, Intensity of value addition, Milk, Tobit, Value addition, Value addition decision

1. Introduction

Value addition refers to the act of adding value(s) to a product to create form, place, and time utility which increase the customer value offered by a product or service. It is very important for farmers because it can transform unprofitable agricultural into profitable one (Fleming, 2005). It has a particular importance for dairy producers in especially where the producers have limited access to raw milk market or where the value of milk is economically less than the value of value added products. In addition to serving as mechanisms in generating income, value added products are potential avenues to minimize losses and increase milk shelf life (Berhanu et al., 2011). Many studies conducted in the past characterized milk value added products of Ethiopia (Asfaw & Jabbar, 2008; Berhanu & Dirk, 2008; Kedija et al., 2008; Asfaw, 2009). Nevertheless, none of these studies attempted to identify determinants of participation decision and level of participation in-farm level milk value addition in Ethiopia. There is a limitation of empirical findings on determinants of milk value addition and level of addition at farm level in Ethiopia. For general knowledge, the only information available regarding this topic in Ethiopia is the work of Berhanu et al. (2011) and Tadele et al. (2014). However the scope of the finding of Berhanu et al. (2011) was limited to rural smallholders rather than urban and peri-urban farmers. Hence, identifying such determinants help to inform subsequent interventions aimed at promoting commercialization of dairy farmers. The output of this research helps as an input for policy makers to make an informed decision. In addition, it can also serve as empirical literature for further and detailed research on determinants of participation decision and level of participation in-farm level milk value addition in the area.

1.1 Statement of Problem

In Ethiopia as milk and milk products are important source of food and income. Despite the huge potential, dairy production has not been fully exploited and promoted in the country (Berhanu et al., 2006). Currently milk and milk products are serving as income generating activities because there is high demand to milk and milk products due to urbanization. In addition to serving as mechanisms in generating income, value added products are potential avenues to minimize losses and increase milk shelf life, a unique opportunity due to strong local demand for such products. The basic patterns of milk value addition such as churning soured milk to make butter, dehydrating butter to make ghee and removing whey to butter to regulate milk fermentation are common traditional practices in Ethiopia (Berhanu et al., 2011). Traditionally, milk value addition is labor intensive, female and children taking the largest share of the work as a domestic chore. Milk value addition through traditional methods is often considered inefficient and it is associated with “losses” of up to 12% due to low rates of butterfat recovery (FAO, 2003). It is questionable, however, as to how real these losses are, since the buttermilk is used to make cottage cheese, a traditional soft cheese, which consumers prefer with the traditional fat resulting from the inefficient butter making. In the context of Ethiopia where market for raw milk is underdeveloped, especially in the rural areas, milk products with added values tend to fetch better income to farmers than the raw milk.

Participation decision and level of participation in-farm level milk value addition is hypothesized to be affected by socio-economic and demographic characteristics of farm households and also in relation to factors associated to institutional support services. Each dairy farmer is different in many aspects, including resource ownership, access to services, etc. which contribute to different decision making behavior and participation level. Many studies conducted in the past characterized milk value added products of Ethiopia (Asfaw & Jabbar, 2008; Berhanu & Dirk, 2008; Kedija et al., 2008; Asfaw, 2009). Nevertheless, none of these studies attempted to identify determinants of participation decision and level of participation in-farm level milk value addition in Ethiopia. There is a limitation of empirical findings on determinants of milk value addition and level of addition at farm level in Ethiopia. As to our knowledge, the only information available regarding this topic in Ethiopia is the work of Berhanu et al. (2011) which tried to analyzed determinants of participation decision and level of participation in farm level milk value addition by the smallholder dairy producers of rural Wolaita zone farmers of south nations, nationalities and peoples (SNNP) of Ethiopia and Tadele et al. (2014) which tried to analyzed the factors influencing urban and peri-urban dairy produces participation in milk value addition and volume of milk value added in welmera woreda, west Shewa zone of Oromia regional state, Ethiopia. However the scope of the finding of Berhanu et al. (2011) was limited to rural smallholders rather than urban and peri-urban farmers. Hence, identifying such determinants help to inform subsequent interventions aimed at promoting commercialization of dairy farmers. Therefore, this study conducted on the objective of analyzing determinants of milk value addition and level of addition in the study area.

1.2 Study Objectives

The objective of this study was to analyze determinants of milk value addition and level of value addition.

1.3 Definition and Hypothesis of Variables

1.3.1 Dependent Variables

Milk value addition decision: it is a dummy variable that represents the probability of value addition participation of the household. For the household who participate in milk value addition takes value of one where as it take zero for the household who did not participate in value addition to produce the major products such as butter, cottage cheese and ghee.

Level of participation in milk value addition: it is a continuous dependent variable and measured in litres and represents the actual volume of milk used in value addition process to produce butter, cottage cheese and ghee.

1.3.2 Independent (Explanatory) Variables

Milk yield per day: is a continuous variable which is measured in litres. A marginal increase in dairy production will has obvious and significant effect in volume of dairy supply. The volume production of dairy is expected to have positive relation to milk value addition decision and level of addition. 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.

Types of milking cows (NCB1 for cross breed, NLB for local breed): This variable is dummy taking 1 for cross breed and 0 for local breeds. The milk value addition decision and level of addition are assumed to be positively influenced by the number of milking cows owned. Production in turn varies directly with the number of lactating dairy cows. As the number of dairy cow increases, production also increases and the percentage share of consumption declines and sales increases (Holloway et al., 2002). Therefore this was variable was expected to influence milk value addition decision and level of value addition positively.

Education Level of the Household Head (ELHH): It is continuous variable and is measured in years of formal schooling of the household head. Education plays an important role in the adoption of innovations/new technologies. Further, education is believed to improve the readiness of the household to accept new idea and innovations, and get updated demand and supply price information which in turn enhances producers' willingness to produce more and increase milk value addition decision and level of addition. Therefore, in this specific study, formal education is hypothesized to affect milk value addition decision and level of addition positively.

Age of the household head (AGE): It is a continuous variable and measured in years. Age is a proxy measure of farming experience of household. Aged households are believed to be wise in resource use, and it is expected to have a positive effect on milk value addition decision and level of addition. Therefore in this study age was hypothesized to affect dependent variable positively.

Family size (FSHH): It is a continuous variable and measured in adult equivalent i.e. the availability of active labour force in the household. As dairying is labour intensive activities, dairy production in general and marketable surplus of dairy products in particular is a function of labour. However, family size is expected to have positive impact on m volume of milk value addition. In this context family size is expected to have positive impact on milk value addition and level of addition.

Access to credit (ACCR): Access to credit is measured as a dummy variable taking a value of one if the household has access to credit and zero otherwise. This variable is expected to influence the milk value addition by dairy household positively on the assumption that access to credit improves the financial capacity of dairy households to buy more improved dairy cows, thereby increasing milk production and milk market participation.

Access to Dairy production Extension service (ATDPES): This variable is measured as a dummy variable taking a value of one if the dairy household has access to dairy production extension service and zero otherwise. It is expected that extension service widens the household's knowledge with regard to the use of improved dairy production technologies and has positive impact on milk value addition and volume of milk value addition. Number of extension visits improves the household's intellectual capitals, which improves dairy production and divert dairy production resources. Therefore, number of extension visits is

hypothesized to impact dairy household milk value addition decision and level of addition of milk positively.

Access to Market information (ATMI): Farmers marketing decisions are based on market price information, and poorly integrated markets may convey inaccurate price information, leading to inefficient product movement. Therefore, it is hypothesized that market information is positively related to milk value addition decision and level of addition.

Distance to nearest milk market (DONM): Is location of the dairy household from the nearest milk market and is measured in kilometer**.** The closer the dairy market to dairy household, the lesser would be the transportation charges, loss due to spoilage and better access to market information and facilities. This improves return to labour and capital; increases farm gate price and the incentives to participate in economic transaction. Therefore, in this study, distance from nearest milk market is hypothesized to be negatively related to milk value addition decision and level of addition.

Experience in dairy production (**EXHH):** is a continuous variable which is expressed in years. As the farmers experience increase the number of cows owned increase and milk value addition increases. Therefore, it is expected that this variable affects market participation decision and level of participation positively.

Access to labour force (ALFMVA): this variable is dummy variable which households have access to labour force gets 1 and 0 otherwise. And it is hypothesized as it is positively and significantly affects milk value addition decision and level of addition.

Value addition extends shelf life (VAESL): this variable is dummy variable and it is hypothesized as positive and significant impact on milk value addition decision and level of decision.

Market access for raw milk (MAFRM2): this variable is a dummy variable which takes one if there is access to raw milk and 0 otherwise. It is hypothesized as negative and significant effect on milk value addition decision and level of addition.

2. Literature Review

Value addition is simply the act of adding value to a product, whether you have grown the initial product or not. It involves taking any product from one level to the next (Fleming, 2005). It refers to increasing the customer value offered by a product or service. It is an innovation that enhances or improves (in the opinion of the consumer) an existing product or introduces new products or new product uses. Adding value does not necessarily involve altering a product; it can be the adoption of new production or handling methods that increase a farmer's capacity and reliability in meeting market demand. For farmers, value addition has a particular importance in that it offers a strategy for transforming an unprofitable enterprise into a profitable one. The farmer is not only involved in production of a raw commodity but also takes part in value addition and distribution. This allows the farmer to create new markets or differentiate a product from others and thus gain advantage over competitors (MSU, 2005). Value addition activities are essentially meant to add such utilities as form

utility, time utility, place utility, information utility, among others.

Milk, butter and cottage cheese are a central part of Ethiopian food culture. Milk is consumed either in fresh or fermented (sour) form. Milk is used for different purposes including home consumption, processed into butter, ghee and cottage cheese. Out of the total annual milk production in rural Ethiopia, 48.48% was used for household consumption, 6.55% was sold, 0.41% was used for wages in kind and 44.57% was used value addition. Out of the total butter production in rural Ethiopia per year, 58.97% was used for household consumption and 36.58% was sold. Out of the total cottage cheese produced in rural Ethiopia per year, 81.85% was used for household consumption, 14.35% was sold and 3.8% was used for wage in kind and other purposes (CSA, 2011). However consumption pattern and preference of consumers vary from culture to culture and from urban to rural.

In Ethiopia, farmers use milk as cash generating commodity by directly selling milk. In most urban centers especially smaller towns, residents tend to own a few cows for milk production for home consumption and sales. Buttermilk, a byproduct of butter making is usually used for cottage cheese making for human consumption. Milk in the lowlands is primarily used as fresh for home consumption followed by sales to urban centers. Where there is no access to fluid milk markets, farmers process it into products (butter, and cottage cheese). However, even if market for selling fluid milk is available, decision making for processing depends on economic factors and meeting family needs for the products. In Arsi zone raw milk is taken alone, taken with other foods, processed into milk products. Cottage cheese, pasteurized milk and cosmetic butter are mostly taken alone while powder milk and edible butter are taken with other foods (Asfaw, 2009). Household preference in fresh milk allocation is given to infants followed by children while adults and elderly are least considered. This pattern, however, may not be the same to all cultures in the country.

3. Materials and Methods

3.1 Description of the Study Area

The study was conducted in Jimma town, and Serbo, Yabu, and Seka local towns of Jimma zone of Oromia Regional State. Jimma is located 352 km south-western of Addis Ababa. The area lies between a latitude of a latitude of 7°41'N and longitude of 36°50'E and has an elevation of 1704 meters above sea level. The area is characterized by a humid tropical climate of heavy annual rainfall that ranges from 1200-2000 mm per year. About 70% of the total annual rainfall is received during rainy season, which lasts from the end of May to early September. The area has a relatively higher temperature of about 25℃-30℃ from January to April and having a minimum temperature of 7℃-12℃ during the months of October to December (OPEDJZ. 2002). Serbo, Yabu, and Seka local towns are the direct supplier of the salesmen and consumers in Jimma town.

3.2 Data Types and Sources

Both quantitative and qualitative data types were used for the study. In order to generate these data types, structured questionnaires were prepared. Based on total production volume (Yield) Jimma town, Seka, Serbo and Yabu local towns from surrounding of Jimma town were

selected purposively. Within the selected production area Kebeles were selected purposively based on distribution of milking cow. Major producing farmers were selected by purposive sampling.

3.3 Sampling Technique

From total producers of the study area representative farmers were selected by random sampling techniques for primary information collection. By using the slovins formula of sample size determination and the 90% confidence level and P= 0 .1% assumed, the sample size is determined. The formula is: $N = \frac{N}{1+N(e)^2}$, Where n is the sample size, N is the population size of dairy producers, traders and consumers, and e is the level of precision. It was calculated as shown as in Table 1.

Table 1. Sample distribution of respondents

Chain actors	Jimma town		Seka		Serbo		Yabu		Total sample
	Population	sample	Population	sample	population	Sample	population	Sample	
Producers	61	38	245	71	300	75	118	54	238

Therefore, the total number of respondents used for this study was 238.

3.4 Methods of Data Collection

The major types of data collection techniques used for this study include focus group discussion with selected farmers, key informant interview and respondent's interview through questionnaire. This information is generated through discussions and individual expert contact at zonal Agricultural and Rural Development Office. In addition, using secondary data sources of the zone and woreda and guided visits to already proposed study area was done. Following participatory research, formal survey is performed to quantify the qualitative data. Survey questionnaires were prepared. Using the questionnaire, interviews were conducted to gather data from dairy producers.

3.5 Methods of Data Analysis

Two types of data analysis, namely descriptive statistics and econometric analysis were used. Descriptive analyses were used for comparing socio-economic and institutional characteristics of households.

3.5.1 Descriptive Statistics

This method of data analysis refers to the use of ratios, percentages, means, and standard deviations in the process of comparing socio-economic and institutional characteristics of the respondents.

3.5.2 Inferential Statistics

Inferential statistics especially chi-square test statistics was used to compare the difference in access to services of both participants and non participants in the value addition.

3.5.3 Econometric Model

Econometric model (Tobit Model) was used to investigate determinants of participation in milk value addition. Because of the restrictions put on the values taken by the regressand, this model can be called limited dependent variable regression model. If zero values of dependent variables were the result of rational choice of farmers, a Tobit model would be more appropriate (Abrar, 2004). Thus, maximum likelihood Tobit estimation (Tobin, 1958) was used in the analysis of factors affecting sales volume. One can concern with the model; recall that in a Tobit with left-censoring at zero:

$$Y_i^* = \beta_0 + \sum_{i=1}^{m} \beta_i X_i + U_i \ , \qquad \text{i= 1, 2 ….m}$$

Where Y=Y*, if Y*>0, Y=0 if Y*=max(Y*, 0)

Where Y_i^* = value addition decision of farmers (dependent variable)

β_0 = an intercept

β_i = coefficients of ith independent variable

X_i = an independent variable and‘ i′ is 1,2,3……,m

U_i = is unobserved disturbance term

The model parameters are estimated by maximizing the Tobit likelihood function of the following form;

$$L = \prod_{Y_i^*>0} \frac{1}{\delta} f\left(\frac{Y-\beta_i X_i)}{\delta}\right) \prod_{Y_i^*<0} F\left(\frac{-\beta_i X_i}{\delta}\right)$$

Where f and F are respectively, the density function and cumulative distribution function of Y_i^*,$\prod Y_i^* > 0$, means the product over those i for which Y_i^*>0 ,and $\prod Y_i^* > 0$ means the product over those i for which Y_i^* <0.

As cited in Maddala (1997), Johnston and Dinardo (1997), proposed the following techniques to decompose the effects of explanatory variables into quantity supply and intensity effects. Thus, a change in X (explanatory variables) has two effects. It affects the conditional mean of Y_{i^*} in the positive part of the distribution, and it affects the probability that the observation will fall in that part of the distribution. Similar approach is used in this study.

1. The marginal effect of an explanatory variable on the expected value of the dependent variable is:

$$\frac{\partial E(Y_i^*)}{\partial X_i} = F(z)\,\beta_i$$

where $\frac{\beta_i X_i}{\delta}$ is denoted by z, following Maddala, (1997)

2. The change in the probability of participation in value addition as independent variable X_i changes:

$$\frac{\partial F(z)}{\partial X_i} = f(z)\frac{\beta_i}{\partial}$$

3. The change in intensity of liter added with respect to a change in an explanatory variable:

$$\frac{(\partial E(\frac{Y_i}{Y_i^* > 0})}{\partial X_i} = \beta_i[1 - Z\frac{f(z)}{F(z)} - (\frac{f(z)}{F(z)})^2$$

Where, F(z) is the Cumulative Normal Distribution of z, f(z) is the value of the derivative of the normal curve at a given point (i.e., unit normal density), z is the Z score for the area under normal curve, β_i is a vector of Tobit Maximum Likelihood estimates and σ is the standard error.

4. Results and Discussion

4.1 Demographic, Socioeconomic and Institutional Description

According to the survey results 70% of respondents participate in milk value addition. The total average amount of milk produced in the study area is 12.5 liter/day. The level of milk value addition is 11.7437 liters per month. The major milk products produced are butter, cottage cheese and ghee. The mean age of milk producer is 44.84454 years old. Average distance travelled by households to the nearest urban centers was 2.8km implying opportunity for milk value addition. Average level of education by household head was 7 years of formal schooling.

Table 1. Descriptive statistics of variables

Variable	Description	Mean(standard deviation)
AOMAV	Level of participation(liters/month)	11.7437 (0.6413486)
DONM	Distance to the nearest urban center (km)	2.794118(0.5392281)
ELHH1	Education level of household head (year)	7.571429(3.077265)
YIELD	Milk Production per day (liters)	12.52731(1.028893)
AGE	Age of the household head (year)	44.84454(4.71699)
NCUAOS	Number of children under the age of six (number)	1.848739(1.223115)
ATDPES	Access to livestock extension services (1=yes,0=no)	0.5714286(.4959146)

ATMI	Access to market information (1=yes,0=no)	0.6386555(0.4814025)
NCB1	Ownership of cross breed cows (1=yes,0=no)	0.789916 (.0757306)
ALFMVA	Availability of labour force (1=yes,0=no)	0.5420168(0.4992815)
VAESL	Extended shelf life (1=yes,0=no)	0.6848739(0.4655451)
MAFRM2	Market access for raw milk (1=yes,0=no)	0.6092437(0.4889482)
ROC	Access to credit (1=yes,0=no)	0.4747899(0.0324372)

Average number of children under six years of age was greater than one. Seventy eight percent of respondents own cross breed cows. Fifty four percent of respondents had available labor for milk value addition. This implies that in the absence of labor, households opt for selling or consuming fluid milk than adding values to milk. Forty two percent and Thirty six percent of the respondents had poor access to livestock extension service and poor access to market information service, respectively. About 68% of the respondents believed that milk value addition extends shelf life. 60.9 percent of respondents responded that they had market access for raw milk. This indicates that majority of dairy farmers immediately sell and/or consume milk products to fulfill their household needs.

4.2 Access to Services

From the total of 238 respondents 168 respondents participate in milk value addition and 70 respondents do not participate in milk value addition.

Table 2. Access to services of respondents

Access to credit	Milk value addition		Total	Chi2 (p- value)
	No	Yes	100%	2.2244 (0.000)
Yes	24.78%(28)	75.22%(85)	100% (113)	
No	33.60%(42)	66.40% (83)	100% (125)	
Total	29.41% (70)	70.59 (168)	100% (238)	
Access to extension				
No	10.78% (11)	89.22% (91)	100% (102)	29.8326 (0.000)
Yes	43.38% (59)	56.62% (77)	100% (136)	
Total	29.41% (70)	70.59 (168)	100% (238)	
Access to market information				
No	15.22% (13)	84.88% (78)	100% (86)	13.2549 (0.000)
Yes	37.50% (57)	62.50% (95)	100% (145)	
Total	29.41% (79)	70.59% (159)	100% (238)	
Distance of nearest market				
1-5 km	46.67% (7)	53.33% (8)	100% (15)	14.4855 (0.001)
5-10 km	63.16% (12)	36.84% (7)	100% (19)	
>10km	25% (51)	75% (153)	100% (204)	
Total	29.41% (70)	70.59% (168)	100% (238)	

From the participants 75.22% of respondents had access to credit and 66.40% of respondents participate in milk value addition but do not receive credit. From non participants 24.78% had access to credit and 33.60% do not receive credit. The chi-square test statistics confirmed that the difference in access to credit among the milk value addition participation was found to be significant at less than 1% significance level (Table 3). From the total participants of milk value addition 62.50% of respondents had access to market information and 84.88% of respondents do not have access to information. From the non participants 37.50% have access to information and 15.12% had access to market information. The chi-square test statistics confirmed that the difference in access to milk market center among the milk market participation was found to be significant at less than 1% significance level. From the participants 89.22% do not have access to extension services and 56.62% had access to dairy extension services. From the non participants 43.38% had access to extension services and 10.78% do not have access to dairy extension services. The chi-square test statistics confirmed that the difference in access to dairy extension service among the milk market participation was found to be significant at less than 1% significance level. The information on average distance to milk market centers was analyzed as an indicator of access to market. From the participants 53.33% was found in 1-5 km, 36.84% found in 5-10 km and 75% found in > 10km distance. Form non participants 46.67% was found in 1-5 km, 63.16% found in 5-10 km and 25% found in > 10 km distance from the nearest milk market center. The chi-square test statistics confirmed that the difference in access to milk market center among the milk market participation was found to be significant at less than 1% significance level (Table 3).

4.3 Econometric Results

The model result depicts that age of the household head as expected had a positive and significant impact on milk value addition decision. The positive and significant relationship between the two variables indicates that older dairy household head could have more milking cows increasing the probability of the household milk value addition. The marginal effect also confirms that when the household age increases by one year, the probability of participating in the milk value addition and the level of milk value added increases by 0.0008% and .0143402 liter respectively. The effect of age on value addition contradicts with previous findings (Berhanu et al., 2011; Berem et al., 2010; Kumar, 2010) while it agrees with the reports of (Tadele et al., 2014, Sanjoy, 2015). The reason behind is that older people prefers to consume more ghee, yoghurt and cheese.

Table 3. Determinants of milk value addition

AOMAV	Coefficient.	T	P>|t|	Change among the whole $\frac{\partial E(Y_i)}{\partial x_i}$	Change in Probability $\frac{\partial F(z)}{\partial X_i} = f(z)\frac{\beta_i}{\sigma}$
AGE	.0143402	2.17	0.031	.0143402	7.99e-06
ELHH1	.0621263	2.70	0.008	.0621263	.0000346
YIELD	-.0006731	-0.13	0.899	-.0006731	-3.75e-07
NCUAOS	1.542071	15.99	0.000	1.542071	.0008591
ATMI	.0071746	0.07	0.945	.0071746	4.03e-06
TYMC	.086198	0.78	0.435	.086198	.000048
ALFMVA	.4665925	3.79	0.000	.4665925	.0006417
DONM	.0181857	0.27	0.784	.0181857	.0000101
VAESL	1.394416	9.53	0.000	1.394416	.0294094
MAFRM2	.0862974	0.72	0.472	.0862974	.0000543
ATDPES	.036212	0.32	0.747	.036212	.0000209
_cons	-1.821001	-4.50	0.000		
Sigma	.4997935				

Number of obs = 238 LR chi2 (10) = 586.09 Prob > chi2 = 0.0000

Log likelihood = -137.2464 Pseudo R2 = 0.6810

And also education level of household head influenced the level of participation positively and significantly at (P<0.01) significant level. The marginal effect also shows that a unit increase in year of schooling a dairy farmer would increase his/her likelihood of participation and level of participation in value addition by 0.00346% and .0621263 liter. The results therefore, suggest that expanding rural education will have a positive effect in increasing number of farmers who participate in value added products. The reason is that higher level of education enables to realize the importance of milk products as they are important source of nutrients. The effect of education has been supported by (Kumar, 2010, Sanjoy, 2015) but contradicts with Berhanu et al. (2011). As expected in the hypothesis number of children under the age of six is positively related and statistically significant at 1%. When the number of children increases by one in the household, level of milk value added also increases by 1.5 liter and participation decision increase by 0.086%. This is because of that when they are sure of having a child, they look for milking cow in order to feed a child and lactating mother. Excess fluid milk left over from child and mother is used to add values to nourish mother and child. This result is in agreement with the result of (Berhanu et al., 2011; Sanjoy, 2015, Benyam et al., 2016) but contradicts with the report of (Tadele et al., 2014). And also as hypothesized, access to labour force is positively related and statistically significant at 1%. This indicates that when dairy producers have access to labour their value addition increases by 0 .46 liter and participation decision by 0.064%. Farmers who do not have available labour automatically sell their fluid milk than add value. Sanjoy (2015) reports contradict with this

result. The need to extend shelf life of milk through value addition is positively associated with farmer's likelihood to add values to milk and statistically significant at ($P<0.01$). As the number of households who need to extend shelf life increases by a number, the level of adding values to milk increases by 1.4 liter and level of participation by 2.9%.

5. Conclusion

In this study, determinants of dairy farmers' participation decision and level of participation in-farm level milk value addition has been analyzed using Tobit regression model. Due to financial and time constraints, it limited its investigation to Jimma zone of southwest Ethiopia. For researchers, findings help them to revisit strategy in line with catering to the needs of producers. As primary beneficiaries, dairy farmers gain much from increased farmers' margin; adopt dairy production technologies, access to market and information and enhance their bargaining power. They also benefit much from value added products as it extends shelf life of products. Consequently, it is believed that these will improve their income, secure household food and alleviate poverty and help to promote commercialization. The Tobit regression model result indicate that age, education level of household head, number of children under age of six, access to labour force and extended shelf life determines household's decision for milk value addition. The results also showed that most of the factors determining participation decision in milk value addition also determined the level of participation The findings are quite consistent with the expected behavior of Ethiopian dairy farmers and provide a clear picture about participation decision and level of participation in-farm level milk value addition. They have important policy implications because these value addition behaviors of farmers would seem to continue to play a vital role in dairy value chain. It is important to understand these determinants of value addition processes of dairy farmers for the benefit of the poor farmers. Therefore expanding rural education and arranging social events to share experience among dairy farmers should be encouraged to enhance dairy value addition and providing training on proper management and utilization of labour force and on the way of adding value on their product by extending their shelf life without compromising the quality of the product is important for milk producers.

Acknowledgement

The research is financed by Jimma University.

Reference

Asfaw, N. (2009). *Improving smallholder farmers' marketed supply and market access for dairy products in Arsi Zone, Ethiopia. Research Report 21*. ILRI (International Livestock Research Institute), Nairobi, Kenya, p. 107.

Asfaw, N., & Jabbar, M. (2008). *Livestock ownership, commercial off take rates and their determinants in Ethiopia*. Research Report 9. ILRI, Nairobi, Kenya. 52Pp.

Belete, A., Azage, T., Fekadu, B., & Berhanu, G. (2010). Cattle milk and meat production and marketing systems and opportunities for market orientation in Fogera woreda, Amhara region, Ethiopia. *IPMS (Improving productivity and market access) of Ethiopian Farmers project*

work paper 19. ILRI (International Livestock Research institute), Nairobi, Kenya, p. 65.

Benyam, T., Zekarias, S., & Taye, T. (2016). Determinants of Dairy Farmers' Market Participation in the Major Dairy Producing Towns of Jimma Zone of Southwest Ethiopia.

Berem, R. M., Obare, G., & Owuor, G. (2010). Is Value Addition In Honey A Panacea For Poverty Reduction In The Asal In Africa? Empirical Evidence from Baringo District, Kenya. Contributed paper presented at *the joint 3rd African association of Agricultural Economists of South Africa (AAAE) and 48th Agricultural economists Association of South Africa* (AEASA) conference, Cape Town, South Africa, September 19-23, 2010.

Berhanu, G., & Dirk, H. (2008). Market orientation of smallholders in selected grains in Ethiopia: Implications for enhancing commercial transformation of subsistence agriculture. *IPMS of Ethiopian farmers project working paper* 11. ILRI, Nairobi, Kenya, p. 44.

Berhanu, K. (2012). *Market Access and Value Chain Analysis of Dairy Industry in Ethiopia: The Case of Wolaita Zone.* A Dissertation Submitted to the School of Agricultural Economics and Agribusiness, School of Graduate Studies, Haramaya University.

Berhanu, K., Fekede, F., & Kedir, N. (2006). Gender based analysis of livestock production systems at Kuyu woreda in north Shewa zone, Ethiopia (pp. 88-100). In D. Tamrat, & F. Fekede (Eds.), *Organizational arrangements and challenges in market oriented livestock production in Ethiopia*. Proceedings of the 14thannual conference of the ESAP held in Addis Ababa, Ethiopia, 5-7 Sept 2006. Part II: Plenary session, Addis Ababa, Ethiopia.

Berhanu, K., Kindie, G., Derek, B., & Belay, K. (2011). Determinants of participation decision and level of participation in farm level milk value addition. The case of smallholder dairy farmers in Ethiopia: The case of smallholder dairy farmers in Ethiopia. *Ethiop. J. Appl. Sci. Technol., 2*(2), 19-30.

FAO. (2003). *FAO action program for the prevention of food loses. Milk and dairy products, post harvest loses and food safety in sub-Saharan Africa and the near east*. Regional approaches to national challenges, Synthesis report, ILRI, Nairobi, Kenya.

Fleming, K. (2005). *Value added strategies: Taking agricultural products to the next level*. Honolulu (HI): University of Hawaii. Agribusiness; AB-16.

Holloway, G., & Ehui, S. (2002). Expanding market participation among smallholder livestock producers: A collection of studies employing Gibbs sampling and data from the Ethiopian highlands, 1998-2001. *Socio-economic and Policy Research Working Paper 48*. ILRI (International Livestock Research Institute), Nairobi, Kenya. 85 pp.

Kedija, H., Azage, T., Mohammed, Y., & Berhanu, G. (2008). Smallholder cow and camel milk production and marketing in agro pastoral and mixed crop livestock systems: The case of Mieso district, Oromiya regional state, Ethiopia. *IPMS of Ethiopian farmers" project working paper 13* (p. 56), ILRI, Nairobi, Kenya.

Kumar, A. (2010). Milk marketing chains in Bihar. Implications for dairy farmers and traders. National center for Agricultural Economics and Policy research, New Delhi – 110 012. *Agric.*

Econ. Res. Rev., 23, 469-477.

OPEDJZ. (2002). *The Office of Planning and Economic Development for Jimma Zone*. Statistical Abstract. Jimma, Oromia, Ethiopia.

Rehima, M. (2006). *Pepper Marketing Chains Analysis. A case of Alaba and Siraro Districts, Southern Ethiopia*. M.Sc. Thesis presented to Haramaya University, Ethiopia.

Sanjoy, K. K. (2015). Determinants of decision to participate in value addition to milk: Level of value addition and decision to choose milk market access.

Tadele, M., Tewodros, T., & Noreen, B. (2014). Factors influencing urban and peri – urban dairy producer's participation in milk value addition and volume of milk value added in welmera woreda, west Shewa zone of Oromia regional state, Ethiopia.

Tadele, T., Mulugeta, T., Yosef, D., Abebaw, G., Karlien, S., & Sarne, De V. (2014). Milk Production and Marketing system in Jimma Town, South-western Ethiopia.

Tobin, J. (1958). Estimation of relationships for limited dependent variables. *Econometrics, 26*, 24-36. https://doi.org/10.2307/1907382

Yamane, T. (1967). *Statistics, an Introductory Analysis* (2nd ed.). New York: Harper and Row.

Zelalem, Y., & Inger, L. (2000). Milk production, processing, marketing and the role of milk and milk products on the smallholder farms in the central highlands of Ethiopia: Pastoralism and Agro Pastoralism, which way forward? In the proceedings of the *8th Annual conference of Ethiopian society of Animal production (ESAP)*, 24-26 August 2000, pp. 139-154. Ethiopian Agricultural research organization (EARO), Addis Ababa, Ethiopia.

Glossary

CSA	Central statistical Authority
FAO	Food and Agricultural organization
SNNP	Southern nation nationalities and peoples
IPMS	Improving productivity and market access
ILRI	International Livestock Research institute

Copyright Disclaimer