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RESEARCH ARTICLE

Validating the dairy marketing performance of Mizan-Aman town, Bench-Sheko zone, Ethiopia

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Abstract

The broad objective of the study was to investigate the determinants of dairy market in Mizan-Aman town, Bench-Sheko zone, Ethiopia. For the purpose of the study, 228 sample households were selected from the town using a stratified random sampling technique and the field data were collected using questionnaires. The binary linear regression model analysis was employed to identify determinants that affect the dairy market. The model result showed that dairy market was strongly and significantly affected by use of improved feed, demand for milk, frequency of getting training, access for credit, and education of the household heads. Shortage of feed and seasonality of demand, particularly in fasting time are challenges of dairy marketing in the area. Dairy producers, retailers, farms, and cooperatives were found the main milk market channel of the study area. The dairy market in the study area uses an informal marketing system which shows the underdevelopment of dairy marketing. Thus, dairy development interventions should be aimed at addressing both dairy production technological gaps and marketing problems. Further, the study shows that there is a high demand for dairy products. Therefore, dairy processing industry's establishment, support for dairy producers and improving access to services should receive due attention in order to improve dairy market in the study area by all dairy development stakeholders.

Keywords: Bench-Sheko zone, Binary linear regression, Dairy market, Dairy value chain, Household.

Introduction

Dairying is one of the investment areas farmers can venture into to improve their standards of living (Kaitibie *et al.*, 2008). Almost 150 million farm households (more than 750 million people) are estimated to be engaged in milk production worldwide. The majority of those in developing countries produce one million liters of milk per year on smallholder dairy farms, creating approximately 200 on-farm jobs (FAO, 2020). It is a vital part of the global food system and plays a key role in the sustainability of rural areas. Out of total agricultural production, milk production value represents between 8.5 and 10.5%. According to the FAO (2020), the trade of milk and milk products accounts for 7% of all agricultural exports. Hence, improving this sector to increase livestock outputs is highly linked and a strategically crucial means to escape poverty (Pica-Ciamarra *et al.*, 2011).

In Africa, Ethiopia has the largest livestock population. Cattle, goats and camel are the main sources of dairy products in Ethiopia (Gillah *et al.*, 2012). According to CSA (2018), approximately 4.4 billion liters of fresh milk were produced in 2018, with 3.08 billion liters (70%) for human consumption; of this, 57% was consumed by rural households and 43% processed and distributed through supply chains (CSA, 2018). About 82% of total milk is obtained from cow and of which 97 % is from local breeds with an average milk yield of 1.35 liter per cow per day for about 6 months of lactation period (CSA, 2018). This production and productivity is deficient compared with other countries and world average (FAO, 2020). Such milk supply shortage in Ethiopia is due to absence of a sustainable approach of dairy development to improve milk production and marketing and due to the challenges of active engagement in milk value chain and market by smallholder milk producers (Getachew Felleke, 2003). Ethiopia holds large potential for dairy development due to its large livestock population, the favorable climate to improve, and the relatively disease-free environment for livestock. In Ethiopia, considering the potential for smallholder income and employment generation, the growth of the dairy sector can contribute

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significantly to poverty alleviation and nutrition (Mohamed *et al.*, 2004).

In Ethiopia, per capita annual consumption of dairy is just 11% of the World Health Organization recommended levels. This is much lower than the African and world per capita average of 40 and 105 kg/year, respectively (Teklemichael, 2012). This is due to inadequate and low-quality feed resources, poor nutrition, genotype, and health care management, poor marketing system, insufficient training, and extension services, the productivity of dairy cattle and consumption of their products is generally low (Azage *et al.*, 2001). About 98% of milk is held and managed by smallholder dairy farmers; however, only 5% of the milk produced in the country is sold in commercial markets, while the rest of 95% is consumed and processed at home (CSA, 2018). This indicates that the demand for milk and milk products is higher and supply is lower in towns than in rural areas due to high pressure of population growth. Despite this high growth, milk per cow per year is low in Ethiopia compared to the neighboring countries (Teshome *et al.*, 2014).

Dairy producers that operates in and around major cities in Ethiopia face milk marketing problems, especially during fasting periods resulting in low milk prices and high milk wastage (Adam *et al.*, 2019). In Mizan-Aman town, Bench-Sheko zone, traditional milk production, processing and handling are a common practice. Traditional milk products are generally reported as substandard quality. Understanding the prevailing traditional practices of milk production, processing and storage is of paramount importance to make future improvement interventions. Most studies have focused on the dairy growth capacity of the country's major cities. However, so far, there is no clear research on determinants of dairy market in smaller and medium-sized towns like Mizan-Aman town where the dairy sector is not well developed. The existing level of milk production produced by smallholder farmers are not being satisfied to the rising demand for processed dairy products. The study is crucial to provide essential information on the operation of dairy products and contribute in filling the demand and supply gap of dairy products by exploring the determinants that affect dairy marketing in Mizan-Aman town. The study is essential to provide vital and valid information on the operation and efficiency of dairy marketing system for effective planning and policy formulation.

This study, therefore, contributed to filling the demand and supply gap of dairy products by investigating the dairy marketing and determinants affecting dairy production in the study area. More specifically, the study has targeted the following objectives:

- To analyze the effect of demand for milk associated with the dairy marketing system.

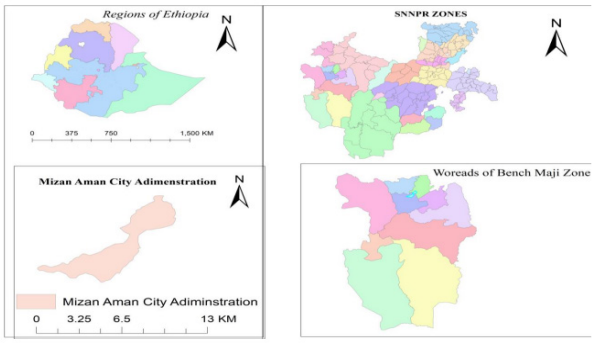

Figure 1: Map of the study area.

- To analyze the effect of education on the urban dairy marketing system.
- To examine the effects of feeding system on the urban dairy marketing system.
- To analyze the effects of credit access on the urban dairy marketing system.

Research Methodology

Description of the Study Area

The mizan-Aman town is the capital of the Bench-Sheko Zone and is located about 561 km from Addis Ababa (the capital) towards the southwest (Figure 1). It has a latitude and longitude of 7°0'N 35°35'E and an elevation of 1451 meters. The total population of Mizan-Aman town is estimated to be 69,453 of which 37,180 of males and the rest 32,273 are females (Zone Health Office, 2016).

The annual average rainfall ranges between 1800 to 2200 mm. The average air temperature ranges from 13 to 27°C and varies according to elevation. The major economic activities of the people in the area are producing crops such as maize, wheat, coffee, banana, enset (false banana) and ginger. Wheat and maize are mostly used for food consumption, while coffee and ginger are for cash. Coffee production in the Mizan-Aman is a time-honored practice and tradition that is as much part of its economy as of its culture.

Research Design

The descriptive research approach is a basic research method that examines the situation as it exists in its current state. Descriptive research involves the identification of attributes of a particular phenomenon based on an observational basis, or the exploration of the correlation between two or more phenomena.

The research was conducted using a quantitative type of data in order to answer the research questions and thus arrive at concrete conclusions. To examine the effect of one variable on another, establish cause and relationship. This research had utilized an explanatory research design to achieve the objectives of the study, the research was designed with a cross-sectional survey design for smallholder dairy farmers. The study was employed through

explanatory design in which quantitative data analysis was used to produce richer and more complete information. A research design provides a framework for the collection and analysis of data. A choice of research design reflects decisions about the priority being given to expressing causal connections between variables, understanding behavior and the meaning of that behavior in its specific social context and having a temporal (i.e. over time) appreciation of social phenomena and their interconnections (Bryman and Bell, 2007). This design considers more than one case. Because it was interested in the association between cases, data were collected on variables simultaneously at a single point in time. Data were quantified in order to establish variation between cases. This design also allowed examining the relationship between variables (Bryman and Bell, 2007).

Type and Source of Data

Both primary and secondary data collection methods were used to achieve the objectives of this study. Primary data were collected from the randomly selected 228 households that raised dairy cattle using semi-structured interviews, questionnaires and field observation. This questionnaire was developed for smallholder dairy farmers to identify the number of milking cows, feeds, milk production, health and breed, milk handling and processing, marketing of milk, major constraints and opportunities for milk production. The researcher used field observations as a supplementary method to collect quantitative data. Secondary data were obtained from various sources such as books, journals and articles from the internet and other relevant materials of the office of urban agriculture development of Mizan-Aman town.

Methods of Data Collection

To assess the milk production of the study area, preliminary visits or panel study were made before statement of the problem development, which is important to the objectives of the study. A partially developed semi-structured questionnaire was used to collect data from sample respondents. The questionnaire contained closed-ended questions allowing the respondents to express their opinions on various issues presented in the narrative analysis technique. The researcher distributed the questionnaire to smallholder dairy farmers as well as dairy cooperatives. The semi-structured questions made it easy to complete and easy for analysis. The questionnaire was developed first in English and then translated into Amharic language. The researcher administered the data collection.

Sampling Technique and Sample size

The current study was conducted in the town focusing on the potential area of milk and the amount of raw cow milk marketed in the study area. Sample households were selected to undertake survey on milk production potential or dairy cow possessions and where milk is widely sold through informal channels. The study used a stratified random sampling technique to select representative sample households from kebeles in the town. The population was divided into homogeneous subpopulations called strata based on specific characteristics in a stratified sample. Each stratum is then sampled using another probability sampling method, such as cluster or simple random sampling, allowing the researchers to estimate statistical measures for each subpopulation. The researcher relies on stratified sampling when a population's characteristics are diverse and the researchers want to ensure that every character is properly represented in the sample.

A total of 530 sample smallholder milk producer households were selected randomly from the list provided by Kebele Administrative Offices. The sample size of milk producers selected for this study was calculated using the formula of Yamane (1967) given as:

$n = n = \frac{N}{1+N(e)2}$

Where, n= sample size,

N= population size,

e= level of precision

N= 530, e= 0.05, 2.325

$n = \frac{530}{1+530\ (0.05)2}$

n=227.957

Based on this, 228 households were taken as a sample from 530 households engaged in dairy farming in the study area with 5% precision level (e) to determine the sample size (Table 1).

On the other hand, 10 milk traders were selected to get milk value chain-related information. They were milk retailers on shops and restaurants. The records of milk traders in the study area were taken from the Agricultural Office and then, all of the legal milk traders were included in the probability of sample selection process to have an equal chance of being selected.

Methods of Data Analysis

For the quantitative data presentation and analysis, statistical methods such as frequencies and percentages were employed to understand the study subjects' characteristics and conditions. Data results were organized and summarized by descriptive statistics presented in the form of tables using SPSS software. Pearson correlation and logistics regression model were used to determine the relationship and identify factors explaining household's dairy production and marketing.

Model used

The binary logistic regression model was used to determine and estimate the significance of the factors that influence household dairy products. A binary logistic regression model is the relationship between a set of independent

Table 1: Sample summary of milk producer households for kebeles and study area

Sample kebeles	*Total milk-producing households*	*Sample households*	*Sample size of households*
Adiss-ketema	127	54	23.96
Edget	106	45	20.00
Aman	187	80	35.28
Hibret	110	47	20.75
Total	530	228	100

Source: Mizan-Aman Agricultural Office & own survey

variables and a binary dependent variable. It is useful when the dependent variable is dichotomous in nature, like death or survival, absence or presence, pass or fail, etc. Independent variables can be categorical or continuous, for example, gender, age, income or geographical region. Binary logistic regression models a dependent variable as a logit of p, where p is the probability that the dependent variables take a value of 1.

These are the logistic regression equation values for predicting the dependent variable from the independent variable. They are in log-odds units. Similar to OLS regression, the prediction equation is

$$\log(p/1-p)= b0 + b1*x1 + b2*x2 + b3*x3 + b4*x4+ b5*x5$$

Where, p is the probability that urban dairy market is improved.

b0= the coefficient for the constant (also called the "intercept") in the null model.

B1 to b5= the coefficient of the regression

X1 to x5 = the independent variables

Validity and Reliability Test

Reliability and validity, jointly called the "psychometric properties" of the measurement scale, are the yardsticks against which the adequacy and accuracy of our measurement procedures are evaluated in scientific research (Bhattacherjee, 2012). So, the researcher checks for validity and reliability of the data collected through survey.

Results And Discussion

Respondent Characteristics

Out of the sample dairy cattle producers, 80.3% were male-headed and 19.7% were female-headed households (Table 2). This shows males are more involved in dairy production than female. This might be as a result of males are risk takers in doing business, getting better opportunities, being independent financially and having the power to make a decision than females.

The marital status of the sample respondents were married 82%, widow 7.5%, divorced 4.4%, and single 6.1% Table 3). The small percentage of single respondents indicates that singles may not get their own land for dairy production. Singles are more of dependent on their families financially and in decision-making to involve in some kind of business. Married are involved in dairy production more than others as they do things together and generate different

Table 2: Sex of respondents

		Frequency	*Percent (%)*	*Valid percent (%)*	*Cumulative percent (%)*
Valid	Male	183	80.3	80.3	80.3
	Female	45	19.7	19.7	100.0
	Total	228	100.0	100.0	

Table 3: Marital status of respondents

		Frequency	*Percent (%)*	*Valid percent (%)*	*Cumulative percent (%)*
Valid	Married	187	82.0	82.0	82.0
	Single	14	6.1	6.1	88.2
	Widow	17	7.5	7.5	95.6
	Divorced	10	4.4	4.4	100.0
	Total	228	100.0	100.0	

Table 4: Age of respondent

		Frequency	*Percent (%)*	*Valid percent (%)*	*Cumulative percent (%)*
Valid	18-39	52	22.8	22.8	22.8
	40-50	122	53.5	53.5	76.3
	above 60	54	23.7	23.7	100.0
	Total	228	100.0	100.0	

ideas for various businesses. Among the respondents, 22.8% had age between 18 and 39, 53.5% were between 40 and 50, and 23.7% had aged over 60 (Table 4). This indicates the majority of dairy producers were in the age of 40–50 years. Even though they are not young, these ages could also be productive in dairying.

According to the respondents, dairy activity is not the major occupation of smallholder dairy farmers. About 52.2% of the respondents said dairy farming was not their major job and the remaining 47.8% said dairy farming was their major occupation (Table 5). So, most of the respondents participating in dairy framing are traders and individuals hired in informal sectors. The main motivator for involving in dairy activity was profitability. Other milk producers were also involved in dairy activity due to experience and profitability. The dairy activity was not the major job of these individuals; they were motivated to be involved in dairy activity due to its profitability.

Education is an important point for the growth of communities and a tool to sustain development. In this context, the educational level of the farming households may have significant importance in identifying and determining the type of dairy production. Education plays a great role in producers' income, implementing technologies, as well as the socioeconomic status of the family (Kassa Tarekegn, 2020). In this finding, producers at the elementary school level of education exceed the proportion of those at a higher educational level. Regarding the respondents' educational status, most dairy producers attended elementary school (Table 6). The overall proportion of illiterate farmers was 19.3, 18.9% in the read and write category only, 43.9, 14.9, and 3.1% were primary school, secondary school and diploma and above categories, respectively. The study results show that dairy owners were mainly educated up to only primary school level.

Work Experience in Dairy Activity

The majority (51.3%) of the people has experience of 6–10 years, 7% have 11–15 years, 4.4% have more than 15 years and 37.3% have less than 5 years of dairy experience in the study area (Table 7). Thus, over half of the respondents have worked in dairy production for between six and ten years. This indicates dairy production starts to expand within ten years, so we may not get a long history about dairying in the study area. The tradition of producing dairy products in the study area seems less developed. This might be due to lack of awareness to produce dairy products in urban areas, due to less demand and less availability of cross-breed cows which is appropriate for urban dairying. The production and marketing system of the respondents were determined by their knowledge through experience therefore, it has a positive relationship with productivity.

Feed and Feeding System

Regarding the major feed source of the dairy producer, about 58.9% of the respondents were purchasing the feed from the crop farmers and other sources, 18.9% of them were harvesting the feed and 22.2% were using a combination of harvesting and purchasing of feed. The

Table 5: Dairy farm as a major occupation

		Frequency	*Percent(%)*	*Valid percent (%)*	*Cumulative percent (%)*
Valid	Yes	109	47.8	47.8	47.8
	No	119	52.2	52.2	100.0
	Total	228	100.0	100.0	

Table 6: Educational level of the respondent

		Frequency	*Percent (%)*	*Valid percent (%)*	*Cumulative percent (%)*
Valid	Illiterate	44	19.3	19.3	19.3
	Write and read	43	18.9	18.9	38.2
	Primary	100	43.9	43.9	82.0
	Secondary	34	14.9	14.9	96.9
	Diploma and above	7	3.1	3.1	100.0
	Total	228	100.0	100.0	

Table 7: Dairy farming experience

		Frequency	*Percent (%)*	*Valid percent (%)*	*Cumulative percent (%)*
Valid	within last 5 years	85	37.3	37.3	37.3
	6-10	117	51.3	51.3	88.6
	11-15	16	7.0	7.0	95.6
	above 15	10	4.4	4.4	100.0
	Total	228	100.0	100.0	

reason for purchasing is that they do not have adequate land size for farming. Shortage of feed was reported by 57% of the respondents and it was mainly due to the lack of raw materials or ingredients for the preparation of roughage, the feeds are not directly purchased from the factory rather than from merchants due to this the cost of feed is very expensive in general (Table 8). This situation might be a major constraint for dairy products that might get attention to increase milk production.

The majority of the respondents (32.9%) use pasture as main feed for their milking cows, 25.9% use hay/attela, 20.2% use straw and 11.8% use the combination of different types of feed namely, roughage (*furshca*), pasture, hay (*dirqosh*), straw, alfalfa and non-usual feed like "Attela" as main feed for their milking cows and only 9.2% of respondents use feed like roughage (Table 9).

Milk Marketing System

Involvement of Producers in Dairy Marketing

In the study area, the majority (96%) of dairy farmers produce whole milk as the predominant dairy product for sale while 4% of households produce butter for home consumption and sale. This indicate that fresh milk has greater demand in the market, so producer may not have surplus milk to go further for processing to butter, yogurt and cheese even though it has demand in the market. Out of the interviewed producers in the urban production system, most households (96%) were market-oriented. The dairy marketing system in the studied area is dominantly informal marketing. Milk is sold mainly on contract basis and in cash to consumers at different prices. This is because of there is only very few formal dairy products shops in common marketplace with fixed price.

Demand for Milk

In the study area the production could not meet the demand in the market, mostly during non-fasting seasons. This indicates that their production is less relative to the market demand. Due to the presence of high demand for milk in the area, the producers did not process the milk in to another form such as butter, except during fasting time when the whole milk was not sold. Although there is high utilization demand of milk in the study area, there are respondents who face a problem of less demand in fasting season. About 79.8% of the respondents faced less demand and about 20.2% did not face demand problems (Table 10). According to respondents, about 67.1% of the respondents admitted that demand problems for milk occurred during fasting time, 12% faced demand problems for milk in any month of the year and 20.2% did not face demand problem (Table 11).

During fasting time, producers would have surplus milk and for unsold milk, they will traditionally process it into byproducts like butter and offer to calves as a food. As milk is a perishable product, the milk also got spoilage during fasting. This is a problem for milk producers. This shows that the need for a processing factory in the area is important to reduce the problem by increasing the shelf life of the milk. Other points, the available demand and supply in the study area are not balanced, it fluctuates from season to season or there is seasonality of demand for milk. During fasting time, the available milk is more than the demand and out of the fasting time, the supply does not satisfy the demand in the market.

Table 8: Feed shortage for milking cows

		Frequency	*Percent (%)*	*Valid percent (%)*	*Cumulative percent (%)*
Valid	Yes	130	57.0	57.0	57.0
	No	98	43.0	43.0	100.0
	Total	228	100.0	100.0	

Table 9: Feed types of milking cows

		Frequency	*Percent (%)*	*Valid percent (%)*	*Cumulative percent (%)*
Valid	Roughage	21	9.2	9.2	9.2
	Straw	46	20.2	20.2	29.4
	Pasture	75	32.9	32.9	62.3
	Hay/Attela	59	25.9	25.9	88.2
	Combined	27	11.8	11.8	100.0
	Total	228	100.0	100.0	

Table 10: Marketing problem for milk products

		Frequency	*Percent (%)*	*Valid percent (%)*	*Cumulative percent (%)*
Valid	Yes	182	79.8	79.8	79.8
	No	46	20.2	20.2	100.0
	Total	228	100.0	100.0	

Table 11: Period for marketing problem

		Frequency	*Percent (%)*	*Valid Percent (%)*	*Cumulative Percent (%)*
Valid	Fasting month	153	67.1	67.1	67.1
	In any month of the year	29	12.7	12.7	79.4
	Not applicable	46	20.2	20.6	100.0
	Total	228	100.0	100.0	

Majority of the respondents (26.8%) sold their milk directly to household consumers and cafes. According to the result, 11.8% sold to household consumers, 22.8% to cafe, 9.2% to household consumer and retailers, 6.1% to retailers and cafes, 13.2% to the household consumer, retailers and café (Table 12). It is common for consumers or cafes to buy milk from producers by moving to their homes and bringing it by the producers to their homes through home-to-home sales. The consumer may not get dairy products easily in the current marketing system rather by going to the producers' home, which is uncomfortable for doing business. Even though urban and pre-urban milk production systems exist in the study area, informal marketing systems were dominated. The least beneficiary of milk from producers were retailers and cafe was 6.1%. Majority (53.7%) of producers sold their milk on a contract basis, about 23.7% sold their milk on a daily-basis, and 22.8% sold their milk based on the combination of both by contract and daily-basis.

Access to Extension Service

Regarding the extension service, extension employees who are appointed by Bureau of Urban Agricultural Development of Mizan-Aman town provide the services twice a month. Result of this study discovered that the contact of development agents with milk producers was frequent and regular. In this regard 51.3% of the respondents said they have access to an extension service and the remaining 48.7% of the respondents said they have no access to an extension service (Table 13). Other governmental institutions like office of trade and the industry office of small and micro enterprises also play a great role in dairy activity by providing informational support. The extension employees trained the milk producers regarding dairying activities. These include how to properly manage milk cows, the breeding system, use of artificial insemination, improved feeding and preparation, health care and how to process at the time of milking. The study discovered the role of government is great in providing training and technical support; therefore, dairy producers have opportunities to use extension services and be relevant in their dairy farms to be more productive.

Access to Credit

The survey result highlighted that producers' willingness or need for credit was high but, access of credit for milk production was low in the surveyed local administrations. In this respect, out of the respondents, 76.8% had a need for credit service and the remaining 23.2% of the respondents did not need for credit service (Table 14). The main reason for not taking credit was the difficulties of a financial institution, credit is not given individually, and credit interest is too high. These respondents have wished to add more cows if they get access credit to finance their dairy farm.

Table 12: Major consumers of milk in the market

		Frequency	*Percent (%)*	*Valid percent (%)*	*Cumulative percent (%)*
Valid	Household consumer	27	11.8	11.8	11.8
	Retailers	23	10.1	10.1	21.9
	Café	52	22.8	22.8	44.7
	Household consumer and retailers	21	9.2	9.2	53.9
	Household consumer and café	61	26.8	26.8	80.7
	Retailers and café	14	6.1	6.1	86.8
	Household consumer, retailers and café	30	13.2	13.2	100.0
	Total	228	100.0	100.0	

Table 13: Extension service given to cattle especially for milk production

		Frequency	*Percent (%)*	*Valid percent (%)*	*Cumulative percent (%)*
Valid	Yes	117	51.3	51.3	51.3
	No	111	48.7	48.7	100.0
	Total	228	100.0	100.0	

Table 14: Need of credit services for dairy farm

		Frequency	*Percent (%)*	*Valid percent (%)*	*Cumulative percent (%)*
Valid	Yes	175	76.8	76.8	76.8
	No	53	23.2	23.2	100.0
	Total	228	100.0	100.0	

Table 15: Access to credit

		Frequency	*Percent (%)*	*Valid percent (%)*	*Cumulative percent (%)*
Valid	Yes	83	36.4	36.4	36.4
	No	92	40.4	40.4	76.8
	Not applicable	53	23.2	23.2	100.0
	Total	228	100.0	100.0	

Table 16: Multicollinearity

Coefficientsa

Model		*Collinearity Statistics*	
		Tolerance	*VIF*
1	EDUCATION	0.785	1.274
	ACC credit	0.774	1.292
	Feeding sys	0.975	1.026
	ACC training	0.902	1.109
	Demand for dairy products	0.901	1.110

a. Dependent variable: diary market.

On the other side, 36.4% of the respondents have access to credit; particularly dairy cooperatives are the main user of credit in the study area, 40.4% of the respondent did not have access to credit mainly the smallholder dairy farmers, and the remaining 23.2% of the respondents did not respond the question, because they do not need to take credit (Table 15). This shows that producers might be limited to expanding their dairy activity to increase milk production due to the lack of credit access.

Explanation of the Significant Variables Influencing Dairy Production

Dairy products are produced for both market and household consumption in Mizan-Aman town. Based on analysis of literature and previous research, it is assumed that a variety of variables affect dairy production.

Assumption of binary logistic regression

Before analyzing the data, it was important to look into the problem of multicollinearity. Pearson correlation test, Tolerance and VIF values were used to check the multicollinearity problem for independent variables to avoid multicollinearity problem, the VIF values should not exceed 10 and the tolerance values should not be less than 0.10 (Keith, 2006). According to the test results, multicollinearity was not a serious problem (Table 16). The tolerance levels for all variables are greater than 0.10 and the VIF values are less than 10. In addition, multicollinearity was examined using Pearson's correlation (Table 17). The values of Pearson's exhibited the relationship between independent variables, this serve as a method for diagnosing multicollinearity (Allison, 1999). Allison (1999) showed that any correlation that is 0.8 or higher is problematic.

Outliers

Outlying observations are unusual data values that can result from data entry errors or rare events affecting the observation or experimentation during data collection. While, outliers can occur by chance within a distribution, they may indicate either potential measurement error or a population consisting of a heavy-tailed distribution (Hair *et al.* 1998). A common assessment of potential outliers is observing the casewise list produced. The result indicates the absence of significant outliers since the casewise plot is not produced, indicating the absence of outliers.

In the model, out of the five explanatory (predictors) variables, only four variables were found to significantly influence dairy production. In reporting logistic regression when there are several independent variables, it is a good idea to present the detailed results in a table and a summary of the key significant results in the write-up. A logistic regression was carried out to assess the effect of improved feed, demand for milk, frequency of getting training, access for credit, and education of the household heads on urban dairy production. The overall model was statistically significant when compared to the null model, ($\chi 2(5)= 99.796$, $p<0.001$), explained 49.7% of the variation of urban dairy production (Nagelkerke R Square) and correctly predicted

Table 17: Correlation Matrix

		Constant	*Demand of diary prdts*	*Access credit*	*Feeding Sys*	*Access Training*	*EducationLevel*
Step 1	Constant	1.000	-0.462	-0.583	-0.587	-0.405	-0.659
	Demand of dairy products	-0.462	1.000	-0.170	0.081	0.122	-0.019
	Access credit	-0.583	-0.170	1.000	0.188	0.031	0.573
	Feeding Sys	-0.587	0.081	0.188	1.000	0.158	0.329
	Access Training	-0.405	0.122	0.031	0.158	1.000	-0.065
	Education Level	-0.659	-0.019	0.573	0.329	-0.065	1.000

81.6% of cases. Education (p<0.001), feeding (p<0.001), access for credit (p< 0.001), and demand for dairy products (p<0.001) were significant but access for training (p= 0.131) was not significant (Table 18).

Hypothesis Testing Results

Demand for dairy products

The result shows that the demand for milk is positively and statistically significant with the dairy production as it is expected at a 1% significant level. Having a demand for dairy products makes the household to produce more by 0.271 times than who have no demand for dairy products (Table 19, 20). Therefore, demand is a very important factor for the household head to produce more and gain more income to reinvest in to his/her business to expand the dairy farm. As discussed in the descriptive part, a high demand for milk will initiate the household head to produce more to satisfy the demand.

Education Level of the Household Head

Education has a positive effect on the probability of dairy household milk market participation decision and is significant at 1% probability level. The positive and significant relationship indicates that education improves the dairy household capacity to produce more and process production in an effective way. Education help in doing dairying in a modern way by minimizing labor cost. The Exp(B) values shown at the right-most column in the variables in the equation Table 20 indicates that addition

Table 18: Model Summary

Model Summary			
Step	*-2 Log likelihood*	*Cox & Snell R Square*	*Nagelkerke R Square*
1	184.59[a]	0.354	0.497

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than 0.001.

Table 19: Classification of dairy market

Classification Table[a]					
	Observed		*Predicted*		
		Diary market		*Percentage Correct*	
		Not improved market	*Improved market*		
Step 1	Diary market	Not improved market	51	21	70.8
		Improved market	21	135	86.5
	Overall Percentage				81.6

a. The cut value is 0.500.

Table 20: Variables in the equation

Variables in the Equation									
		B	*S.E.*	*Wald*	*df*	*Sig.*	*Exp (B) Lower*	*95% C.I. for EXP(B)*	
								Upper	
Step 1a	Demand of dairy products	-1.307	0.480	7.416	1	0.006	0.271	0.106	0.693
	Access credit	1.791	0.462	15.009	1	0.000	5.995	2.423	14.834
	Feeding Sys	1.214	0.434	7.820	1	0.005	3.366	1.438	7.881
	Access Training	-0.574	0.381	2.275	1	0.131	0.563	0.267	1.187
	Education Level	3.516	0.512	47.104	1	0.000	33.644	12.327	91.824
	Constant	-5.251	1.838	8.158	1	0.004	0.005		

a. variable (s) entered on step 1: Demand of dairy products, Access credit, Feeding Sys, Access Training, Education Level.

Table 21: Omnibus tests of model coefficients

Omnibus Tests of Model Coefficients				
		Chi-square	*Df*	*Sig.*
	Step	99.796	5	.000
Step 1	Block	99.796	5	.000
	Model	99.796	5	.000

Table 22: Hosmer and Lemeshow Test

Step	Chi-square	Df	Sig.
1	15.345	8	0.053

of one-year formal schooling leads the probability of dairy production to rise by about 33.64%.

Use of improved feed

The result shows that the use of improved feed was positive and significant at less than 1% significant level. Using improved feed is very essential factor for the daily production of milk in the household. Different types of feed have its own contribution on milk production. Therefore, dairy households used feed that is appropriate for milking cows. The Exp(B) values shown at the right-most column in the variables in the equation Table 20 indicate using improved feed makes the producers increase their milk production by 3.36 times than those who do not improve feed.

Access for credit

The result shows that access for credit has a positive relation with dairy production, as it is expected and significant at 1% significant level. Access to credit makes the milk producer produce more by 5.99 times than households with no access for credit. This shows that the finance that the households gain significantly affects dairy production improvement (Table 21). One of the mechanisms to maximize dairy farms or any business is the availability of credit from different sources (Table 22). Financial income from different sources has a significant effect on production volume. The result designates the relation between the variable, indicating that any additional financial income enables the dairy household to purchase more improved breed dairy cows, contributing to increased milk production per household per day.

Frequency of Getting Training

The model result shows that this variable has negative relation with the dairy market which was not expected and statistically not significant at 5% probability.

Conclusion

This study was conducted with the objective to explore the determinants of dairy market in Mizan-Aman town of Bench Sheko zone. The study was undertaken in the town's four kebeles: Adiss ketema, Edget, Hibert and Aman. Dairy farmers from each kebles were selected using a stratified random sampling technique. Data were collected from 288 smallholder dairy farmers using a semi-structured questionnaire. Survey data collected from four kebles was analyzed by using descriptive analysis. The result shows that the demand for milk was positive and significantly affected dairy production. This positive impact of the variable indicates that high milk market demand leads to high production. Further, the result has also shown that dairy household production positively and significantly affected by having frequent training and marketing about dairying. It improves the readiness of the dairy household to accept new ideas and innovations, and get updated demand and supply information which in turn enhances their willingness to produce more, thus increasing dairy production. The study noted that the existing milk production systems (mainly extensive) & marketing (mainly informal) systems are interwoven by many constraints. The overall milk marketing system was found to be traditional, underdeveloped, fragmented, and informal. The major constraints for dairy development in the area include shortage and high feed costs, seasonality of milk demand, less awareness and unwillingness to access credit. The rapid urbanization of the zone capital city Mizan-Aman, with that of human population increase, is an opportunity for the development of dairy in the area. Dairy development in the studied area can be improved by encouraging private investors and thereby, pre-urban and urban producers could be encouraged to enter into milk collection schemes. Moreover, household dairy producers should be supported through services related to feed supply, credit, extension and training, besides the establishment of formal marketing systems enhanced. Further research should be undertaken to generate achievable policy strategies and development targets with regards to dairy marketing management. There is a need for more studies at the local level to allow further assessment of local dimensions of the subject. A further study could assess the long-term and wider range effect of the problem of dairy market at household levels. Such studies could help in the design of better strategies and policy instruments in the dairy marketing management sector.

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