

Analysis of Dairy Value Chain in Jidda and Abichuf Gnea Districts of North Shewa Zone, Oromia Regional State

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Abstract

The study was initiated on analysis of dairy value chain with the objectives of examining the dairy marketing channels and efficiency. Data came from the separate survey of dairy producing households and marketing middlemen. 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. Concentration ratios and marketing margin analysis were conducted in examining efficiency. Market participation decision is affected by household demographic and socio-economic characteristics represented by distance to market and urban centers. Volume sale of dairy is affected by intellectual capital represented by distance to district capital. Un concentrated suppliers characterize dairy market; market at the next level is also un concentrated for butter and cheese but concentrated for liquid milk. The dairy processing industries enjoy the highest return while the dairy cooperative gets the lowest margin. The results suggest that production and marketable surplus should be improved and adequate marketing infrastructure like roads and transport facilities should be established between districts and rural 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.

Keywords: North Shewa, Econometric model, Value chain and Market channel

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Introduction

Agriculture is the mainstay of the Ethiopian economy and its contributions to the economy of the country accounts 72.7% employment and 36.2% to the country's GDP (CSA, 2017). From the agricultural sector, livestock is an integral part of the agriculture and the contribution of live animals and their products to the agricultural economy accounts 40%, excluding the values of draught power, manure and transportation. In other sources according to (Behanke and Metaferia, 2011) the sub-sector accounts nearly 47% of total agricultural GDP.

Ethiopia is believed to have the largest Livestock population in Africa. The total livestock population estimated to be about 59.9 million cattle, 30.20 million goats, 30.70 million sheep, 2.16 million horses, 8.44 million donkeys, 0.41 million mules and 1.21 million camels. Out of the total population about 11.83 million are milking cows, 1.26 million goats are kept for milk and 23.15 percent of camels are kept for milk production (CSA, 2017). From the same source in the given year the total milk production from cow and camel is about 3.1 billion, 179.66 million liters respectively.

According to (CSA, 2017) about 11.4 million households are involved in livestock production in Ethiopia. Livestock plays a significant role in generating income for 80 % of rural smallholder households, and livestock products and by-products meeting domestic consumption meat, milk, eggs, cheese, and butter are animal protein that contributes to the improvement of the nutritional status of the people. Livestock productions has key role in providing export commodities, such as live animals, hides and skins to earn foreign exchanges to the country (LMP, 2015).

Dairy has been identified as a priority area for the Ethiopian government, which aims to increase Ethiopian milk production at an average annual growth rate of 15.5% during the GTP II period (2015 to 2020), from 5,304 million liters to 9,418 million liters. The government is actively encouraging the private sector to produce milk and is making supporting investments in supply-chain infrastructure, training, improved breeds, and dairy-focused agricultural commercialization clusters. Agricultural commercialization clusters that support commercialization of smallholder farmers in dairy have been identified in all four major regions (Tigray, Amhara, Oromia, and SNNP), and the government is particularly prioritizing genetic improvement through selecting premium indigenous breeds and introduction of exotic breeds (GTP, 2016).

Oromia region is characterized by diversified Agro-climatic zones, topography, agricultural potential and natural resources endowment. The region is contributing for 63% of the national volume of export of agriculture and share about 54% of grain production and 44.62% of livestock production from the country (CSA, 2017). In

North Shewa zone livestock play important role in the economic and social well-being of the population. In spite of the greater ecological and economic value of livestock milk production is low compared to the number of milking cows (CSA,2015). The potential for production and growing demand for dairy, marketing is characterized by weak institutional support, inadequate infrastructure and dairy commodity value chain development not significantly contributing to benefits smallholder farmer.

Value chain is essential for those commodities to coordinate and effective transactions, allow small producers to access to the quality services, information, value addition and increase long term benefits from participation in market. In the study area different traders/actors are involved in marketing of produced milk and milk product along different value chain. Therefore, analysis of value chain of milk and milk product of the study area is found to be important and aimed do the value chain analysis.

The other problems are the actors along dairy value chain have weak collaboration, inadequate milk value addition, and information on price, weaken bargaining power and the major dairy processing system traditional. Milk and butter marketing system is traditional and under developed, fragmented and inefficient (ADPLAC, 2019).

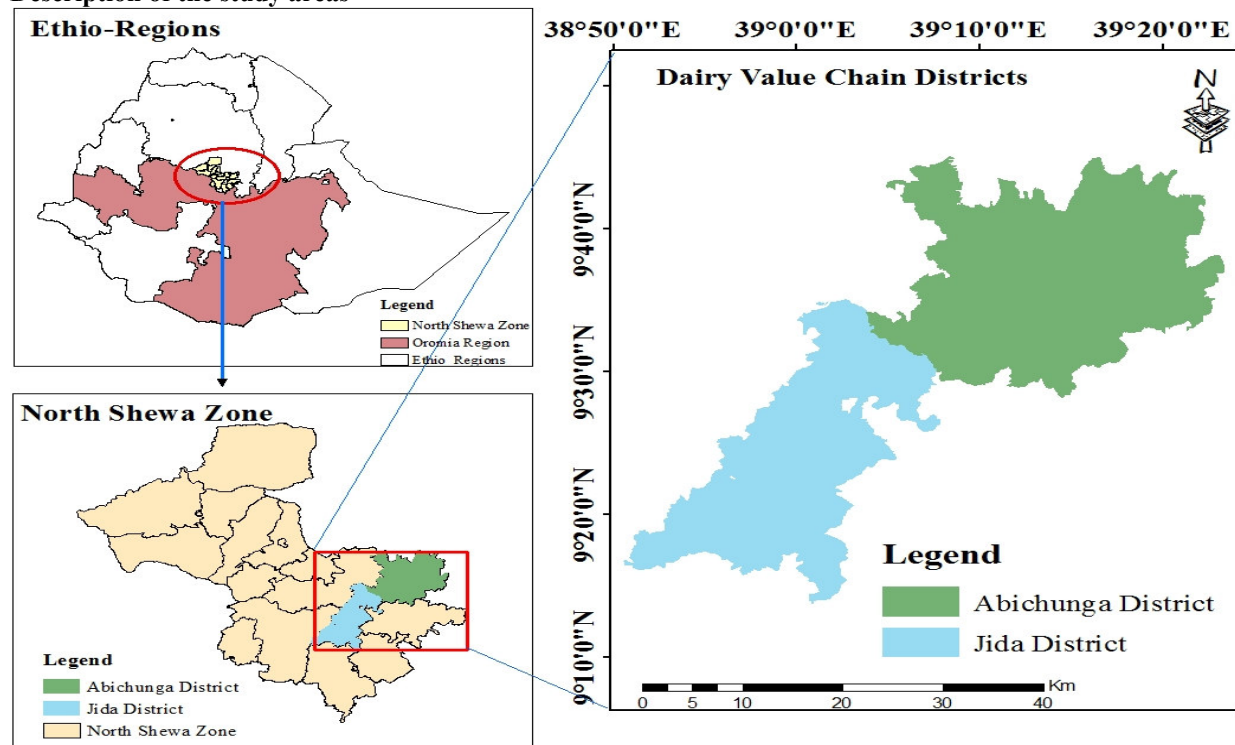
There were no studies specifically examining the value chain of dairy for farmers/ producers to identify the actors participate in dairy value chain, the factors which determine from participation and volume supply, profit margin and their constraints and opportunities in North Shewa zone.

Therefore, in the study area, there was a gap of information and knowledge on dairy value chain. The existing information and knowledge gap in the study area were not well known, the actors participate in the chain, market participation, volume of supply, beneficiary from the participant in the chain and how it will develop the dairy value chain in the study area. In line with this how smallholder dairy producer households can reach to market and sells its product.

So that, this study was proposed to fill the information and knowledge gap as to how the dairy products were reached to the end market/consumers and identify the actors, beneficiary, constraints and opportunities and how the producers market share. The main objective of the study was to estimate the potential production and marketing volume of cow milk in the study area with interrelated sub objectives to identify the major value chain actors participated on the production and marketing of cow milk and to identify the constraints on production and marketing of milk.

Methodology

Description of the study areas



Sampling technique and Sample size determination

The sample dairy producing households were drawn randomly from four kebeles, i.e., Adare Ejersa (56 household) and Mendida Zuria (56 household) (Abichuf Gnea) and Arrabsa Chifara/kolfe (45 household) and Siba Sirti (45 household) (Jidda). Both districts have the potential for both crop and livestock production, which is mainly

undertaken by smallholder farmers. Through proportional probability 202 dairy producing households from two districts were selected.

Two-stage random sampling technique was employed to select sample households. The districts were selected purposively. In the first stage, five kebeles were selected randomly and in the second stage, a total of 202 small holder farmers and 36 other value chain actors of sample respondents were randomly selected from the sampling frame of milk producers by using simple random sampling technique. The sample size of respondents was allocated based on probability of proportional to size. Data Collection and Analysis Both primary and secondary data were used. Primary data were collected from dairy producer farmers and different value chain actors. Secondary data were obtained from different sources of reports of Agricultural offices at different levels and Dairy Cooperative in the study districts. Other sources of secondary data were previous research findings, journals, books, websites and other published and unpublished materials, which were relevant to the study. Questionnaire was developed, pretested and modified accordingly and then interview was conducted and the data were collected the study used for this research was both quantitative and qualitative especially on field interview methods both producers and intermediate value chain practitioners. Data were analyzed using descriptive statistics such as means, frequency, test statistics and percentages in tabular and graphical forms by using Statistical Package for Social Sciences (SPSS). Value chain analysis of milk was done using different chain diagrams/value chain maps

Methods of Data Analysis

The concentration of dairy product in the market, as an indicator of the structure, was estimated using the common measure of concentration ratio. Marketing margins were analyzed for the most marketable dairy products such as milk, butter and cheese. The market participation of the smallholder dairy farmers with dairy products (milk, butter and cheese) was analyzed using logit model. A Tobit model was used to analyze the relative importance of different determinants of volume of butter sale.

Concentration ratio

Concentration ratio has been widely used as numerical index of industrial organizations for measuring the size of firms in market (Shugart, 1990). It is calculated as:

$$C = \sum_{i=1}^r r S_i, i = 1,2,3 \dots \dots \dots r.$$

Where S_i is the percentage market share of i^{th} firm and r is the number of largest firms for which the ratio is going to be calculated. There are a number of measures of market concentration, but the most commonly used is the concentration ratio, which measures the percent of traded volume accounted for by a given number of participants.

Marketing margin

Total gross marketing margin (TGMM) is the final price of the produce paid by the end consumer minus farmers' price divided by consumers' price and expressed as a percentage (Mendoza and Rose grant, 1995).

$$TGMM = \frac{\text{Consumers' price} - \text{Farmers' price}}{\text{Price paid by the consumer}} \times 100$$

The Net Marketing Margin (NMM) is the percentage over the final price earned by the marketing middleman as his net income once his marketing and transaction costs are deducted. From this measure, it is possible to see the allocative efficiency of markets. Higher NMM or profit of the marketing intermediaries reflects reduced downward and unfair income distribution, which depresses market participation of the smallholder. An efficient marketing system is where the marketing costs are expected to be closer to transfer costs and the net margin is near to normal or reasonable profit.

$$NMM = \frac{\text{Gross Margin} - \text{Marketing cost}}{\text{Price paid by the consumer}} \times 100$$

Where: TGMM = Total Gross Marketing Margin

NMM = Net Marketing Margin

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 marketing (may sale or not sale). This dependent variable is discrete consisting of two outcomes, yes or no, so the use of Ordinary Least Square technique for such variables poses inference problems, and thus not appropriate for investigating dichotomous or otherwise limited dependent variables. In such circumstances, maximum likelihood estimation procedures such as logit/probit models are generally more efficient (Gujarati, 1988). A Tobit procedure was employed in identifying factors affecting volume sales decision of dairy products. The logic behind the use of the Tobit model was covariates affecting participation decision might be

different from covariates affecting sales decision, and the magnitudes of the effects of parameter estimates is also different.

Market participation

Models, that include a yes/no type dependent variable, are called dichotomous or dummy variable regression models in which determinants of an event happening or not happening are 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 the mathematical relationship between explanatory variables and dependent dummy variable, which is always, assigned qualitative values (Gujarati, 1988; Maddala, 1992; Feder et al., 1985; Pindyck and Rubinfeld, 1981)

$$\rho_i(y = 1) = \frac{1}{(1 + e^{z_i})}$$

Where ρ_i = is the probability of participating in the market for the i th dairy producer and ranges from 0 – 1.

e^{z_i} : Stands for irrational number e for the power z_i

Z_i : Is a function of a number of explanatory variables, which is also expressed as;

$$Z_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni}$$

Where X_1, X_2, X_n are explanatory variables and β_0 is the intercept, $\beta_1, \beta_2, \dots, \beta_n$ are parameters (slopes) to be estimated.

The interpretation of logistic regression coefficients (β_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).

$$\rho_i = \frac{1}{1 + e^{(\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni})}}$$

If ρ_i is the probability of market participation decision then $(1 - \rho_i)$ is otherwise.

Now $\frac{\rho_i}{(1-\rho_i)}$ 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 producers would not.

Factors affecting sales volume of dairy sale

A Tobit model was used in analyzing factors affecting sales volume of dairy. 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, 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), which is expressed as:

$$Y_i^* = \beta'0 + \sum \beta'i X_i + e_i = \text{and } e_i \text{ is } N(0, \sigma)$$

Where $Y = Y^*$, if $Y^* > 0$, $Y=0$ if $Y^* < 0$ and $Y = \max(Y^*, 0)$

Y_i^* represents dependent variable and quantities of dairy supplied to the market by farm households which contains observed and censored data, X_i represents a set of covariates and the reduced form equation of sales depends on explanatory variables, which are categorized into resources, the household socio-economic characteristics, and travel time or distance to dairy product market or district capital.

- | | |
|---|---|
| X1 = Number of household members | X8 = Return time from the market |
| X2 = Experience in dairy production | X9 = Return time from the district capital |
| X3 = Educational level of household head, | X10 = Amount of loan received last year |
| X4 = Educational level of spouse | X11 = Financial income from non-dairy sources |
| X5 = Number of extension visits, | X12 = Grain production |
| X6 = Number of local bred dairy cows | X13 = Sex |
| X7 = Number of cross bred dairy cows | |

β_0 represents the constant term

$\beta_1, \beta_2, \beta_3 \dots, \beta_{13}$ 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;

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

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 $\prod y^* \leq 0$ means the product over those i for which $y_i^* \leq 0$.

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;

$$\frac{\partial E(Y_i)}{\partial X_i} = F(Z)\beta_i$$

Where, Y_i is dependent variable and 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 sale of dairy with respect to change in explanatory variables among the participating households under Ceterus Paribus assumption was given by;

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

Definition of explanatory variables

Distance to market: The closer the market the lesser would be the transportation charges, reduced transaction costs, reduced trekking time, reduced loss due to spoilage, and reduced other marketing costs, better access to market information and facilities. This improves return to labour and capital and increase farm gate price and the incentives to participate in economic transaction (Admasu 1998).

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

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

Distance to district capital: Most of dairy production is found in rural areas while the demand and profitable market is found in the district capital. The closer the urban center the lesser would-be transaction and marketing costs. Distance to urban centers is a proxy to transactions cost which negatively affect participation and sales volume decision of dairy products. Small-scale dairy producers face many hidden costs that make it difficult for them to gain access to markets and among the barriers are transactions cost (CSA,2015).

Age of the household head: Is measured in terms of number of years of the household head, aged households are believed to be wise in resource allocation and use, and it is expected to have a positive effect on participation decision and sales volume of dairy products (EIAR,2012).

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

Experience in dairy: This variable is measured in terms of the number of years of dairying of the household head; it is expected to have a positive effect on market participation and sales volume (Birhanu, 2012).

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

Number of extension visits: The number of visits made by extension agent in the year measures the variable. Number of extension visits improves the household's intellectual capitals, which improves dairy production and divert product resources to market such as different forms of dairy products. These dairy products would otherwise be consumed by the household or wasted. Therefore, number of extension visits has direct influence on market

participation and sales volume. Studies have shown that visits by extension agent improve participation and volume decision of dairy sale (Holloway et al., 2000).

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

Estimation procedure

The model used for the study of market participation was logit model and the model adopted for analyzing factors affecting dairy sales volume was Tobit model. In short, the coefficient of the interaction of the variables indicates whether one of the two associated variables need to be eliminated from the model analysis (Kothari, 1990).

Results and Discussions

Socio-economic characteristics of dairy product producers

Table 1 below summarizes the dummy variables that were used in the analysis. The data revealed that high percentage of respondent's study areas were male headed (81.68%) when compare to female's (18.32%). The education level of sampled household head indicates that about 64.85% were literate while illiterate (35.15%). The survey result showed that 97.52% of the respondents were married, and 2.48% of them were single and the remaining was widowed.

According to the survey result, about 12.38% of smallholder dairy producers had access to extension services in the study areas. Access to credit service is an important input in dairy product value chain. The study showed that about 70.30% of household respondents were not used or no access to credit services that affects dairy production and marketing in the study areas.

The study result revealed that, about 80% of dairy producers had access to market information. Large percentage of respondents reported to depend on actual market day information/through personal observation, market information obtained from fellow/other farmers in the neighbors' betrothed on the same activities, and friends for prices and selling decisions. Majorities (90.59%) of household respondents had accessed to animal health services in the study areas.

The study result showed the majorities (63.86%) of the smallholder dairy producers were the member of any cooperative. About 76% of the respondents' household heads had mobile phone which is play crucial role in beef cattle value chain as means of market information.

Table 1. Summary statistics of sample respondent households (dummy variables)

Variable	Categories	Frequency	Percentage
Sex of household head	Male	165	81.68
	Female	37	18.32
Education of household head	Literate	131	64.85
	Illiterate	71	35.15
Marital status of household head	Married	197	97.52
	Single	5	2.48
Access to extension services	No	177	87.62
	Yes	25	12.38
Access to credit services	No	142	70.30
	Yes	60	29.70
Animal health services	No	15	7.43
	Yes	187	92.57
Access to market information service	No	39	19.31
	Yes	163	80.69
Membership to cooperatives	No	73	36.14
	Yes	129	63.86
Mobile ownership	No	19	9.41
	Yes	183	90.59

Source: Computed from survey data, 2022

The study result showed that the average available labor forces (labor supply) estimated by adult equivalent scale was about 6.56 persons per household. The average landholding respondents' households were 0.43 hectare on average which includes both cultivated and grazing land. About 62.2% households' holds less than 0.5 hectare.

The minimum and maximum land holding size was 0.125 and 1.5 hectare respectively which indicates scarcity of this resource in the study areas (Table 2). This has implication of livestock feed shortage due to limited land size per household.

The study result indicated that, cow milk had on average 12.36 years of general experience in practicing cattle keeping with the minimum and maximum experience of 1 and 45 years respectively.

The study result indicated that the total livestock owned by the respondent households was on average 4.19 TLU with the minimum and maximum livestock owned of 0 and 13 tropical livestock unit (TLU) respectively in the study areas. Moreover, the mean total number of cattle owned by the respondents' households was 3.24 tropical livestock unit (TLU) with the minimum and maximum livestock owned of 0 and 11 tropical livestock unit (TLU) respectively in the study areas.

Table 2. Summary statistics of sample households (continuous variables)

Variable	Mean	Std. Dev	Min	Max
Age of household head in years	34.08	8.71	18	70
Household size in numbers	6.56	2.36	1	14
Total landholding owned in hectares	0.421	0.254	0.125	1.5
Grazing land owned in hectares	0.021	0.059	0	0.5
Cultivating land owned in hectares	0.404	0.248	0	1.5
Number of total livestock owned in TLU	4.18	2.86	0	13
Number of cattle owned in tropical livestock unit	3.24	2.42	0	11
Farm experience in cow milk in years	12.36	9.63	1	45
Distance to the nearest market place in minutes	97.62	54.29	15	360
Distance to the main road in minutes	18.37	10.86	5	60
Dairy product supply to market in numbers (heads)	1.84	1.14	1	9
Male cattle sold in numbers (heads)	1.63	0.890	1	6
Female cattle sold in numbers (heads)	1.203	0.65	0	5
Animal mean age for fattening (years)	4.23	1.12	2	10

Source: Computed from survey data 2022

Forms of dairy sale by households

The most marketable product representative in the areas is butter. From the total 45.54% participated in butter sale and 27.72% participated in selling milk, spatially the sale of the former is restricted to urban and peri urban areas while the sale of the later is undertaken elsewhere in the districts. As depicted in Table 3 households have a tendency of selling one dairy product at a time. Many households participate in selling butter and market participating farm households tend to sell one type of dairy product at a time. Better combination was observed between butter and cheese. The combination of milk with other dairy products was weak and this shows that milk-selling households try to specialize in selling milk.

Table 3. Households selling different forms of dairy products

Market participating households	Number	Percentage
Households selling butter	92	45.54
Households selling milk	56	27.72
Households selling cheese	2	0.99
Households selling butter and cheese	33	16.34
Households selling butter and milk	11	5.45
Households selling milk and cheese	5	2.48
Households selling butter, cheese and milk	3	1.49

Source: Survey results, 2012/13

Uses of income from dairy

Many households in the study area are not market oriented and much of dairy product is used for household consumption. Large number of dairy products especially butter is used during cultural and religious festivals as cosmetics and preparation of varieties of cultural foods. Dairy income is used to cover expenditures on students' school material and purchase of grain and food items, farm inputs and replacement stock Table 4. More than 30% of the sample households allocate their income to cover student expenses as their first priority. There were better terms of trade right after crop harvest which had been continuously reducing till the next crop harvest. Terms of trade declines in summer when prices of crops escalating and opposite movement of prices of dairy products. Therefore, trading dairy products for grain far more support poor people in the district. Again, selling dairy products for grain during periods of food shortage improves food security of the poor because of its favorable terms of trade and continuous income.

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

Table 4 Percentage expenditure of income from dairy by sample households

Type of expense	1 st	2 nd	3 rd
Soap and cloth	12.3	19.5	2
Buy grain	18.3	9.2	8
Loan repayment	4.6	4.3	11
Other and coffee	25	49	58
Student material	30	14	18
Cow feed	9.8	4	3

Source: Computed from survey data, 2012/13

Dairy Product Utilization

Table 5 Utilization of milk among sample farm households

Dairy products	Liters	Percent
Milk for human consumption in the household	9,174	21
Milk sold	16,035	37
Milk processed into butter	16,314	38
Milk processed into yoghurt	1,675	4
Total milk produced	43,198	100

Sample households produced 43,200 liters of milk per week. Most of the milk produced, 16,314 liters (38%), was processed into butter and 16,035 liters (37%) was sold in liquid form (figure 1). The remaining 9,174 liters (21%) was consumed in the household in milk form, and 1,675 liters (4%) was processed into yoghurt.

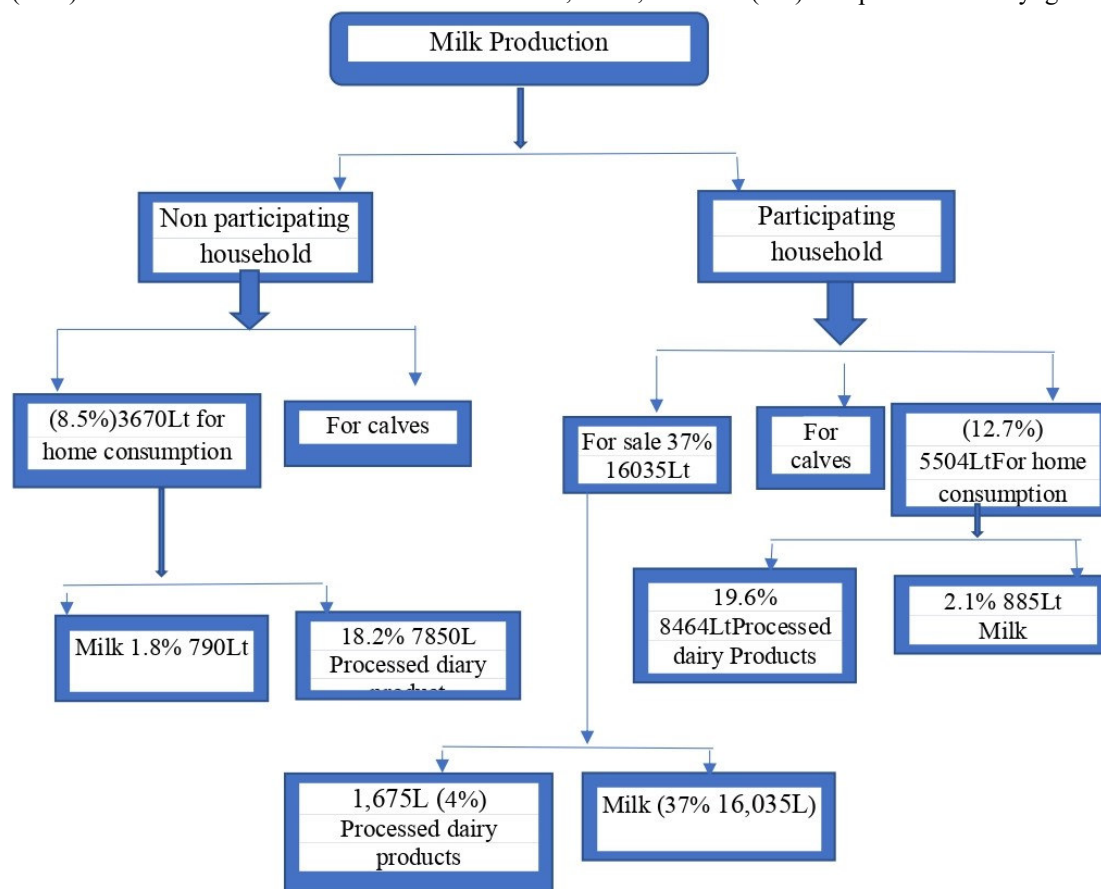


Figure 1 Milk

Problems of smallholders in dairy marketing

Subsequently 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 marketing in the district were low marketable surplus, remoteness from markets and urban centers, low prices and lack of tradition in dairy marketing.

Table 6 problems of dairy marketing of smallholders by commodity type

Marketing Problem	Milk	Butter	Cheese
Low price	121	56	75
Distance from market or town	40	28	25
Low production	31	99	58
No tradition of selling dairy	3	-	42
No problem	7	19	2
N	202	202	202

Source: Survey results 2012/13

As indicated in Table 6 121 (59.9%), 56(27.7%) and 37.1%) of the respondents prioritized low price of production as a major constraint in milk, butter and cheese marketing, respectively. Low price itself seems to be the result of the lack of market chain and price information. 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.

Distance has relatively minimum effect on butter and cheese sales because of reduced volume and perishability. Remoteness coupled with high perishability and bulky natures of liquid milk have important effects on market participation decision and its volume of sales. Some respondents, 40(19.8%), indicated that because of their long distance from markets and major urban centers, 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.

Small number of respondents about 3(1.5%) and no have- pointed out that lack of tradition and said no problem, respectively in milk and butter sale inhibited them from involving in dairy markets (Table). Sample farmers inherently know the resource allocative power of price and tend to allocate resources according to relative returns expected to be realized from producing for the market.

Econometric Analysis

Factors affecting dairy market participation

Meaningfully household physical wealth affecting market participation decision is local breed and crossbred dairy cows. As it was expected, they are posited to affect market participation decision significantly. 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 small and marginal areas are left for pasture. This has resulted into an ever-decreasing pasture both in quality and quantity. Therefore, only few urban and peri urban market-oriented farmers possess crossbred dairy cows.

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 has positive coefficient, indicating that such resources strengthen the ability of smallholder dairy producers for coping with different risks of production and consumption and enter to economic transactions

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 positive coefficient and large households with greater members tend to participate in the market.

Transaction costs are hypothesized to impede market participation because they impose added cost burdens to the dairy marketing activities. Distance to market is considered as a proxy for transaction costs and is hypothesized to negatively affect market participation; that is, the farther away is a household from the market, the more difficult and costly it would be to get involved in the market. Consistent result was found in this study. Distance to district capital has negative coefficients affecting market participation level. However, distance to the market and district capital has indirect effect on household output and also affect market participation position of the household.

Table 7 factors influencing dairy market participation

Variables	Coefficient SE	Odds ratio	Wald statistic (Z-test)
Family size	0.06 (0.17)	1.05	0.15
Crop production	-0.02 (0.01)	0.87	1.65
Education	0.40* (0.24)	1.45	2.56
Extension Visit	0.30* (0.20)	1.22	3.12
Education of household head	0.41** (0.211)	0.55	3.53
Return time from the district capital	-1.90** (0.80)	0.11	5.43
FINANCE income from different source	0.001** (0.00)	1.00	5.49
Return time from the nearest main market	0.30 (0.41)	1.50	0.53
Number of crossbred dairy cows	1.02 (0.83)	2.42	1.31
Constant	1.20 (1.52)	2.48	0.54

*** Significant at 0.1 and 0.05 probability level, respectively

Loglikelihood ratio index (Mc Fadden R²) 0.53

Number of observations = 202

Households who have sufficient per capita grain production avoid the idea of market participation altogether. Relatively wealthy households consume a high portion of milk extracted from cows with surplus turned to butter, which partly indicates that 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, negative coefficient of crop production indicates inverse relationship with dairy market participation decision. Relatively rich households, when they find crop production to be more profitable less likely to engage in dairy marketing and other off-farm activities. This shows that under such undeveloped situations, specialization of relatively wealthy households in crop production may be a custom. On the other hand, poor households with limited per capita crop production try to diversify income source from farm and non-farm activities. The poor with limited per capita crop production is observed to participate in the dairy market and negative coefficients of crop production corroborate this fact. 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 market. 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.

Factors influencing volume of dairy sales

The appropriate model for estimation under this condition is 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, therefore, 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 intellectual capital represented by education of household head and spouse and number of extension visits received by farm households during the year.

Demographic characteristic believed to affect volume decision of dairy was number of household members. Farm households with better 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. From the study the female-

headed households have better predisposition to entry into dairy market and volume supply. 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 70%. This is low but reasonable given the small sample size. However, it also indicates possible non-inclusion of other relevant variables. Intellectual capital hypothesized 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. Intellectual capital of the household expressed as educational level of the household head and spouse had negative and positive coefficients, respectively.

Education of household head was significant at 5% level while education of spouse was insignificant. Extension visit on the other hand was consistent with a priori expectation and exhibited a positive coefficient and significant effect at 5% level (Table 8).

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, two proxies were used instead—return time from the market and the district capital. Return time from the market had positive and insignificant effect on the volume of dairy sale while return time from the district capital had negative and significant at 5% level.

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 insignificant, as households were keeping poor performing dairy cows. The effect of crossbred dairy cows was positive and significant at 5% level. Households who keep crossbred dairy cows are market oriented and because of higher productivity marketable surplus also increases with crossbred dairy cows. 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 significant at 1% and 5% level, respectively.

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 favorable terms of trade.

Crop production per household exhibited negative coefficient as expected and was significant at 10% level. 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. Their opportunity cost of labor of those households in participating dairy market is also low because of reduced land and subsequent reduced farm activity.

Table 8 factors influencing farm households' volume of dairy sales

Variables	Coefficients (SE)	t- value
FAMSIZE	0.090 (0.0610)	1.50
EDUCATIONH	-0.189 (0.087) **	-2.15
EDUCATIONHS	0.067 (0.054)	0.84
EXPDAIRY	-0.009 (0.009)	-1.05
EXTENSIONV	0.162 (0.064) **	2.01
RETRNTMMRT	0.047 (0.138)	0.20
RETRNTMDISCAP	-0.271 (0.119) **	-2.35
FINANCE	0.00027 (.00013) **	2.05
LOAN	.00063 (.000091) ***	6.60
CROPPRO	-0.015 (.009) *	-1.64
SEX	-0.640 (0.33)	-1.54
DAIRYCOWS	0.191 (0.334)	-0.64
BREED (1)	2.94 (1.393) **	2.10
(Constant)	0.216 (0.725)	0.25
$R^2 = 0.70$	$\delta = 1.27$	
Chi-square = 79	$f(z) = 0.110$	
Log likelihood = -34	$F(z) = 0.328$	
N = 202		

*** Significant at 0.01 probability level, ** Significant at 0.05 probability level, * Significant at 0.1 probability level

Marketing

The analysis of dairy marketing is expected to provide a systematic knowledge of the flow of dairy and its products (butter and cheese) from production areas in Abichuf Gnea and Jidda districts to final consumers (end users) in different parts of the country. Marketing also describes the actors who play roles and how they function in the market.

Raw milk and milk products marketing routes

There are several marketing routes for raw and skimmed milk produced in the study area. From the FGD, the proportion of milk marketed by dairy producers was only 15%. The rest 85% of the produced milk will remain within the households either for household consumptions or for processing purposes (butter and cheese). The dominant market route for raw milk is the local Market of Mendida Zuria cooperative, hotels, cafeteria and individual urban and pre-urban consumers of the town of Debre Brian). The evening milk will be used for home processing into butter and cheese and for household consumption.

Butter and cheese market routes

The main market routes for butter are consumers of Mendida and Sirti towns. Debre Brian and Shano also serve as market outlets for retailers to the Finfinnee. Traders are responsible for directly purchasing butter from farmers and distribute to the wholesalers of Addis Ababa markets. In some instances, wholesalers directly purchase the butter and sell to Debre Brian and Addis Ababa markets.

The primary market outlet for cheese is the Debre Brian market. Large traders collect cheese using their own collectors on major market days and transport it to the Debre Brian market. Likewise, traders from different area purchase cheese from the producers in Mendida, Jimate and Sirti market and sell it to wholesalers of Addis Ababa.



Figure 2 during butter and cheese sell

Characteristics of Dairy Traders

Traders to be successful require a pool of friends, families and suppliers in a trade. The number and capacity of families and friends in the dairy trade who supported in the past and at present and the number of languages or dialects spoken by traders would enhance their social capital position. The social capital helps in terms of exchange of market information, on credit purchase and sale, and number of local and distant trade contracts.

Dairy producers

Smallholder dairy farmers are the major players in the dairy value chain in Abichuf nyea and Jidda districts. The proportion of milk marketed by farmers is lower. According to the information from FGD, the proportion of milk marketed by dairy producers is only small amount of the total production. The large amount of the produced milk will remain within the household either for household consumption or for processing purposes (butter and cheese). The main reason given for not selling milk was low-level of milk production, which was not sufficiently larger than home consumption.

Collectors

Collectors are one of the important actors in the dairy value chain. Some of collectors undertake their regular duties for private processor by collecting milk in their rented collection shops in Mendida, Mendida Zuria, Adare Ejersa (Abichuf nyea) and Kofale, Siba Sirti (Jidda) villages. They usually use plastic can to transport the milk to collectors. In order to detect the milk quality, they mainly use lacto- meter tests and visual observations for their regular customers.

Private processors

one private dairy milk-processing firm (cheese trader private milk processing) was involved in milk marketing in

Debre bran town. this private processor has other milk collection centers in Abichuf nyea district. According to the information obtained from FGD and key informants, cheese trader private milk processing commands small amount of the fresh milk market. The main market outlet for this firm was the urban consumers of Debre bran and Addis Ababa, where it has a mini shop that sell the milk products (cheese and butter) and sour milk to the consumers of this town.

Hotels/cafeterias

Hotels and cafeterias directly purchase fluid milk (morning and evening milk) from the producers based on contractual agreements. They purchase butter from local butter traders at a price of 550 ETB/kg. The average daily intake for raw milk reaches up to 12 liters/day/hotel or cafeteria. According to the information obtained from FGD and key informants, hotels/cafeterias command large amount of the fresh milk market of the study site. They consider quality parameters such as freshness, adulteration with water, taste, hygiene and price in their decision to buy liquid milk.

Individual consumers

There are three main dairy products consumed by individual consumers in the area: raw milk, edible butter and cheese. Smallholder dairy producers are still very important sources of milk for individual consumers of the study area. Smallholder dairy producers sell fresh milk to their neighbor and other individual consumers on monthly contractual basis. In this case, the consumer collects milk from the producer's gate. Either the children or women are usually collecting milk from the producer. Collection could be in the morning, afternoon or both depending on their agreement. In this case too, there is no formal written agreement.

Since the two parties meet every day, they easily communicate the quality problems so that producers can correct them as much as possible. If not, the consumer looks for better quality milk from other producers usually after finishing the contract.

On the other hand, for other dairy products like cheese and butter the major points of purchase are town markets and the main sellers are traders and individual producers

More than 98% of traders started up their trading business themselves, which is small and personalized. Only 10% of traders indicated that their mothers were involved in dairy trade and none of them suggested that their father was in dairy trade thus insignificant social capital was derived from family dairy trade. Traders didn't appear to switch businesses very often; the total number of years the traders surveyed had worked in dairy trading was only slightly higher than the number of years they had been in their current business, and the average number of years in dairy trade of those in the sample was 9.17 years. There appears to have been relatively little variation within the sample in terms of years of schooling or experience in dairy trade; traders received 4.33 years of schooling on average.

Table 9 Trader's experience, financial and social capital (N=20)

Variables	Mean values (SE)
Amount of capital currently used	50,193.90 (933.46)
Years in dairy trade	9.17 (1.91)
Years of schooling of trader	4.33 (0.92)
Trade alone or in partnership	0.03 (0.31)
Number of markets visited/week	3.7 (0.39)
From how many people buy on credit	3.47 (2.22)
To how many people sell on credit/week	4.24 (1.03)
Number of friends in dairy trade	1.25 (0.290)
Number of local trade contracts/week	3.42 (0.41)
Number of distance trade contracts/week	0.43 (0.10)
Number of partners through telephone order only/week	0.30 (0.15)
Parents in dairy trade	0.10 (0.06)

Source: Survey results, 2012/13

Marketing Channels

The persistence of this section is to review the structures adopted by marketers to deliver dairy products, mainly milk and butter, from producers to consumers. Roads, communication facilities and market institutions are often poorly developed in the rural areas and this limit the range of marketing functions and services and confine sales to the nearby consumers. Poor infrastructure coupled with perishability of dairy products form a major obstacle to the marketing functions and limits the involvement of market intermediaries, which resulted into poor development of marketing channel for dairy products. Dairy products reach the consumer in a variety of ways: by means of direct sales to rural and urban consumers, direct sales to rural traders or retailers, through farmer trader, direct

sales to shops, direct sales to the cooperative and dairy processing industries. More often, smallholder farmers transport dairy products to the rural and urban markets themselves, either carrying or using donkeys, and sometimes sell directly to farmer trader (retailers) at the farm gate or in the market, or directly to wholesalers. Urban and peri urban producers sell dairy products to consumers, dairy cooperative, shops and kiosks, and processing industries.

Through the network of marketing channel as the dairy product moves from producer to consumer either sold as liquid milk or transformed to butter, cottage cheese and yoghurt. The bulk of dairy products in rural areas is sold in the form of butter and cheese, and milk is more transacted around urban and peri urban areas.

Urban consumers have high quality considerations of dairy products such as hygiene and standards. Few and poorly developed dairy market institutions are not able to satisfy these growing needs. This indicates unsophisticated dairy market structure. Marketing in the form of liquid milk is restricted to major urban centers while transaction in the form of butter and cheese is dominating and undertaken all in rural and urban areas in the district.

However, because of limited production of dairy especially butter, the district is not able to satisfy the increasing demand both in urban and rural areas. Therefore, the district is deficit in butter product and there is wide supply-demand gap.

Summary transaction of liquid milk in the rural areas is mainly because of small dispersed production, problem of collecting and transporting milk to market, bulky and high perishability nature of milk and lack of cooling facilities and reduced demand because of income and inhibiting traditional and cultural taboos in the rural areas. Farm households were using farm gate and milk collection centers owned by the cooperative and milk processing industries as an outlet for liquid milk. No sale of liquid milk was observed in physical market place, which was the case for butter and cheese.

Marketing channels for milk

As depicted on the Figure 2 about 71% the product, passes from the producer to the consumer. Milk is bulky and highly perishable and its spatial transaction is very much limited as compared to butter and cheese. This characteristic of milk and increasing demand for milk in major urban centers has resulted in institutional arrangement to establish reliable outlet. Milk marketing channel in milk market is changing rapidly with the increasing milk marketing outlets in urban and peri urban areas. This is because of the coming into scene of some new actors to the marketing channel, which were hitherto unknown until very recently in the district i.e., private processing industries and dairy producers cooperative and who stood between producers and consumers. This is the second most important channel through which the product reaches the consumer.

Fresh milk for consumption without changes of form must flow in the marketing channel very quickly from producers to consumers. The flow of milk through the channel starts with the fresh product produced early in the morning, being sold either to consumers or processors before noon. Vertical integration by forming producers' dairy cooperative is extremely important in marketing of high quality and highly perishable dairy product such as milk, which ensures greater efficiency and effectiveness in the milk market

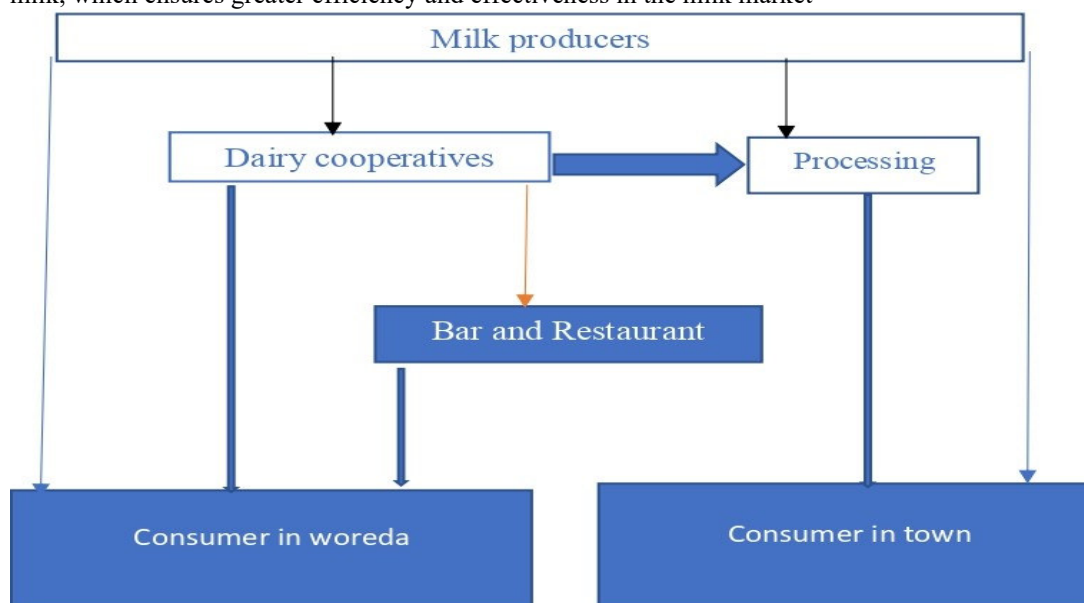


Figure 2 milk market channel

The analysis of dairy marketing channels is assumed to provide a systematic knowledge of the flow of dairy

and its products from their production areas to their final end-users. In due course, it allows simplifying the complex nature of the subsector, helps to identify all key actors and the main leverage points for the sub-sector where targeted interventions could affect the entire value chain.

Analysis of information obtained from different sources during the study depicts that there are four main market channels for fresh milk produced in Mendida and Jidda districts with which it reaches to final consumers. The final consumers of dairy products in the study area are individual consumers and hotels/cafeterias of the main route road of Debre brain and Addis Ababa city.

Marketing channels for butter

Fresh butter produced by the smallholder farmer in the districts is expensive and has dual functions; used for cooking as well as cosmetics. Usually, urban consumers who are concerned with quality and food safety prefer such a product for household consumption.

Most farmers sell butter in markets within their vicinity. This can be attributed to the small amount of butter produced and offered for sale, long distances, and to the high demand urban and peri urban markets is rare because of reduced output levels and consequently the increasing transactions cost. However, most of the product, around 85%, passes from producer to consumer. Small quantities of butter produced and offered for sale restrict most farmers to take advantage of spatial arbitrage. This is mainly because of the transaction costs and opportunity cost of time for farmers to mediate exchange is high since output levels are low. Therefore, mobile butter traders are involved in accumulating supplies for resale to consumers in rural and urban markets.

Mobile butter traders purchase butter from wholesalers in Addis Ababa and Debra baran, purchase fresh butter and cheese from producers in the district for resale in urban and rural market. They buy dairy products of better shelf life from producers at farm gate or at market place after transported to the market. About 4.9% of butter reaches the final consumer through this line of system

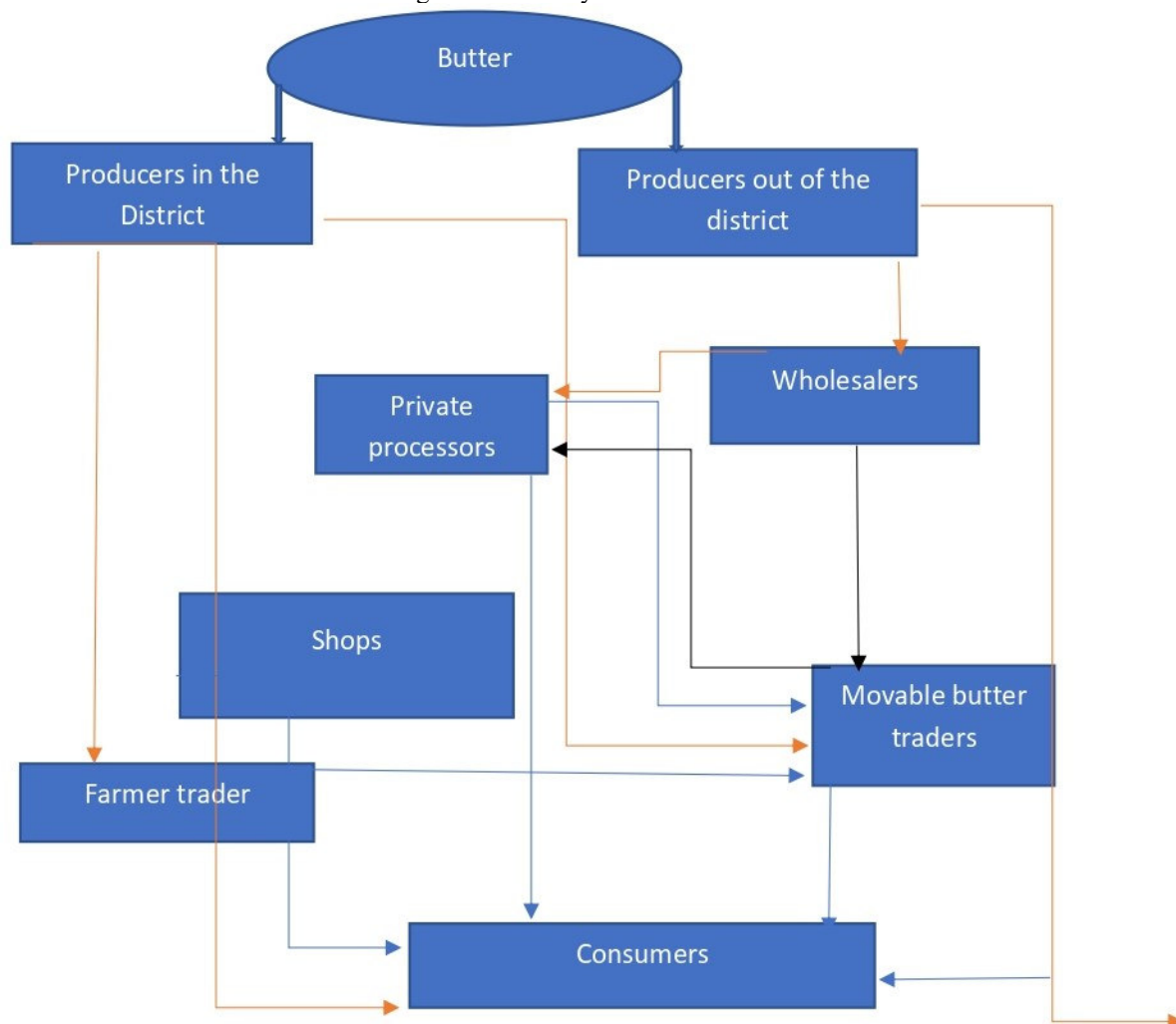


Figure 3 Marketing channels of butter

Concentration of firms

Dairy market of milk, butter and cheese in the district is characterized by the prevalence of un concentrated supplies. Dairy products are supplied by a very large number of producers from different areas, whereby no producer affects the function of other producers. Market in the next level, at buyers' level, is also un concentrated for butter and cheese. So, this market resembles the characteristic of a competitive market. Milk market on the other hand exhibits relatively concentrated buyers. Concentration ratio for milk market is calculated by taking the annually purchased volume of milk by market participants in liters.

However, there are reasons why high concentration levels may be reasonable in light of small potential volume traded and where much of the product passes directly from producer to consumer. Moreover, dairy products especially milk is bulky, perishable and lower volume of production per household and per unit area and the associated higher transaction cost.

Marketing margins

The overall marketing margin is simply the difference between the farm gate price and the price received at retail sale. It is important to sort out the producers' share in the consumers Birr and also to know the shares of different actors. Market prices reflect two elements; marketing and transaction cost on one hand and normal profit on the other. Normally, at each successive stage, the price per unit is higher because of adding value by all or some of the marketing functions of transport, storage and processing. In marketing margin analysis, the purchase price and selling price of dairy products of different marketing middlemen was considered.

In an efficiently operating market, the competitive environment should keep the marketing margin to the minimum. Efficiency in performance of marketing is not in all cases equated with small marketing margins. Small marketing margin, however, is not always equated with efficient performance in marketing functions. Similarly, large margins are not necessarily a firm indication of inefficiency or excess profit. Marketing margin and costs can be meaningfully discussed in relation to the services and functions provided. Sometimes widening margin overtime may reflect an increasing demand by consumers for additional services.

Small-scale dairy traders comprise those who trade in butter and milk as a main business, farmer trader, milk bars, processors and those who trade in dairy as part of other retail activity mainly involving sale of other household consumer items like shops and kiosks. Here the dairy trade comprises of less than one fourth of the total turnover.

Table 10 Costs and margins of dairy products (milk/L butter/kg and cheese/kg) in Birr

No	Costs/margins	Movable Traders (N= 12)		Bars & Shops (N= 5)	Processing Plants (N= 1)	Dairy coopera.
		butter	cheese	milk	milk	milk
1	Marketing cost					
	Purchase cost	27	4.6	2	1.85	1.90
	Processing cost	-	0.75	0.05	0.4	-
	Transport cost	1.16	0.13	0.06	0.13	0.0578
	Other cost	0.17	0.3	0.12	0.1	0.0032
2	Transaction cost					
	Opportunity cost of capital	0.036	0.18	0.01	1.65	0.012
	Opportunity cost of labor	0.07	0.58	0.84	0.15	0.077
3	Total cost	28.23	5.49	3.19	2.46	2.0889
4	Sales	31.40	6.80	3	3.34	2.1111
5	Margins					
	Total gross marketing margin	14.12%	32.34%	33.3%	44.6%	10%
	Net marketing margin	7.8%	19.26%	-6.25%	19.7%	1.05%

Source: Survey results, 2012/13

As shown in Table 10, the net marketing margin is one of the lowest and is only 1.05% as compared with other traders. However, member dairy producers contribute 100gms/kg of milk sold with the aim of strengthening the financial position of the cooperative and yet many dairy producing households in urban and peri urban areas prefer to sell the produce to the cooperative. This is mainly because they feel the sense of ownership and consider the cooperative as their own and it is also a reliable year-round outlet for their produce. The provision of inputs and veterinary services keep members loyalty and maintain milk yield and giving the cooperative economies of scale.

Market actors

In marketing chains, the product passes through different market stages in the value chain before it reaches to final consumers. The main actors in dairy and its products markets include a network of private processor, cooperatives (available at kolfe but its channel through Muka Turi), hotels/cafeteria, individual consumers and farmers.

Challenges of Dairy Value Chain

Constraints at Input Supply

Information gap on credit services: With regard to credit, farmers and dairy producers have limited awareness about the terms and conditions of credit providers. Currently most farmers do not have good knowledge of how to get credit services, amount of credit and loan repayment periods for dairy farming activities. Farmers abstain from using this credit mainly due to lack of understanding of its terms.

Low quality and untimeliness of AI and animal health service provision: Based on famers' response during FGD, the service rendered by the AI technicians was inadequate and offering low quality services. Due to this problem, nowadays farmers tend to use bull service for breeding, which is more attractive from the point of view of its timely accessibility when service is required.

Additionally, the situations become even worse for those farmers who live in far distance areas within the peasant association where provision of animal health and AI services were either unavailable or inadequate. It was learnt that those farmers in distant areas travel more than 5 hours to arrive at the service provider station. In some cases, they reach the service station after the heat period is over. This leads to failure of conception which perpetuates farmers to lose their confidences on AI services and leads to the use of the alternative bull services.

Unavailability of budget for demonstration sites on improved forage production in Farmers Training Centers (FTC): Utilization of FTC as training ground for demonstration of improved forage development was not observed in the study area. The major problem behind this was budget shortage. Due to lack of awareness and emphasis regarding the importance of improved forage deployment in enhancing dairy productivity, the allocated budget for the district went for development of major cash crops like carrot, onion, bread wheat and pulse crops. As a result, farmers were following the practice of producing only natural grazing pasture, fodder beet and oats using the knowledge obtained from their neighborhood.

Shortage of government and private farms and multiplication centers for the supply of improved dairy heifers and bulls: Farmers stated that there was shortage of ranches that multiply and distribute improved heifers and bulls in the area.

Opportunities

The major opportunities available to stimulate the transformation of the dairy sector of two districts are include:

- Favorable climate and weather conditions
- The availability of some progressive farmers who have adopted the practice of keeping improved dairy cows provides clear evidence that there is an opportunity to bring about the positive changes.
- Change of lifestyles in urban centers joined with urbanization and rapid population growth.

Conclusions and Recommendations

Conclusions

Market participation and sales volume decisions are found to be important elements in the study of marketing patterns. Participation in dairy sale is a dichotomous dependent variable the Maximum Likelihood Estimation procedure of logit model was thus used in the study. Participation decision of the smallholder was affected by education of household head, experience in dairy production, and return time from the district capital and financial income from different sources. The sales volume decision of dairy was analyzed using Tobit model. Education of the household head, extension visit, return time from the district capital, financial income from different sources, credit, grain production and crossbred dairy cows were important determinants affecting volume of dairy sales. Marketing costs and margin were also analyzed in this study. Milk marketing is changing rapidly with increasing market oriented small scale dairy producers and milk marketing outlets, such as milk processing industries and dairy producer's cooperative which stood between producers and consumers.

Recommendations

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

Inaccessibility from district capital and demand areas is one of the constraints to dairy marketing in the district, which resulted into inadequate marketing link between the rural producer and the urban consumer. This missing

link can be forged through institutional arrangement such as cooperative structures. Cooperatives can be very successful in dealing with both information asymmetries and easily attain competitive edge.

They do this through collective action, pooling resources and lowering the unit cost of transactions. Members should widely understand the cooperative and its aims to 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. Extension and training programs in dairy market should be designed primarily in such a way to target and inform these sectors of the society.

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 expenditure.

Financial income from different sources and credit found to stimulate dairy market participation 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 market.

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