

Factors Associated with Supply of Butter and Optimal Value Chain of Milk Product in Kedida Gemela District of Kembata Tambaro Zone, Southern Ethiopia

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ABSTRACT

Butter product is one of most important Dairy products in the livestock production and referred as livelihood base that ignites economy of the farming communities in Kedidagamela districts and Kembata Tembaro zones of Southern Ethiopia. But the level of value addition in butter and its determinants and optimal value addition channel was not identified and updated. Hence, the study done based on targets of gathering update information to examine factors affecting butter supply in the value chain and indicate optimal value addition channel for the districts. The study done at Kedidagamela districts of Kembata Tembaro zone and used cross sectional data from household survey of 101 households. The study applied multiple linear regression model and descriptive statistics for analysis. The study finding indicated that level of butter supply defined as function of agricultural and off-farm income earned, age of respondents, area of improved forage at farm land, number of cow owned and feeding and medication costs of dairy cow. The study identified the optimal value chain for producer that provokes the household to adopt value addition practise in making different products rather than selling fresh milks for consumers. The study points out that butter supply to market can be enhanced through promotion of improved forage cultivation, enabling producers to earn income from agricultural and none agricultural activities, reducing feeding and medication cost of cow rearing, owing more cows and obtain experience in production. The level of value added in dairy products and income of producers can be optimized in adopting value addition practices of dairy products that experienced by more than two third households in the districts.

Keywords: Butter, Cow, Dairy Products, Optimal Chain and Value Addition

Introduction

The livestock value chain can be defined as the full range of activities required to bring a product (e.g. live animals, meat, milk, eggs, leather, fiber, manure) to final consumers passing through the different phases of production, processing and delivery. It can also be defined as a market-focused collaboration among different stakeholders who produce and market value-added products. In Ethiopia, the current per caput consumption of meat is 13.9 kg year; being lower than the African and the world per capita averages, which are 27 g/year and 100 kg/year, respectively [1,2].

Now a day the demand for livestock products in Sub Saharan and eastern African countries is increasing tremendously. However, the overall performance of beef sector in Ethiopia is very low as compared to other countries in east Africa and world standard; this is due to of weak value chain of the beef sector in the country. Therefore, undertaking the beef value chain analysis and upgrading the beef sector is one footstep [3].

The Ethiopian livestock and product value chain is operating in an environment characterized by several constraints that aggravated by lack of update information beef value chain, value addition practices and gaps in the system. These problems assumed to one of the major constraints hinder the development of the sector with interlinked problems complicated the system. The other important challenges in the sector listed as poor market infrastructures, low benefit of producers from the sector and exploitation of certain actors, seasonality in marketing and production, competition of the domestic and the export sector, market entry barriers, distant marketing points, high transaction costs, information asymmetries and unfriendly relations between actors [4].

The major constraints affecting milk production potential of dairy cattle in Ethiopia includes shortage of grazing land, disease and parasites, land shortage for cultivation of improved forage, inadequate veterinary and inadequate Artificial Insemination service, low milk production potential of local cattle and labor shortage [5]. The availability of both important formal and informal channels in Ethiopia characterized as a complex dairy value chain. Fresh milk sales is determined by access to dairy product processing enterprise or cooperatives [6].

The major challenges of dairy products production in the Value chain in Ethiopia comprised of seasonality of production, spoilage, lack of improved milk collecting facilities, poor animal health and management, inadequate supply of quality feed, low productivity and genetics, quality problem, weak vertical integration, absence processing plant, inadequate permanent trade routes and other facilities like feeds, water, holding grounds, lack or non- provision of transport, lack of access to land, ineffectiveness and inadequate infrastructural and institutional set-ups, prevalence of diseases, lack of credit and inadequate market information are dominant [7].

The study result by Debele and Verschuur implied that factors affecting milk value chain in smallholder dairy farmers were summarized as reduction in volume of milk produced, high cost of different inputs (animal feeds, improved breeds), high bargaining power of trader, weak relationship of dairy cooperative with its members, long fasting period of Ethiopia Christians [8].

The major production problems of dairy value chain comprised of weak link between milk producers, traders and other stakeholders, shortage and high cost of feed, lack of market service providing institution, difficulty to get land, disease prevalence, lack of technical support and other related technologies. The major milk marketing constraints include lack of quality control of milk, lack of cooling and storage facilities, poor quality of milk supplied from rural areas, sale of raw milk, inappropriate milk handling and storage vessels, and spoilage. The major opportunities for the development of the dairy sector include high demand for milk, presence of enabling policy that encourages investment, absence of competitors and easy access to transportation [9].

The study result by Gemechu indicated that that distance to the nearest main road negatively, quality milk supply, Access to market information and reliability of milk supply positively

CSA information on Milk production

Location	no. of dairy cows owned	No. of milking cows owned	Lactation period in months	Average daily milk yield	Annual milk production
Ethiopia	7155114	11833179	6	1.373	3134181317
SNNPR	3337107	2683643	6	1.395	725878141(23%)
Kembata Tembaro	121610	104257	7	1.674	40007183 (-5.5%)
Hadya	285403	217975	6	1.359	57757203 (7.9%)
Wolaiyta	257965	224314	7	1.399	69065134 (9.52%)
Dawuro	96006	68454	5	1.203	14962719 (2.06%)
Research result			11	6.25 for cross & 2 local	

As illustrated in the table above the Southern Nations, Nationalities State farming community that hold 46.64% of dairy cow produce about quarter of milk produced in the country.

Results and Discussions

Table 1: Farmers' Demographic Characteristics

Socioeconomic variables	Statistical			T test
	Mean	Std. Deviation	t-value	Sig.(2 tailed)
Family size	7.45	2.12	37.06	0.00
Age of respondent farmer	43.89	10.33	45.26	0.00

affects the participation decision of smallholder farmers in dairy value chain upgrading [10].

The study finding by Ejigu implied that providing information and resources increase smallholders' capacity with resources intervention enable the agricultural marketing system to properly function by serving smallholders in linking to the global food chains [11]. The direct actors of dairy value chain comprised of input suppliers, producers, local collectors, wholesalers and retailers [12].

Objectives

General Objective

To examine factors affecting supply of butter, estimate the level of value added and map optimal value addition channel

Specific Objectives

- To identify factors affecting butter supply to the market in Kedida Gamela district
- To estimate value added from cross and local cattle breeds in study district
- To summary proportion of dairy products supply to the market district

Methodology

The survey was carried out the tow potential kebele of Kedida Gamela district in Kembata Tambaro Zone. The survey was carried in the Dega kedeida and Zato shodera kebles of the district. From respective kebeles, 54 households from Degaga Kedida and 47 from Zato Shodora peasant associations. The two Keble selected based on breed diversity, milk production and secondary data collection gathered from offices. The dairy cattle herder farmers selected for interview randomly. Based on cattle population, breed type, road access the selection of Kebele and Woreda was carried out using purposive sampling.

Even if the average age of the small scale farmer was 44 year; its ranges varies in between 20 and 68. From sampled farmers majority (97.3%) are in economically active age group in the age range of 20 and 65 years. The average family size of farmer in the district was 7. The family size distribution shows that it ranges between 3 and 5 for 22.5% households, ranged between 6 and 9 for 58.5% households and ranged between 10 to 12 for 19% households. The study indicated that majority of the households have medium family size.

Table 2: Religion of respondents across Kebele

Religion type	Kebele		Total
	Dega kedeida	Zato shodera	
Orthodox	3	2	5
Catholic	4	0	4
Muslim	2	0	2
Protestant	44	45	89
Hawaryat	0	1	1
	54	47	101

The survey result confirmed that the religion of small scale farmers varies across kebele depending on farmers' institutional

setting and other related factors. From sampled farmers in the two kebele 5 % were orthodox, 4 % were Catholic, 2% muslim, 88% protestant and 1% was Hawaryat.

Land Ownership

The survey result showed that amount of land owned varied across small scale farmers households in the study districts. The proportional distribution of sampled farmers that owned in the range between 0.05ha to 0.2ha was 31.1%, 0.25ha to 0.5ha was 42.8%, and 0.63ha to 0.88ha was 17% and 1ha to 1.5ha was 8.9%. The study result justified that majority of sampled farmers (91.1%) possessed less than 1ha land and only 8.9% owned more or equals to 1ha farm land.

Table 3: Way of Dairy Cow Ownership across Kebele

Kebele	Way of dairy cow ownership			Total	Contingency coefficient value	Approximate sig
	Private own	Share holding	Private and share holding			
Dega kedeida	50	6	1	57		
Zato shodera	43	6	0	49		
Total	93	12	1	106	0.66	0.00

The study indicated that the way of dairy cattle ownership characterized as private owned in the district. From sampled farmers 87.74% characterized as private ownership, 11.32% identified as share holding and 1.89% known as both private and share holding.

Table 4: Breeds of Dairy Cattle owned

Kebele	Breed of dairy cow			Total	Value of Contingency coefficients	
	Private own	Share holding	Private and share holding			
Dega kedeida	9	44	4	57		
Zato shodera	7	40		47	0.62	0.00
Total	16	84	4	104		

The survey result confirmed that proportion of dairy cattle breed type owned varied across kebele varies and sampled producers. It was reported that from sampled farmers 15% local reared, 81% kept cross breed and, 4% both in the two kebele. The survey result carried in the two potentially known kebele in Kedida Gamela district indicated that majority (81%) of farmers started to be transformed in improved dairy cattle breed ownership.

only 25% to the market and consume 60% at household level, the other 40% local dairy cattle owners' supply 50% to the market and consume the same proportion at home and the other only 20% producers supply more than 50% to the market from total production. From cross dairy cow owners 20% producers supply less than 50% of production, 60% producers supply 50% of production and 20% producers supply more than 50% of production to the market. The study generally pointed out that the extent of butter supplied to the market was lower than that consumed at home. From sampled farmers that owned local breed cow, 77% producers supply butter less than 50% of their total production to the market. From small scale farmers that kept cross cow, 75% supply less than half of their total production to the market. Having improved dairy breed by its own promotes small scale farmers to supply more to the market. The study indicated that through promoting small scale farmers to keep improved dairy cow, it is possible to supply more butter to the market that helps for nutritional security and balance for the community.

Table 5: Proportion Butter Supply from Different Dairy Cattle Breed

breed of dairy cow	Proportion of butter supplied to the market (%)										Total
	25	30	33	35	40	50	67	70	75		
local cow	5	0	0	0	0	5	1	0	2	13	
cross cow	6	2	3	1	1	45	3	2	14	77	
Both cross and local breed	1	0	0	0	0	3	0	0	1	5	
Total	12	2	3	1	1	54	4	2	17	96	

The study indicated that proportion of butter supplied to the market differs for sampled farmers that owned different dairy cattle type. From local dairy cow owners, 40% producers supply

Table 6: Proportion of Milk Supply by Dairy Cattle Breed

Breed of cow	Proportion of milk supplied to the market (%)								Total
	5	5	30	33	50	60	67	75(%)	
local cow	2	2	0	0	5	0	0	0	9
cross cow	2	13	5	3	45	0	3	4	75
Both cross and local breed	0	1	0	0	2	0	0	0	3
Total	4	16	5	3	52	0	3	4	

The survey result showed that the Proportion of milk supplied to the market differs across sampled farmers with breed of dairy cow kept at household level. For local dairy cow owners 44.45% producers supply less than half of total production and consume

more than 50% at household level, 55.55% producers supply more than half of their production to the market and consume less than half milk at home. From cross dairy cow owners, 30% producers supply less than 50% of their total production, 60% producers supply half of their production and 10% producers supply more than 50% of production to the market. From the two major dairy products: the proportion of milk consumed at home higher than more than butter. The proportion of both butter and dairy products consumed at home is higher than that supplied at home. The proportion of milk supplied to the market and consumed at home higher for cross cow owners than that of local dairy cow owners. From sampled dairy product producers that kept local dairy cow and cross dairy cow, 44.45 and 30.67% supply less than half of their total production to the market, respectively.

Table 7: Model Summary

Mode	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.778 a	.605	.302	2.55382	.605	1.999	13	17	.090

a. Predictors: (Constant), distance from farmers residence to watering point in km, no. of Family size, distance from farmers residence to animal health centre in km, amount of annual offfarm income in Birr, market distance from farmers residence in km, number of cow owned, amount of milk produced daily from cross cow, improved forage land owned in meter square, feeding and medication cost for dairy cattle, lactation length in months of cross dairy cow, Age of respondent farmer, agricultural income earned from crop farming, tree farming and fruit farming, informal cost incurred for informal institutional cases.

Table 8: Factors Affecting Amount of Butter Supply

Independent variables	Unstandardized Coeff		Standardized Coeff	t	Sig
	B	Std. Error			
(Constant)	-1.60	3.57		-4.45	.65
Amount of annual off-farm income (Birr)	.03	.01	.38	2.02	.054
No. of Family size	-.14	.20	-.09	-6.68	.50
Age	.10	.05	.30	1.82	.07
Land covered by improved forage (m ²)	.00	.01	.03	.19	.84
Amount of milk produced daily litter	.18	.14	.17	1.28	.21
Agricultural income earned Birr	8.47	.005	.377	2.64	.012
Informal institutional cost incurred annually	.000	.000	.145	.78	.436
Feeding and medication cost for dairy cattle	-.01	.001	-.305	-2.02	.051
Number of cow owned	.55	.26	.29	2.12	.040
Dependant variable	Amount of Butter supplied to the market (Kg)				

Age: It is a continuous variable measured in years. This variable is in is a proxy measure of dairy cattle keeping experience of household. Aged households are believed to be better in adopting improved forages and improved cattle breed technologies and it had positive effect on amount of butter supplied to the market. The result implied that ten year experience increase in dairy cattle production by farmers' increases the extent of butter supplied by extent of one kg more, holding other factors constant. The study also supported by other findings, Abay and Bezabih that found out that age of the farmers as experience affected tomato and potato supplied to the market positively [13,14]. Hence the finding pointed out that there is a room for promoting butter supply through awareness creation and experience developing,

which by itself helps in nutrition balance for non dairy product producers.

Off-farm Income: it is an income earned from non agricultural activities such as trade, carpentry, daily labour and employed labour and the like. The parameter estimate of off-farm income was 0.3 that has positive relation with level of butter supplied to the market. The study indicated that ten Birr increase in annual income of off-farm activities for small scale farmers, results in supply of one more kg of butter supply to the market, holding others factors constant. The small scale farmer who could gain more income from nonfarm activities able to purchase more supplements and there by better products, supply more of butter

in comparison to other farmer that could not able to get the income.

Agricultural Income: This is continuous variable defined as extent of income earned from crop farming and natural resource management practices. The parameter estimate was 8.47 that have positive effect on amount of butter supplied from agricultural activities. The study confirmed that one birr increase form farming activities resulted in increase of butter supply more than 8 units, holding other factors constant.

Feeding and Medication Cost: This explanatory variable defined as amount cost incurred for dairy cattle production at household level. The variable estimate has value of -0.01 that possessed negative relation with amount of butter supplied to the market. If the small scale invested more costs in dairy cattle products production, the extent of butter supplied to the market decreases. This could be due to the fact that the farmers that has dairy cow with health problem and majorly purchase feeds for butter production that not developed improved forage forced the producers supply less. The study pointed out that it is possible to enhance the small scale farmers to supply more butter through enabling improved forage development and animal health service provision improvement. The result also supported by other studies that implied production cost negatively affect value added in Beef production [15].

Number of Cow Owned: The number of cow owned at household level was defined as one of the explanatory variable that positively affected the extent of butter supplied to the market. The value of Variable estimate was 0.55 and it implied that keeping one additional dairy cow at household level make the farmers to supply more than half kg butter to the market.

Table 11: Extent of Milk Production across Breeds

Statistics	Amount of milk produced daily from cross cow in litter	Lactation period of cross dairy cow	Amount of milk in litter daily from local dairy cow	Lactation period of local dairy cow
N	92	91	34	33
Mean	6.72	11.09	2.03	8.91
Std. Deviation	3.75	4.32	1.01	2.09
Minimum	2.00	1.80	1.00	6.00
Maximum	18.00	36.00	5.00	12.00
Sum	618.00	1009.80	69.00	294.00

The table above indicated that the average milk produced daily from improved cross cow exceed that produced from local by more than 30%. This indicated that the small scale farmers that kept local cow loss more than one third every days compared to the household that kept improved cow.

Table 12: Price of Dairy Products

Statistics	price of one litter milk	price of soured one kg butter	price of fresh butter	price of one litter milk after butter	price of one essir cheese
N	97	94	98	20	97
Mean	10.37	204.26	182.4490	6.0	52.79
Std. Deviation	.82	22.07	22.43254	2.36	14.12
Minimum	8.00	150.00	120.00	3.00	20.00
Maximum	13.00	220.00	200.00	9.00	80.00
Sum	1006.00	17320.0	14940.00	120.00	5121.00

Table 9: Proportion of Dairy product supply

Kebele	Types of dairy products sold					Total
	Butter	Fresh milk	Milk after butter	Cheese	Cheese, butter and milk after butter	
Dega kedeida	3	13	2	1	30	49
Zato shodera	6	12	3	2	19	42
Total	9	25	5	3	49	91

The table above indicates that Majority the small scale farmers (73.5%) in the study area practice value addition practices to soar the profit margin the earned from dairy products. The proportion of small scale farmers directly sale fresh milk for consumer amounted to 26.5%.

Table 10: Proportion of Dairy Cattle Breed kept across Kebele

Kebele	Breed of dairy cow			Total
	local cow	cross cow	Both cross and local breed	
Dega kedeida	9	43	5	57
Zato shodera	7	40	0	47
Total	16	83	5	104

The table above indicated that the proportion of adopted improved dairy cattle breed differs across Kebele in surrounding Kedida Gemela.

The table above illustrated that small scale farmers sell their dairy products at different prices. The price butter showed variation in prices based on longevity of stay after production as fresh and soured butter. In relation to preferably by different consumers and its higher value per unit of application on food made the price of soured butter higher than that of fresh one.

Table 13: Value of Dairy Cattle Products at Kedida Gamela Woreda Peasant Associations

Dairy Value chain Map	Producers proportion in the chain	Major product in the value chain	Production of Milk for one lactation period from cross cow (6.72litter/day)	Value of dairy product for cross cow in the chain	Value differential by breed	Production of Milk for one lactation period for local cow(2litter/day)	Value of dairy product in the chain for local cow	Value differential by value chain
Dairy cow Fresh Milk Consumer	26.5%	Fresh milk	3689.64 litter	38261.59 (10.37 Birr *3689.64 litter)	39220.85 (77482.44- 38261.59)	2381.64 litter	24697.61	23316.83= (50014.44- 24697.61)
Dairy cowfresh milk butter cooked milk consumer	73.5%	Cooked milk at Hotel	3689.64 litter	77482.44 (3cooked milk *7 Birr *3689.64 litter)		2381.64 litter	50014.44	
Dairy cow-- fresh milk- butter cooked milk consumer		Makiyato (milk with coffee)	3689.64 litter	103309.92 (4 makiato *3689.64 litter*7 Birr)	65048.33 (103309.92- 38261.59)	2381.64 litter	66685.92	41988.31
Average of three product in the value chain	Product proportion	Fresh milk, cooked milk and Makiyato	3689.64	73017.98	52134.59	2381.64 litter	47132.66	32652.57

Source: own calculation from survey data

Conclusion

Dairy products production and value addition practices are known as the important livelihood base and economic stay of farming communities in Kembata Tembaro zones of Southern Ethiopia. But, policy supports given for the sector is not comparable to the economic values gained from livestock sector. In addition to these, there is no update and scientific information on factors determine the level of butter supply to the market and its demarcation of optimal value addition channel in specific potential districts. Hence, the study was carried out to synthesize information factors affecting level of butter and indicate optimal value addition channel. The study done in Kedidagamela districts of Kembata Tembaro zone by using cross sectional data from household survey of 101 households. The study applied multiple linear regression model for analysis. The study finding indicated that level of butter supply to the market explained positively by agricultural and off-farm income earned, age, area of improved forage at farm land, number of cow owned and negatively by feeding and medication costs of dairy cow rearing. The study identified the cost effective value chain channel for producer that can improve benefits of the household is adopting value addition in production of products. It is advisable to produce cheese and butter than selling fresh milks for consumers. The study points out that butter supply to market can be enhanced through promotion of improved forage cultivation, enabling

producers income from agricultural and non agricultural activities, reducing feeding and medication cost of cow rearing, owning more cows and obtain experience in production. The level of value added in dairy products and income of producers can be optimized in adopting value addition practices of dairy products that experienced by more than two third households in the districts. The synthesized information in the table above implied that there is great difference in milk productivity across breed type, household level and study destinations.

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