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Marketing strategy choice and the associated income differentials among smallholder dairy farmers in Ethiopia

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Abstract: *This study investigates factors that influence the choice of marketing strategies among dairy farmers in Ethiopia. The farmers used three marketing strategies, namely, milk products marketing (26 per cent), raw milk marketing (59 per cent), and both milk products marketing and raw milk marketing (15 per cent). The results showed that the following factors influenced the probability of choosing a raw milk marketing strategy over milk products marketing: age of the household head, proportion of crossbreed cows owned, total milk produced, distance to the market, income per litre of milk, and cooperative membership. Further analysis revealed that dairy farmers are better off if they utilize the raw milk marketing strategy, which has higher returns. Farmers who relied only on milk products marketing had significantly lower dairy income. It is recommended that tailored efforts are channelled towards improving access to raw milk markets by establishing more milk collection points.*

Keywords: marketing strategy choice, income effects, dairy farmers, multinomial model, Ethiopia

Introduction

THE AFRICAN CONTINENT IS PLAGUED by persistent high rates of poverty that are the result of decades of economic decline and stagnation (Wouterse and Taffesse, 2018). According to Mellor (2017), poverty is most dramatically illuminated by hunger and severe malnutrition. Promoting agricultural development is particularly relevant for Africa since close to 70 per cent of the households rely on agriculture for their livelihoods (AGRA, 2017). Smallholder farmers face numerous challenges in their effort to engage in productive agricultural activities. Improving smallholder farmers' access to markets is one of the pathways to foster agricultural development and improve the welfare of the poor in African countries. In a similar vein, Daidone et al. (2018) point out that structural constraints to poverty reduction can be addressed by ensuring that critical interventions reach the poorest including increasing access to markets and various other services.

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This is anchored by USAID (2019) which points out that increasing agriculture productivity alone will not result in the reduction of hunger and poverty but needs to be closely supported by effective trading among local, regional, and international markets.

The Ethiopian dairy sector, which is the focus of this study, has high potential for development but it is largely subsistence oriented with low milk production (4 billion litres of milk per annum) and low consumption (26.6 kg/year/person) (Lenjiso et al., 2016). The sector accounts for 40 per cent of the agricultural gross domestic product (GDP) and 16 per cent of the national GDP (Ethiopian Embassy, 2018). Improving access to markets for smallholder farmers in Ethiopia has the potential to increase production, productivity, and household income (Lenjiso et al., 2016; Chagwiza et al., 2016). Furthermore, milk market participation is associated with the adoption of high-yielding cow breeds and improved feed technology (Lenjiso et al., 2016) that translates to higher productivity and better income. Better access to markets among dairy farmers in Ethiopia would contribute to accelerating agricultural development and poverty reduction. The dairy sector's potential to benefit smallholders through income and employment generation from high-value dairy products makes it a strategic pathway to contribute significantly to achieving the Sustainable Development Goals (SDGs) of the country (Ethiopian Embassy, 2018).

The circumstances under which the farmers are operating their dairy farming influence the choice of marketing strategy for their product. Mmbando et al. (2016), therefore, highlights that the choice of marketing channel among smallholders is a key consideration because different channels are associated with relative profitability and costs differentials. According to Teklewold (2016), dairy farmers have a choice to participate in raw milk marketing or milk products marketing, which requires processing their milk output into by-products such as butter and cottage cheese. These are the two marketing strategies common among farmers, particularly dairy farmers: the milk product marketing strategy and the fresh or raw milk marketing strategy. These two marketing strategies differ in that the milk product marketing strategy has lower returns than the fresh or raw milk marketing strategy (Teklewold, 2016).

Teklewold (2016) observed that the decision on whether to sell agricultural produce directly or to process produce into another form is a critical aspect of agricultural marketing that has seldom been studied in developing countries. Our study is therefore unique in that it focuses on marketing *strategies* rather than channel choices which has been a focus of most previous studies. There are a number of unique factors that guide farmers in how they market their product. For instance, Holloway et al. (2000) point out that despite the higher returns associated with fresh milk marketing, the perishability and bulkiness of fresh milk, coupled with a number of transaction costs limit farmers' access and participation in raw milk marketing and they end up resorting to a milk products marketing strategy. This is echoed by Mabuza et al. (2014), who asserts that the marketing of highly perishable commodities is invariably associated with high transaction costs, which if not contained may ultimately affect producers' competitiveness

in the value chain. Although some farmers may be interested in selling their produce through a strategy that offers better prices, their socio-economic characteristics and institutional environment may hinder them from capitalizing on such avenues. Hence, the difficulties in accessing higher remunerative markets force smallholder farmers to transact their produce through channels offering low prices (Tarekegn et al., 2017).

Understanding the underlying mechanisms that influence the market dynamics of the Ethiopian dairy sector is crucial for the following reasons:

- Most smallholder farmers derive a livelihood from marketing of dairy products.
- The dairy sector has good potential, given its favourable climatic and geographical location (Holloway et al., 2000).
- There is unstable demand and supply of milk and milk products because the majority of the Orthodox Christians that compose 43.5 per cent of the country's population engage in longer fasting periods of about 265 days per annum when they abstain from milk and milk products.
- It is important to understand how farmers are integrated into the value chains and the factors that hinder them.

Given the importance of dairy production in the study area and in Ethiopia in general, the study further compares the dairy income obtained by the farmers from the three different marketing modalities. Teklewold (2016) highlights that these marketing strategies have different rates of return. It is, therefore, crucial to establish these differences in order to inform policy on how farmers can be assisted to ensure they get optimal economic benefits from market participation. There are no comprehensive previous studies which investigated the impact of the choice of marketing channels on income. Hence, this study also aims to fill this information gap, thereby contributing to the literature.

The rest of the paper is structured as follows. The next section reviews the literature on the factors that influence the choice of the producers' marketing strategies. The methodological approach followed in the study is then discussed. This is followed by a presentation of the results and a discussion. The paper ends with some conclusions and policy recommendations.

Theoretical framework

In this section, we look at the factors influencing the manner in which small-scale farmers are integrated into the value chains. We do this by identifying the determinants of marketing strategy choice among farmers. Integration of farmers into the value chains is crucial for exploiting the economic benefits that come through market participation. Most importantly, the manner in which the farmers are integrated into the markets has a bearing on the income they receive.

Despite markets being advocated as critical in agricultural development, the usually intended beneficiaries face several transaction costs that limit their participation (Ahmed et al., 2004; Machethe, 2004: 29). Such transaction costs impeding market access among smallholder farmers include lack of information about markets,

lack of negotiating skills, and lack of collective organization (Ahmed et al., 2004). Different kinds of markets do exist, but they selectively fail for particular households (De Janvry et al., 1991) due to a wide range of household-specific attributes and marketing transaction costs. To address these constraints, a better understanding of the factors that influence smallholder farmers' choice of marketing channel is required (Mmbando et al., 2016).

A number of studies have identified the factors that determine the farmer's selection of a market outlet in different agricultural sectors. For instance, a study by Kumar et al. (2011) shows that dairy farmers' education level, milk price, milk quality control, and presence of cooperative milk collection centres influence farmers' choice to integrate into modern formal milk marketing supply chains in India. Findings from the study by Brar et al. (2018) revealed that age of the household head, distance to selling point, and price of milk influenced the choice of a milk marketing channel among small and medium dairy farmers in India. Musara et al. (2018) established that dependency ratio, household income, average marketing price, number of buyers with whom a farmer directly relates in a particular market, transport costs, distance to the market, frequency of extension contact, and sales volumes by households significantly influenced the choice of a marketing channel among sorghum producers in Zimbabwe.

In an attempt to find out the factors influencing the choice of marketing channel among wheat producers in Ethiopia, Dessie et al. (2018) resolved that the choice of market outlet was significantly influenced by age of household, farming size, livestock holding and accessibility of credit service, literacy status of households, farming size, and non-farm income source. Using a multinomial logistic regression model, Xaba and Masuku (2013) found that the following factors had a significant influence on the choice of marketing channel among vegetable farmers in Swaziland: age of the farmer, quantity of baby corn produced, level of education, distance from production area to market, membership in farmer organization, and marketing agreement.

Zuniga-Arias (2007) found that farm household characteristics (experience, risk attitude), production system (farm size), and market context condition such as distance to market influence the mango outlet choice among farmers in Costa Rica. A study by Mmbando et al. (2016) revealed that transaction costs, household wealth, access to credit and extension services, and social capital affect the choice of marketing channel among maize and pigeon pea smallholder farmers in Tanzania. Another study by Jagwe and Machethe (2011) looked into the reasons for farmers' choice of different marketing outlets in Central Africa. The findings revealed that collective action, gender of household head, degree of dependence on the crop, geographical location, and access to price information significantly affect the choice of selling point.

In light of this discussion, we seek to identify and analyse the factors influencing the choice of marketing strategies among dairy farmers in Ethiopia. The choice of variables included in the model are motivated by previous studies in the dairy sector and other agricultural commodities, as well as observations, made during the field work.

Approach

Study area

The study was carried out in Selale, located in the Oromia Region of Ethiopia. Oromia region has the highest number of milking cows (44 per cent) among the four regions, followed by Amhara (17 per cent), Southern Nations, Nationalities, and People's Region (SNNPR) (22 per cent), and Tigray (9 per cent) (Ethiopian Embassy, 2018). Selale is well known for its high potential in dairy production. The locals derive their main sources of livelihoods from dairy production and livestock rearing. They also engage in growing a variety of crops including oat, teff, beans, barley, wheat, and peas.

Data

The data for this study were collected from a total sample of 384 smallholders (192 cooperative members and 192 non-members) using a structured questionnaire. The sample consisted of respondents selected from five cooperatives (Chancho, Lelistu, Nano Seyu, Debre Tsige, and Torbanashe) which were randomly selected from the 24 primary cooperatives operating in the area. A proportional random sampling technique was applied to select members from the five primary cooperatives that have been selected from the pool of 24 cooperatives. The 192 non-members were also selected from the same *kebeles* (lower administrative unit in Ethiopia) where the five selected cooperatives are located. These farmers were randomly taken from a list of the *kebele's* dwellers (every *kebele* holds a census of its inhabitants). The data ranged from household demographics to social and economic characteristics.

Econometric analysis

The factors influencing choice of a marketing strategy were investigated and analysed using a multinomial logistic regression model (MNL). The data for this study were analysed using SPSS version 24. The dependent variable for this study is the choice of marketing strategy used by the dairy farmers in Ethiopia.

Three marketing strategies were identified:

1 = milk products marketing;
2 = raw milk marketing;
3 = both (milk products and raw milk).

The reference category used in this study is the milk products marketing strategy.

Following existing similar studies, a multinomial logistic regression model was used to isolate factors influencing the choice of a marketing strategy among smallholder dairy farmers. According to Gujarati (2004), the multinomial logistic model is the standard method for estimating unordered, multicategory dependent variables as it allows the researcher to analyse data where participants are faced with more than two choices.

The logistic function for the probability of farmer *i* choosing a particular marketing strategy, *j*, is given as follows:

$$P(yt = y|Xi1,\ Xi2 \ldots Xim) = \frac{ex^{\beta Xik}}{\sum_{c=1}^{n} e\beta xi^{k}} \text{for } j = 1,\ 2, \ldots,\ C$$

Where: $j = 1, 2, 3$ representing the marketing strategies;
$i = 1, \ldots, n$ observations;
β = coefficients;
$X_k = 1, \ldots, m$ explanatory variables

MNL model fitting

The MNL was fitted as follows:

$$\begin{aligned}\text{Marketing strategy choice} = {} & \beta_0 + \beta_1 \text{AGE} + \beta_2 \text{FAMILY\_SIZE} + \beta_3 \text{PROPORTION\_CROSS} \\ & + \beta_4 \text{TOTAL\_LAND} + \beta_5 \text{TOTALMILK} + \beta_6 \text{MKT\_DISTANCE} \\ & + \beta_7 \text{INCOME\_PER\_LITRE} + \beta_8 \text{COOP\_MEMBER} \\ & + \beta_9 \text{CREDIT\_ACCESS} + \beta_{10} \text{TRAINING} + \varepsilon\end{aligned}$$

The definition of variables used for empirical analysis and their expected influence on market channel choice are presented in Table 1.

We further seek to understand the implications of the different marketing strategies on the welfare of dairy farmers, particularly in terms of dairy income earned. Initial analysis revealed that equal variances were not assumed. Given that the homogeneity of variances was violated and also due to the differences in the sample sizes in the different marketing strategies, ANOVA could not be employed. A non-parametric Welch ANOVA was, therefore, run to ascertain if there are any variations in terms of dairy income between and within the different marketing strategies used by the dairy farmers. According to Field (2009), using the Welch's F-test reduces the effect of heterogeneity in variances.

Empirical results and discussion

In this section, we first highlight the distribution of the respondents according to their choices of marketing strategy. Second, the factors influencing the farmers' probability of choosing one marketing strategy over the other are presented and discussed. Lastly, the Welch ANOVA and the post-hoc results are presented.

Farmers' marketing strategy choice

In the study area, it was established that farmers had three strategies that they utilized in order to market their dairy produce: 1) milk products marketing (where farmers have to process the raw milk into by-products such as butter and cheese); 2) raw milk marketing; and 3) marketing as both milk products and raw milk (where farmers process a portion of their milk produce, and the other portion is sold as fluid milk). Table 2 shows that the majority (59 per cent) of the farmers preferred

Table 1 Definition of variables used in the analysis

Variable	*Type*	*Measure*	*Expected sign*
Marketing strategy	Nominal	1 = Milk products marketing[1] 2 = Raw milk marketing 3 = Both milk products and raw milk marketing	
Cooperative membership	Nominal	Non-member = 0 Member = 1	+
Gender	Nominal	1 = male 0 = female	+
Age	Continuous	Number of years	–
Family size	Continuous	Number of members	–
Total land size	Continuous	Hectares	+
Education level	Ordinal	Basic education Elementary Junior Secondary and above	+
Distance to milk market or collection centre	Ordinal	Kilometres	–
Proportion of crossbreed cows owned	Continuous	Proportion	+
Training on milk production	Nominal	Yes = 1, No = 0	+
Credit access	Nominal	Yes = 1, No = 0	+
Income per litre of milk	Continuous	Birr	+
Total daily amount of milk produced	Continuous	Number of litres	+

Note: [1]Milk products marketing is the reference category

the raw milk marketing strategy which, according to Teklewold (2016), has a higher market return. This was followed by the milk products marketing with 26 per cent of the respondents. Only 15 per cent of the farmers indicated that they were using both marketing strategies.

Factors influencing choice of marketing strategies among dairy farmers

A multinomial logistic regression analysis was performed to identify factors that influence dairy farmers' selection of a marketing strategy. Table 3 presents the

Table 2 Distribution of farmers according to marketing strategy

Marketing strategy	*Frequency*	*Percentage*
Milk products marketing =1	95	25.6
Raw milk marketing = 2	219	59.0
Both = 3	57	15.4
Total	**371**	**100.0**

Source: Own calculations using household survey data

Table 3 Factors influencing choice of marketing strategy

Marketing strategy choice	*Strategy 2 = Raw milk*			*Strategy 3 = Both*		
	B	*Wald*	*Exp(B)*	*B*	*Wald*	*Exp(B)*
Intercept	–0.982 (1.332)	0.543		–1.329 (1.415)	0.882	
Age of household head	0.036** (0.016)	4.866	1.036	0.001 (0.019)	0.001	1.001
Family size	–0.066 (0.091)	0.521	0.936	0.070 (0.096)	0.527	1.072
Proportion of crossbreed cows	4.204*** (0.632)	44.284	66.964	3.046*** (0.676)	20.302	21.022
Total land size	–0.260 (0.160)	2.639	0.771	–0.046 (0.168)	0.075	0.955
Total milk produced	0.160** (0.051)	10.023	1.174	0.154** (0.051)	9.091	1.166
Distance to the market	–0.206** (0.074)	7.774	0.814	–0.048 (0.074)	0.420	0.953
Income per litre	0.001*** (0.000)	10.323	1.001	0.000* (0.000)	2.775	1.000
Cooperative membership	–2.762*** (0.602)	21.032	0.063	–2.450*** (0.622)	15.532	0.086
Credit access	1.063 (1.153)	0.850	2.895	0.196 (1.191)	0.027	1.217
Training on milk production	–0.114 (0.562)	0.041	0.892	–0.433 (0.578)	0.561	0.649

Notes: The reference category is: 1.00 = Milk products marketing

Cox and Snell R^2 = 0.545; Nagelkerke R^2 = 0.636; McFaden R^2 = 0.405; – 2 log-likelihood = 399.125; Chi-square = 271.472; df =20; p = 0.000

Level of significance: *10%, **5%, *** 1%; Figures in parenthesis are standard errors

multinomial logit results. The Cox and Snell R^2 results reveal that 55 per cent of the variation in the choice of a marketing strategy was explained by the independent variables included in the model. Comparably, the Nagelkerke R-squared was 64 per cent. Chi-square was 271.47 and significant at the 1 per cent level (p = 0.000).

As expected, the age of the household head positively and significantly influenced the probability of choosing the raw milk marketing strategy over the milk products marketing strategy. The logit coefficient of age was 0.036 and the exponential beta was 1.036. This implies that the odds of choosing the raw milk market were 1.036 less than the odds of choosing the milk products marketing strategy. Thus, the odds of choosing the raw milk marketing strategy would increase by 10.36 per cent with an increase in the age of the household head. The results suggest that older farmers preferred the raw milk marketing strategy relative to the milk products marketing strategy. Milk value adding is a laborious and time-consuming task, given the fact that most households rely on traditional milk processing equipment since they cannot

afford to buy more efficient equipment. Hence, it makes sense that older farmers may choose to resort to selling milk in its raw state rather than process it. Ahmed et al. (2004), therefore, suggest that development interventions should be aimed at addressing both technological gaps and marketing problems. Similar findings were shared by Mmbando et al. (2016) who reported that the age of a household head reduced the likelihood of a maize producer selling to traders in a nearby market, compared with brokers at the farm gate in Tanzania. Due to old age, the farmers resort to selling their maize where they do not have to travel longer distances.

The results further revealed that both the proportion of crossbreed cows and total milk produced had a positive and significant influence on the probability of choosing the raw milk market strategy and choosing both raw milk and milk products marketing strategies in relation to the milk products marketing. The proportion of crossbreed owned had a beta coefficient of 4.204 and an exponential beta of 66.964 for selling to raw milk marketing strategy. Similarly, for the combination of both channels, the beta coefficient was 3.046, and the exponential beta was 21.022. This result implies that the odds of selling to raw milk and a combination of raw milk and milk products were higher than the odds of selling as milk products. The beta coefficient for total milk produced was 0.160, and the exponential beta was 1.174, implying that the odds of selling to raw milk market was 1.174 higher than the odds of selling to milk products market. Likewise, for the combination choice, the beta coefficient of total milk produced was 0.154, and the exponential beta was 1.166, meaning that the odds of selling to both marketing channels was 1.166 higher than the odds of selling as milk products. Hence, the odds of selling milk in its raw state or as both raw milk and milk products increase with an increase in the proportion of crossbreed cows and total milk produced. The results suggest that as the proportion of crossbreed cows and the volume of milk produced increase, farmers tend to move away from relying only on value-addition but engage more either in the fluid milk marketing stream or a combination of fluid milk and milk products marketing. According to Musara et al. (2018), households with higher volumes of saleable output prefer to be more income secure and are sceptical of transacting in the local marketing channel mode which is usually not financially rewarding.

The results also showed that the beta coefficient of distance to the markets was –0.206 and the exponential beta was 0.814. The results imply that the odds of selling to the raw milk market were 0.814 less than the odds of selling as milk products. Thus, the odds of selling to the raw milk market would decrease by 8.14 per cent with an increase in distance. Longer distances to milk markets reduce the probability of farmers choosing the raw milk marketing strategy in relation to the milk products marketing. This implies that farmers who are staying further from the market were more likely to engage in milk products marketing than to walk longer distances to the raw milk market or collection points. This illustrates the extent to which distance can hinder farmers from reaching the market and also restrict farmers in the way they would like to market their produce. This is worsened by the perishable nature of milk which is easily spoiled when refrigerated facilities are not used in transportation. The perishable nature of milk has an important influence on how farmers react to the increase in distance. Xaba and Masuku (2013) also identified

distance as a constraining factor limiting vegetable farmers to market their produce with NAMBoard in Swaziland. In another study by Mmbando et al. (2016), distance to the main market was found to significantly reduce the likelihood that a pigeon pea producer would sell to wholesalers rather than to brokers. Thus, even though the farmers were aware that wholesalers pay higher prices, they were demotivated by the distance they had to travel to reach the market and end up selling to brokers. Long distance to the market is one of the critical factors limiting the marketing of agricultural products among smallholder farmers (Makhura, 2001).

The results further revealed that income per litre positively and significantly influenced the probability of the farmers to choose raw milk marketing and a combination of raw milk and milk products marketing strategies over the milk products marketing. The odds of selling to raw milk market was 0.001, and the exponential beta was 1.001. Similarly, the odds of selling as both raw milk and milk products was 0.000, and the exponential beta was 1.000. This means that the odds of selling to raw milk and to both raw milk and milk products were 10 per cent higher than the odds of selling to milk products market. This result is in agreement with *a priori* expectation. The positive sign means that farmers are more likely to utilize the raw milk marketing strategy and a combination of raw milk and milk products marketing strategies than milk products marketing. This implies that households who are more market oriented are more likely to choose the raw milk marketing strategy in relation to milk products marketing. Similar findings were reported by Mmbando et al. (2016), who found that pigeon pea price was positively and significantly associated with a higher probability of choosing wholesalers who offered high prices relative to brokers. As indicated by Kihoro et al. (2016), higher prices increase farmers' margins and provide an incentive for farmers to increase production and get more income.

Cooperative membership had a significant and negative effect on choosing the raw milk marketing strategy and a combination of both raw milk and milk products strategies. Cooperative membership had a beta coefficient of –2.762 and an exponential beta of 0.063 for choosing the raw milk marketing strategy. This implies that the odds of selling as raw milk were 6.3 per cent less than the odds of selling milk products. Likewise, the cooperative membership had a beta coefficient of –2.450 and an exponential beta of 0.086, implying that the odds of selling to both channels were 0.086 less than the odds of selling milk products. The finding is against the *a priori* expectations since cooperative members who own high milk yielding cow breeds and have surplus milk to supply the raw milk market are more likely to choose the raw milk marketing strategy. The explanation for this result could be that there are other critical factors that play an important role in influencing the choice of marketing channels which have not been analysed in this study. For instance, the milk producers in the study area usually experience milk rejection when they deliver their milk to the cooperatives as a result of failing to meet the cooperatives' quality requirements. This is echoed by Hao et al. (2018), who indicated that products sold through cooperatives generally have to comply with relatively stringent safety standards and food quality. To this end, Hao et al. (2018) also found no significant effect of cooperative membership on selling to the cooperative itself. Our finding is

also in agreement with that of Xaba and Masuku (2013) who found that cooperative membership negatively influenced the probability of choosing the non-wholesale market channel in relation to other wholesale markets. Overall, this finding points to the important role that dairy cooperatives are currently playing to promote food safety and food quality in Ethiopia. Hence, institutional arrangements such as collective action should not be ignored when discussing marketing strategy dynamics among smallholder farmers.

Testing the effect of marketing strategy on dairy income

The marketing strategy that farmers choose has important implications for their welfare. It was established that dairy production is an important source of income and livelihoods in the study area. It was, therefore, important to assess which marketing strategy was yielding a higher income for the farmers. A non-parametric Welch ANOVA was employed to ascertain if income obtained from dairy production differed between and within marketing strategies.

A significant P-value of the Welch's test results in Table 4 provides sufficient evidence that the incomes received from different marketing strategies are different. However, the statistically significant difference does not tell exactly where the differences are. This limitation is overcome by employing a post-hoc test (posteriori). Table 5 presents the post-hoc results.

Table 5 shows a statistically significant difference of p = 0.000 between milk products marketing strategy and raw milk marketing strategy. This implies that farmers who sell their milk in its fluid state are earning significantly higher income than the farmers who engage with the milk products marketing strategy. Overall, the results show that dairy farmers in Ethiopia are better off if they utilize the raw

Table 4 One-way Welch ANOVA results for dairy income between and within groups

	Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*
Between groups	29,445.665	2	14,722.833	12.989	0.000
Within groups	417,125.127	368	1,133.492		
Total	446,570.792	370			

Table 5 Games-Howell post-hoc test results for dairy income by choice of marketing strategy

(I) Channel choice	*(J) Channel choice*	*Std error*	*Sig.*
Milk products marketing	Raw milk marketing	4.547	.000***
	Both milk products and raw	6.041	.018**
Raw milk marketing	Milk products marketing	4.547	.000***
	Both milk products and raw	4.948	.654^{NS}
Both milk products and raw	Milk products marketing	6.041	.018**
	Raw milk marketing	4.948	.654^{NS}

Note: *** 1%, ** 5%, NS not significant

milk marketing strategy which has higher returns or if they market their produce both as raw milk and processed products such as butter and cheese. Farmers who relied on milk products marketing only had significantly lower dairy income. This marketing strategy is associated with lower returns (Teklewold, 2016). Since the value-adding marketing channel is often associated with low returns; it becomes critical, therefore, to come up with innovative ways to improve the rate of return of this marketing channel. Processed milk products marketing is mainly a survival strategy for remote farmers who face limited means of marketing their produce.

Conclusions and policy recommendations

The study was carried out to identify and explain the factors that influence the choice of marketing strategies among dairy farmers in Ethiopia and to assess the income differentials between the channels. A multinomial logistic regression model was used to identify the factors influencing the choice of a marketing strategy. The Welch ANOVA was employed to establish if there were differences in dairy income obtained from the different marketing channels. The study findings highlighted a high likelihood for choosing the milk products marketing strategy as opposed to selling milk in its raw state. In this study, cooperatives do not seem to play a major role as many farmers who are members of cooperatives do not sell to their cooperatives. This is contrary to what other studies have found, but this study could not establish the reason for this. Hence, this requires further research to establish concrete empirical evidence for it.

Another important finding from our analysis is that dairy producers who engage in milk products marketing were characterized mostly by longer distances to markets. The only sensible choice for farmers who stay away from markets is to process the milk into less perishable products such as butter and cheese. Hence, the milk products marketing channel is a survival strategy for that group of farmers. This signals a lack of proper infrastructure which hinders farmers from reaching preferred markets. It, therefore, becomes critical to improve the accessibility of infrastructures such as road, transportation, and cold storage facilities. There is a need to establish more collection points within the proximity of farmers so that they can have a choice on how they want to market their milk rather than being restricted by barriers such as distance.

With regard to the Welch ANOVA results, the findings suggest that despite all the constraints that the dairy farmers in the study area are facing, they are better off if they market milk in its raw state because of the higher returns associated with the channel. As well, farmers who utilize a combination of the raw milk and the milk products strategies are also fetching significantly higher dairy income. It is evident that the farmers who utilize these marketing strategies have higher income than farmers who rely only on milk products marketing. The lower (net) income from the milk products marketing strategy might not only be related to differences in production costs but could also be due to marketing costs. It is therefore imperative that efforts are channelled towards improving accessibility of raw milk markets among dairy farmers.

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