



ECONOMIC ANALYSIS OF MILK MARKETING IN SELECTED LOCAL GOVERNMENT AREAS OF ADAMAWA STATE, NIGERIA



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Received: August 16, 2021 Accepted: October 07, 2021

Abstract: The broad objective of the study was to carry out an Economic Analysis of Milk Marketing in Selected Local Government Areas of Adamawa State, Nigeria. The specific objectives were to: describe the socio-economic characteristics of the respondents; determine the cost and returns associated with milk marketing, identify the factors influencing the profitability of milk marketing and identify the constraints associated with milk marketing in the area. Multistage sampling procedure was used to collect data from 110 milk sellers in selected markets using a semi-structured questionnaire. Data collected were analysed using descriptive statistics and inferential statistics involving the use of multiple regression model. The study revealed that majority of the respondents had no formal education (92%), were married (67%), within the economically active age of not more than 40 years (65%), with large household sizes of between 6-15 persons (74%), had more than 10 years of milk selling experience (61%), did not belong to any social group (61%) and sourced capital for business from family and friends (54%). The profitability analysis of milk marketing in the study area showed that: the gross margin per litre of milk was ₦108.46 while return per Naira invested was ₦1.75 showing that milk marketing in the study area is a profitable venture. The multiple regression analysis showed significant coefficients of: number of milking cows (X_1), milk selling experience (X_2), number of bottles sold/day (X_3), cost of containers (X_4), selling price of a bottle of milk (X_5) and household size (X_6); implying that these factors influenced and determined profitability of milk marketing in the study area. The coefficient of determination R-square was 0.797, which implies that about 80% of the variability in the profitability of milk selling is explained by the independent variables used in the model. Number of milking cows (X_1) with a coefficient of 0.51 (significant at 5%) has a direct relationship with the profitability of milk, implying that having more milking cows will increase supply of milk, which will in turn generate more income and vice versa. Also, milk selling experience (X_2) with a coefficient of 0.41 (significant at 5%) means that the probability of a respondent having a better gross margin is increased by 0.4 for a year's increase in experience implying that respondents with higher selling experience stand a better chance of a profitable gross margin than those with less. Prominent among the constraints to milk marketing in the area were; low milk demand, inadequate supply of milk, high cost of transportation, and inadequate capital.

Keywords: Economic analysis, milk, marketing, Adamawa State, Nigeria

Introduction

Milk is a food of outstanding interest and has been taken by humans since the earliest pre-historic times and still forms the basis of most nations' economy (Alfa, 1987). Milk for consumption by humans is produced from a number of animals, although, cow is by far the most important in commercial terms (Adams and Moss, 1995) with White Fulani (Bunaji) recognized as the principal producer (Adeneye, 1989). Milk is designed by nature to be a complete food for young animals and of high nutritional values. The principal constituents of milk include fat, protein, total solid, lactose, ash. In addition to this, milk contains several hundred minor constituents many of which include milk fat, vitamins, metal ion and flavor compounds, which have a major impact on the nutritional, technological and sensory properties of milk and dairy products (Armstrong, 1995).

Marketing has been defined as all processes involved from the production of a commodity until it gets to the final consumer (Crammer *et al.*, 2001). According to Yahuza (2001) the activities for making milk and milk products available to end-users involves large number of individuals, including pastoralists, processors, milk product distributors and retailers. The traditional cow milk market is dominated by the Fulani women and girls who are directly engaged in the collection, processing and sales of cow milk products. The milk produced by the cows is for both household consumption and direct sales to local consumers as fresh milk, ghee or other forms of traditional dairy products (Ali and Uche, 2006). Traditional milk products include 'madara' (fresh milk), 'nono' (skimmed milk), 'kindimo' (Yoghurt), 'maishanu' (local butter) and 'warankasi' (Cheese). According to Kubkomawa *et al.* (2019), consumers display a strong preference for locally processed milk products such as "nono" (sour milk),

"kindirmo" (yoghurt), 'maishanu' (local butter) and 'awara' (cheese) and this preference is based on flavour, perceived nutritional value, regional values/customs and perceived cheaper price than their imported substitutes. Fresh milk is sold either as whole milk 'madara' or as processed milk 'kindirmo' to rural dwellers and workers in semi-urban areas. Fresh milk is sometimes sold in exchange for grains and occasionally to government processing plants in milk collection centers (Idaters and Bayer, 2001).

Inflation and unfulfilled demands have driven up the price of imported dairy products in Nigeria. Changes in price over time are attributable to some main sources which include general inflation in the country of origin of Nigeria's dairy imports, relative changes between the prices of dairy exports and other goods in these countries of origin, changes in the level of import duties and similar taxes on dairy commodities entering Nigeria as well as general inflation in Nigeria relative to countries of origin for dairy imports. Other factors include the relative unavailability of foreign exchange and license for the imports of dairy commodities compared to other goods as well as changes in domestic supply and demand for dairy products relative to other goods in general (FAO, 2003).

Despite the importance of pastoral herd in the provision of nutritional requirements of Nigerians, the pastoral milk production is still bedeviled with some problems. These problems make it difficult for local production to meet up with the demand for milk. The sale of dairy products is widespread among the Fulani. Marketing of agricultural products serves as a stimulus for greater production. Fulani women usually undertake the responsibility of fresh milk processing and marketing after their male counterparts have done the milking exercise. Milk marketing channel is usually directly from producers to consumers. However, sometimes middle men are

involved. This shows that many actors are involved in milk marketing and so there is utmost need to study the marketing system in other to ascertain its viability or otherwise.

It is observed that several studies on marketing of agricultural products were carried out in the study area, such studies include comparative analysis of processed and fresh fish marketing in Yola north and Girei local government Areas of Adamawa state, Nigeria, Economic of local cow milk products marketing in Kwara State, Nigeria, Economic effects of US Dairy policy and alternative approaches to milk pricing, survey on dairy cattle milk production and milk quality problems in peri-urban areas in Burkina Faso, profitability of Maize production in Yola south Local Government Area of Adamawa State, profitability of groundnut production in Girei and Yola north local government areas of Adamawa state, Nigeria. Yet, documented literature on milk marketing in the study area are very few. This research therefore, intends to analyse dairy milk marketing in selected local government areas of Adamawa State to add to existing literature.

The broad objective of the study was to conduct an economic analysis of milk sellers in two selected Local Government areas of Adamawa State. The specific objectives of the study were to:

- i) describe the socio-economic characteristics of milk sellers in the study area;
- ii) determine the cost and returns associated with milk marketing;
- iii) determine the factors influencing the profitability of milk marketing;
- iv) identify the constraints associated with milk marketing.

Materials and Methods

The study area

This study was conducted in Yola North and Yola South Local Government Areas (LGAs) of Adamawa State, Nigeria. The two LGAs are part of the 21 local government areas of the State. Yola North lies between latitude 9° 13' 48" N and longitude 12° 27' 36" E of the Equator. It is 1,965 feet (599 m) above seas level; with a projected population of 230,830 people as at 2011 (NPC 2011). Yola South on the other hand has an area of about 718 km² and lies between latitude 9° 00' and 9 16' N and between longitude 12° 12' and 12° 35' E. Yola south has a projected population of about 226,810 people as at 2011 (NPC, 2011). The study area has wet season, which starts from April to late October, with mean annual rain fall of about 1,000 mm and a dry season that lasts from November to April. The study area has a maximum temperature of 40°C and a minimum temperature of 18°C (Adebayo, 1999). Yola North and South LGAs are bordered by Demsa to the west, Fufore to the east and Girei Local Government Area to the north. It has a major river (River Benue) which passes through the area. Yola North and Yola south is also an important breeding center for cattle and other related livestock such as sheep and goat. The common breeds of cattle found in the study area include; Adamawa gudali, white Fulani, Red Bororo and Uda imported species of various breeds.

Sampling technique

Primary data was used for the study through the use of structured questionnaire administered to 125 respondents in the study area. The population for the study was the milk sellers in Yola North and Yola South Local Government Areas of Adamawa State. There are five (5) markets in Yola north (YN) and four (4) markets in Yola south (YS). Major markets from Yola north (YN) and Yola south were purposively selected because of their popularity and high population of milk sellers; then, three (3) and two (2) major markets were randomly selected from Yola north and Yola South, respectively. A total number of five (5) major milk markets were included in the study from which 125

respondents were randomly selected proportionate to the sizes of the markets.

Analytical technique

Both descriptive and inferential statistics were used to analyse data collected. Descriptive statistics (involving the use of frequency tables, means and percentages) were used to achieve objectives i and iv. Gross margin was used to achieve objective ii, while multiple regressions was used to achieve objective iii.

Gross margin

$$GM = \sum p_i Q_i - \sum k_j x_j \dots \dots \dots (1)$$

Where: GM= Gross Margin; P_i= unit price of output (N); Q_i= quantity of output (CL); K_j=Unit cost of variable input (N); X_j=quantity of variable input (kg); Σ= Summation Sign; TVC=Total Variable Cost (₦)

Multiple regressions

Multiple regression model was used to determine the factors influencing the profitability of milk sellers in the market using the linear function.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + U \dots \dots (2)$$

Where: Y = Gross income (₦) β₀ = Constant; X₁ = Number of milking cows; X₂ = Number of years of selling milk product; X₃ = number of bottles of milk sold per day; X₄= Cost of containers for selling milk product; X₅= Price of one bottle (faro bottle) of milk; X₆= Household size i.e. number of people in the household; U_i = error term

Results and Discussion

Socio-economic characteristics of Respondents'

The distribution of the respondents by age is presented in Table 1. The result revealed that majority (65%) of the respondents were not more than 40 years of age. This is similar to the findings of Aboki *et al.* (2019) where most (60%) of the cow milk producers were between 25-44 years. This age range implies that most of the milk sellers were within the economically active age and would be able to undertake activities associated with milk marketing; respondents above 50 years of age constituted about 15% of the respondents. The distribution of the respondents according to level of educational attainment shows that majority (92%) of the respondents had no formal education, while about 8% had attended primary school. This implies a very low level of literacy among the respondents. The study shows that majority (67%) of the respondents were married, about 26% of them were single, 7% were divorced, while about 3% were widowed. This suggests that, milk selling is carried out by more married people. The distribution of the respondents by household size showed that, majority of the respondents (60%) had household size of not more than 10 persons, while about 6 had household size of more than 20 persons. Similarly, about 25% had household size of 1115 persons. Furthermore, the distribution of the respondents based on their experience in terms of their years of experience in milk selling shows that, 82% of the respondents had experience of not more than 20 years in the trade. This corroborates. Similarly, 18% had experience within the range of 21-30 years. This implies that, majority of the respondents have some many of experience in the sale of milk which can enable them perform the activity efficiently and may may help them to take better marketing decisions. The respondents sell different milk products: 44% of them sold 'Kindirmo' (Yoghurt), 35% sold 'Nono' (Skimmed Milk) while 21% sold Madara (Fresh Milk). This trend may be attributed to the taste and preferences of the customers.

Every business activity requires capital for it to thrive. Many (54%) of the respondents sourced their capital from family and friends while 46% got their capital from own personal savings. This shows clearly that the respondents were unable

to access capital from formal financial institutions. The distribution of respondents based on membership of social groups indicates that majority (61%) of them did not belong to any social group while 39% belonged to such groups. This suggests that most of the respondents were unaware of the importance of such associations in improving their welfare and of their family.

Table 1: Socio-economic characteristics of the respondents (N=110)

Variable	Frequency	Percentage
Age (Years)		
14-20	11	10.0
21-30	25	22.7
31-40	36	32.7
41-50	22	20.0
51-60	16	14.6
Gender		
Male	93	77.50
Female	27	22.50
Marital Status		
Married	74	67.3
Single	26	23.6
Divorced	7	6.4
Widowed	3	2.7
Household Size		
≤5	13	11.8
6-10	47	42.7
11-15	27	24.5
16-20	16	14.5
21-25	7	6.36
Educational Attainment		
No Formal education	102	92.73
Primary education	08	7.27
Experience in Milk Selling		
2-10	49	44.55
11-20	41	37.37
21-30	20	18.20
Membership of Group		
Non-Member	67	60.9
Member	43	39.1
Type of Milk Sold *		
Madara (Fresh Milk)	53	21.12
Kindirmo (Yoghurt)	110	43.82
Nono (Skimmed Milk)	88	35.06
Madara (Fresh Milk)	53	21.12
Sources of Capital		
Family and Friends	59	53.64
Personal Savings	51	46.36

Source: Field survey, 2016; * Multiple Response

Table 2: Cost and return of milk marketing

Variable	Value (₦)	Percentage (%)
A. Variable Cost		
i. Cost of container (₦/Week)	83, 250	51.76
ii. Cost of transportation (₦/Week)	70, 270	43.69
iii. Tax (₦/Week)	7, 320	4.55
Total Variable Cost	160, 840	100
Total cost/litre of milk	62.05	
B. Return		
Total Revenue/Week	441, 980	
Gross Margin/ Week	281, 140	
Gross Margin/ Litre of Milk	108.46	
Return/₦ Invested	1.75	

Source: Field survey, 2016

Profitability of milk marketing

The aim of every business is to maximize profit. Profitability analysis gives the solvency of every business and shows areas that need improvement to maximize gains. Table 2 presents the gross margin accruable to milk selling in the area. The study revealed that the average variable cost (AVC) of the respondents was ₦1, 462.18 per week. Cost of containers constituted the bulk of the total cost (TC) representing about 52% of the cost, followed by transportation cost (44%) and taxes (4%). The total cost per litre of milk was ₦62.05 while the total revenue/week was ₦441, 980 with a weekly gross margin of ₦281,140. Return/₦ Invested was ₦1.75; this establishes that milk selling is a profitable venture in the study area. This is similar to the findings of Aboki *et al.* (2019) which showed that cow milk production is profitable with a return of 0.46 k/Naira invested in Yola South Local government area of Adamawa state, Nigeria.

Factors influencing milk marketing

Multiple regression model was used to identify the factors that influence the profitability of milk selling in the area. The result of the analysis as contained in Table 3 revealed that the significant determinants of profitability of milk selling in the area were; Number of Milking Cows (X₁), Milk Selling Experience (X₂), Number of Bottles sold/day (X₃), Cost of Containers (X₄), Selling Price of a Bottle (X₅) and Household Size (X₆). The coefficient of determination R²square was 0.797, which implies that about 80% of the variability in the profitability of milk selling is explained by the independent variables used in the model. The finding reveals that the Number of Milking Cows (X₁) has a direct relationship with the profitability of milk sell having a coefficient of 0.51 (significant at 5%). This implies that, having more milking cows will increase the supply of milk which will in turn generate more income and vice versa. Similarly, Milk Selling Experience (X₂) was positive and statistically significant at 5% level. Specifically, the probability of a respondent having a better gross margin is increased by 0.4 for a year increase in experience. This implies that respondents with higher level of experience have a better chance of having a profitable gross margin than those with less. Consistent with *a priori* expectation, the co-efficient of Number of Bottles sold/ day (X₃) was positive and statistically significant at 1%. This indicates that, respondents that were able to sell a higher number of milk bottles per day will have a more profitable gross margin than those with less. Cost of Containers (X₄) was inversely related to having a profitable gross margin. Specifically, a Naira increase in the cost of the container will reduce the profitability of the gross margin by 0.0162 (significant at 5%). Selling Price of a Bottle (X₅) positive affects the gross margin of milk sell. This connotes that, the higher the selling price of a bottle of milk, the higher the gross margin and vice versa (significant at 1%). Similarly, having a large household size (X₆) positively affects the profitability of milk selling and the coefficient is significant at 1%. This is may be attributed to the fact that, collection and processing of milk may require large amount of labour especially if the milking cows are many.

Table 3: Factors influencing milk marketing

Variable	Coefficient	Std.Error	t-Statistic
Number of Milking Cows (X ₁)	0.005257	0.002154	2.440433**
Milk Selling Experience (X ₂)	0.004637	0.002215	2.093571**
Number of Bottles sold/day (X ₃)	0.026892	0.002161	12.44222***
Cost of Containers (X ₄)	-0.000162	7.87E-05	-2.056181**
Selling Price of a Bottle (X ₅)	0.002935	0.000540	5.435427***
Household Size (X ₆)	0.008877	0.003403	2.608959**
Constant	2.167605	0.113757	19.05461***
R ²	0.797387		
F-Statistic	63.62408		
S. E	0.151431		

Source: output from Eviews 5 software; **, *** Significant at 5 and 1% respectively

Table 4: Constraints Associated with Milk Selling

Constraints	Frequency	Percentage (%)
Inadequate supply of milk	34	27.20
Lack of capital	24	19.20
High cost of transportation	25	20.00
Low milk demand	42	33.60

Source: Field survey, 2016; *Multiple responses

Constraints associated with milk selling among the respondents

The results in Table 4 outline the various constraints faced by respondents in milk marketing in the area. Foremost among these constraints was the issue of low milk demand in the area (34%). Most of the respondents considered the demand of commodity to be low; this implies that supplying large quantity of the commodity to the market sometimes may not be profitable, considering the perishability of milk. Inadequate supply of milk during the dry season was ranked second (27%) among the milk marketers' challenges. This is expected in the dry season as a result of less supply of water and livestock feed invariably leading to less supply of milk. Similarly, high cost of transportation (19%) is another factor affecting the profitability of milk selling in the area. This may be due to the fact Fulani milk sellers often reside in remote villages close to farms and grazing lands where they can feed their cattle and other animals are relatively far from markets where they sell their products and therefore have higher costs of transportation. Lastly, inadequacy of capital to carry out their business activities was also outlined as a challenge to the respondents.

Conclusion and Recommendations

Milk marketing is profitable in the study area. There is a need to make the business efficient and sustainable. This can be achieved through overcoming the constraints limiting milk marketing in the area. Based on the findings of the research, the following recommendations were proffered to make milk selling more profitable to its participants;

- i) The government and other concerned agencies should promote literacy programs among the respondents to enable them to take more informed decision about their businesses (e.g. adoption of modern milk processing to add more value to their product).
- ii) Participants in milk marketing should be availed the opportunity to access soft loans so as to increase their capital base. This will enable the participants to increase their volume of supply and also their scope in terms of market coverage.
- iii) The respondents should be encouraged to join groups so as access benefits accruable social groups, especially soft loans, literacy programmes, social protection among others.

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