The profitability of cheese production in Ola-Oluwa local government area, Osun State

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ABSTRACT

The study carried out an economic analysis of cheese production in Ola-Oluwa Local Government Area, Osun State, Nigeria. It described the socioeconomic characteristics of the cheese producers, identify the constraints and determine the cost and return on cheese production. A two-stage sampling procedure, cluster sampling to select 10 communities and snowball sampling to select 12 cheese producers, was used to select 120 respondents. Descriptive statistics (frequency, percentages and mean) and inferential statistics (budgetary and regression analyses) were used to analyse data obtained. Findings reveal that all (100.0%) were female, 40.8% were within the age range 41-50 years and 95.0% were married. More than two-thirds (78.3%) had enterprise experience ranging from 18 to37 years, 53.3% had no formal education and the mean household sizes was 7 persons. The major constraints faced by cheese producers are inadequate funding (85.8%), distance to market (68.3%), farmer/herders' conflicts (65.0%) and insufficient fodder (56.7%). Total revenue from cheese production was N481882.50, while the total variable coast was N372, 000 giving a gross margin of N109882.50 with the net farm income of N107136.10. Cost of raw milk (t = 5.460), cost of packing (t = 5.190) and the number of lactating cows (t = 6.230) had a positive influence on gross margin of cheese producers and was significant at 1% level. Similarly, cheese production experience and cost of preservative were positive and significant at 5% and 10% level, respectively. In conclusion, cheese production was profitable in the study area but the producers should adopt modern technology in producing cheese to meet the international standard to enhance the gross margin profit.

Keywords: Cheese production, Cheese preservation, Gross margin

INTRODUCTION

Animals are used as food either directly or indirectly, mostly after processing. Animal foods include milk, which is obtained from the mammary glands of mammals, e.g. cow milk, which in many cultures is drunk or processed into various other dairy products (Curry, 2013). Milk is an essential part of the daily diet for growing children and expectant mothers. Milk is a major constituent of the diet; its quality assurance is considered essential to the welfare of a community (Marimuthu, Sankar, Sathish, Vivek and Mohan Raj, 2013). Milk is defined as lacteal secretion, practically free from colostrum obtained by the complete milking of healthy cows. Milk that is in the final form for beverage use should be pasteurized, and should not contain less than 8.25% milk solids –not – fat and not less than 3.25% milkfat (Ocansey, 2010).

It can also be defined as a white fluid secreted by the mammary glands of female mammals for the nourishment of their young and consists of minute globules of fat suspended in a solution of casein, albumin, milk sugar and inorganic salts (Douglas, 2007). Milk is an excellent source of all nutrients except iron and ascorbate (Ukwuru, Ibeneme and Agbo, 2011). It is one of the main products in the most pastoral system in Africa, yet the contribution of dairying to pastoral economics is often overlooked (Kerven, 1986). Milk consumption in Nigeria has taken the form of addition of small amounts of concentrated milk products such as evaporated milk or milk powder to breakfast cereals, porridge, cocoa beverages, tea and coffee (Nsofor, and Anyanwu, 1992).

The White Fulani or Banaji cattle were reported as the leading triple purpose (meat, milk and draught) breed in West Africa (Belewu, 2006). They also play an important role in the religion and social lives of the people. They serve as a reserve of family wealth and as a mark of respectability and status in the community. Cattle are well known to be the major source of milk worldwide, however, the milk production by local cattle breeds in Nigeria have been reported to be low due to the poor quality and insufficient feeds and feedstuffs especially during the dry season (Olafadehan and Adewumi, 2010).

In Nigeria, milk production is mainly done by the Fulani nomadic people who are pastoralists involved in the rearing of cattle moving from one location to another in search of green pasture. Due to lack of refrigeration facilities, the Fulani women process the surplus fresh milk into a soft, unripened cheese called "warankasi" or "wara" in short term (Adetunji and Babalobi, 2011). Cheese is a concentrated dairy commodity produced by acid or rennet coagulation or curdling

of milk, stirring and heating the curd, draining off the whey, collecting and pressing the curd. The cheese is ripened, cured, or aged to develop flavour and texture (Raheem and Saris, 2009). Cheese is a dairy product made from pressed milk curds produced mainly from animal milk throughout the world where animal production is available. Different types of cheese are made from unripened (fresh) or ripened (aged) cheese (Huth, DiRienzo, Miller, 2006).

Cheese is a nutritious food and one of the numerous products from the processing of milk of cows, goats, sheep, buffalos, camels and yaks. It is produced by coagulation of the milk protein known as casein (Akinloye, and Adewumi, 2014). Cheese is an important milk product with milk nutrients having good storage properties with increased shelf life. It is traditionally produced to preserve the nutrients of milk. It is said to be the product of the selective concentration of milk (Parihar and Parihar, 2008).

Commercial milk coagulants exist but their cost is a limiting factor in poor rural households in Africa making cheap alternatives attractive. However, there are needs for caution to ensure that the latter's use does not introduce health risks to the consumers. Use of *Calotropis procera* leaves in making fresh cheese from fresh milk was first reported among the Fulani pastoralists (Abakar, 2012).

Despite the traditional method employed in the production of cheese, the small quantities of cheese produced appear to be a valuable food and source of protein particularly among the Fulani where it serves as a means of livelihood (Akintunde, Bisi-Johnson. OBesong, Enwe, Okoli Uaboegbenni, 2010). Available empirical studies in Nigeria on dairy production issues associated with milk production are mostly descriptive analysis and ordinary least square regression model; concentration has been on the production of milk, yoghurt and other dairy products with few on Cheese production. (Akintunde, Bisi-Johnson, OBesong, Enwe, Okoli Uaboegbenni, 2010; Adetunji and Babalola, 2011and Ocansey, 2010). However, none of these studies has taken into account the effects of constraints on cheese production among Fulani women. Therefore, this study contributes to the literature on production and gross margin analysis of Cheese production in Olaoluwa local government area of Osun state. The specific objectives were to describe the socio-economic characteristic of the cheese producers, identify the constraints to the cheese production and determine the cost and return on cheese production in Ola-Oluwa Local Government Area, Osun State, Nigeria

METHODOLOGY

The study area is Ola Oluwa Local Government (LGA) of Osun State, Nigeria. The headquarter of Ola Oluwa. LGA is Bode Osi and the LGA is made up of several towns and villages including Ikire Ile, Iwara, Bode Osi, Obamoro, lle Ogo, Asa, Ajagun lase, Ajagba, Ogbaagbaa and Telemu. The estimated population of Ola Oluwa LGA is about 103,600 as at the year 2006 census with the area mostly populated by members of the Yoruba ethnic group. The agrarian local government is also occupied by Fulani, Ebira and Igbo ethnic groups. (Wikipedia, 2018). Farming is the major economic activity in Ola Oluwa LGA with crops such as cocoa cashew, and rice is grown in the area. Other important enterprises of the people of Ola Oluwa LGA include animal rearing and craftsmanship (Wikipedia, 2018).

A two-stage sampling procedure was used to select 120 respondents for the study. In the first stage, cluster sampling was used to select 10 communities where there is a concentration of cheese producers in the study area. The second stage involved the selection of 12 Fulani women per community using snowballing sampling technique and a total of 120 women were sampled.

Primary data were obtained through field survey with a well-designed questionnaire for this study. The questionnaire was designed in English language and was interpreted in orally into the Yoruba language to elicit information from the respondents.

The data collected were analyzed with descriptive statistics and inferential statistics. The descriptive statistics that were used in this study include means, frequency counts and percentages. The inferential statistics used was multiple regression analysis.

Profitability index was determined using two measures of profitability analysis to determine the profitability of cheese production, these include: Cost and Return Analysis and Gross Margin (GM)

Benefit Cost Ratio (BCR) = Total Revenue (Benefit) ÷ Total cost.

The budgetary analytical approach was used to estimate cost and return in cheese production to know the net profit of cheese producers.

Profit = Total Revenue - Total variable cost

Mathematically, π= TR-TFC+TVC

Where π denotes profit: TR is Total Revenue (amount realized from the enterprise); TFC is a total fixed cost (expenditure incurred on fixed assets used in production equipment e.g., pot, bowl, conical basket etc.) and TVC is the total variable cost (cost of milk, cost of transportation, cost of coagulation etc.).

The Gross margin (GM) equation is given as: GM= TR – TVC = P x Q - TVC. Where: GM= Gross margin (in Naira), Q= Quantity of milk processed to cheese process (Liters/pieces), P= price of cheese (in Naira).

The implicit model used for the study is expressed as;
$Y= f(X_1+X_2+X_3+X_4+X_5+X_6+X_7+X_8+et)$
Where;
Y= Gross margin of cheese production in Naira (N)
X_1= Cost of raw milk in Naira
X_2= Cost of coagulant in Naira
X_3= Cost of packaging in Naira
X_4= Cost of lagidi in Naira
X_5= Cost of preservative in Naira
X_6= Cost of transportation in Naira
X_7= Number of lactating cows
X_8= Cheese production experience
X_9= Error term

RESULT AND DISCUSSION

Socioeconomic characteristics

Table 1 shows that the majority (40.8%) of the cheese producers were in the age range of 41 and 50 years, while 37.6 % of the respondents were between the age of 31 and 40. The mean age of cheese producers in the area of study was 38.0±77 years. This implies that cheese producers are still active and productive. This finding supports the research of (Habibu, 2016), that majority of cheese producer is between the age of 41 and 50. All the respondents were female indicating that cheese production is a female-dominated, while their husbands were cattle rearers. Almost all (95.0%) of the cheese producers were married, very few (3.3%) were widowed, and (1.7%) were single. This implies that the majority of the cheese producers in the study area were married and have responsibilities.

The majority (65.0%) of the cheese producers had a family size between 4 and 6 persons, 27.5% had a family size between 7 and 9 persons. The average family size of the cheese producers was 6.0±1.4 persons. This implies that on the average, there is an appreciable number of family labour that may be giving helping hand in cheese production. This is in agreement with Osotimehin *et al*., (2006) when he reported that nomads had over six household members.

More than half (53.3%) of the respondents had no formal education, while 32.5% had between 1 and 6 years, 12.5% of the cheese producers had between 7 and 12 years, while 1.67 percent had above 12 years. The average years of formal education were 3.0±4.4. Muhammed et al., (2009) noted that the level of education is expected to influence farmers' adoption of agricultural innovations and decision on various aspects of farming. This development had greatly hampered their adoption of modern technology in producing cheese

Most (93.3%) of the cheese producers had cheese production as their primary occupation and very few (6.7%) were farmers. It can be concluded that the primary occupation of Fulani women in the study area is cheese production.

Some (39.17%) of the cheese producers had between 18 and 27 years, and between 28 and 37 of cheese production experience. The mean years of cheese production experience were 25.0±7.8 years. This shows that most of the cheese producers had been into production for quite some time. This is in tandem with the submission of Lawal and Adedeji (2013).

The size of the herd is traditionally considered as a measure of wealth and social status among the nomads (Ngetha, 2000 and Ogundiwin, 1978); the larger the size of the herd of a nomad, the greater the security such an individual enjoys. The majority (54.2%) of the cheese producers had between 41 and 80 herds of cattle, while very few (1.6%) had above 120. The means herd size is 51.0±25.0 cattle. Furthermore, the majority (64.1%) of the cheese producers had between 3 and 6 lactating cows. This implies that most of the cheese producers have an appreciable cow in which milk can be drawn from. This result conforms with Zekeri and Mukhtar (2015) that the majority of cheese producers were having a minimum of three lactating cows and a maximum of six lactating cows per household.

TABLE 1: Distribution of cheese producers according to their socio-economic characteristics (n = 120)

Socioeconomic characteristics	Frequency	Percentage
Age		
21-30	23	19.1
31-40	45	37.6
41-50	49	40.8
51-60	3	2.5
Mean = 38, STD 7.7 years		
Gender		
Male	0	0
Female	120	100
Marital Status		
Single	2	1.7
Married	114	95
Widow	4	3.3
Household Size		
1 - 3	7	5.8
4 – 6	78	65
7 – 9	33	27.5
≥10	2	1.7
Year of Education		
No formal education	64	53.3
1 – 6	39	32.5
7 – 12	15	12.5
>12	2	1.67
Primary Occupation		
Cheese production	103	88.3
Farming	4	3.3
Trading	8	6.7
Artisan	2	1.7
Farming Experience		
7-17	23	19.16
18-27	47	39.17
28-37	47	39.17
38-47	3	2.5
Herd Size		
1-40	44	36.7
41-80	65	54.2
81-120	9	7.5
Number of Milking Cows		
3 - 6	77	64.2
7 - 10	35	29.2
11 -14	8	6.6
>120	2	1.6

Source: Field Survey, 2019

Constraint to cheese production

Table 2 shows that the major constraints confronting cheese producers in the study area in descending order are inadequate funding (85.8%) ranked 1st, distance to market (68.3%) ranked 2nd, farmer/herders' conflicts (65.0%) ranked 3rd and insufficient fodder (56.7%) ranked 4th while lack of formal education and poor record-keeping (13.3%) ranked 10th, lack of improved breeds (12.5%) ranked 11th and lack of extension services (4.2%) ranked 12th was the least constraint to cheese producers in the study area. This indicates that education is not an important prerequisite for cheese production in the study area. This may be one of the reasons why the Fulani herders are not educated.

Table 2: Constraints to cheese production (n = 120)

Constraints	Frequency	Percentage%	Ranking
Inadequate funding	103	85.8	1st
Distance to market	82	68.3	2nd
Farmer/Herder conflicts	78	65.0	3rd
Insufficient fodder	68	56.7	4th
Low breed dairy cattle	63	52.5	5th
Non-accessibility to drugs for cows	34	28.3	6th
Processing and preservation facilities	33	27.5	7th
Low milk production of indigenous cattle	29	24.2	8th
Poor market	18	15.0	9th
Lack of formal education	16	13.3	10th
Poor record-keeping	16	13.3	10th
Lack of improved breeds	15	12.5	11th
Lack of extension services	5	4.2	12th

Source: Field Survey, 2019
***Multiple answer choices**

Cost and return on cheese production

Budgetary analysis in Table 3 reveals that the depreciation on the fixed asset was ₦2,746.40 while the total variable cost was ₦372,000.00, and the total revenue was ₦481,882.50. The result further reveals that the average net income of the cheese producer was ₦107,136.10 per annum on cheese production. The results show that cheese production was a profitable venture in the study area.

Table 3: Costs and Returns Analysis for cheese production

S/N	Item	Amount	Scale
A	Revenue (TR)	481,882.50	
B	Variable Cost		% of TVC
	Cost of raw milk	175,230.00	47.11
	Cost of coagulant	14,460.00	3.89
	Cost of packaging	47,550.00	12.78
	Cost of preservative	50,610.00	13.60
	Cost of transportation	76,200.00	20.48
	Cost of lagidi	7,950.00	2.14
C	Total variable cost (TVC)	372,000.00	100
D	Gross margin (TR-TVC)	109,882.50	
E	Fixed cost		
	Depreciation on the fixed cost	2,746.40	
F	Total production cost	374,746.40	
G	Net cheese processing income	107,136.10	

Source: Field Survey, 2019

The result of the Regression analysis in Table 3 shows that R-squared was 80.4% indicating that the variation in cheese production in the study area is explained by the independent variables in the model and the F-value (65.73) was significant at 1% level, showing that the model has a good fit.

The coefficients of the cost of raw milk (X_1), cost of packaging (X_3) and the number of lactating cows (X_7) were positive and significant at 1% level. This implies that these variables are positively related to the level of gross margin from cheese production in the study area.

Similarly, the cheese production experience (X_8) and cost of preservative (X_5) were positive and significant at 5% and 10% level, respectively; a direct relationship between these variables and the level of gross margin from cheese production in the study area.

Table 4: Results of Regression Analysis showing linear relationship between level of cheese production and gross margin of production

Variables	Coefficient	Standard error	t-value	Probability
Cost of raw milk (X_1)	0.514	0.094	5.460	0.000*
Cost of coagulant (X_2)	0.540	0.845	0.640	0.524
Cost of packaging (X_3)	2.821	0.543	5.190	0.000*
Cost of lagidi (X_4)	-0.829	0.748	-1.110	0.270
Cost of preservative (X_5)	3.722	2.063	1.800	0.074***
Cost of transportation (X_6)	-1.662	0.349	-4.760	0.000*
Number of lactating cows (X_7)	2488.483	399.121	6.230	0.000*
Cheese production experience (X_8)	149.836	71.824	2.090	0.039**
Constant	3160.854	7055.767	0.450	0.655

R-squared = 0.804, Adj R-squared = 0.729, F value = 65.730
***significant at 1% level, **significant at 5% level, ***significant at 10% level**
Source: Field Survey, 2019

CONCLUSION AND RECOMMENDATION

In conclusion, the mean age of the cheese producers was 38 years, all-female, married with a household size between 4 and 6 people and had no formal education. The main constraint to cheese production is inadequate funding, distance to market, farmers/herders' conflict, insufficient folder. The net profit income from cheese production is N107,136.10. Cost of raw milk (t = 5.460), cost of packing (t = 5.190) and the number of lactating cows (t = 6.230) had a positive influence on gross margin of cheese producers and was significant at 1% level. Therefore, the government should provide a conducive grazing environment and financial assistance for producers of cheese to acquire modern milking technology. Top breed dairy cows should be imported to Nigeria to enhance the net profit of cheese producers, Cheese producers should initiate the modern way of packaging their products to meet the international standard to improve on the net profit.

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