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ANALYSIS OF COSTS AND RETURN TO SMALL SCALE DAIRY PRODUCERS AND MARKETING IN IGABI LOCAL GOVERNMENT AREA, KADUNA STATE, NIGERIA

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ABSTRACT

The study aimed at providing information on profitability of dairy product processing among small scale producers and marketers in Igabi Local Government Area, Kaduna State, Nigeria. Data were collected using well structured questionnaire with the aid of trained enumerators under the guidance of the researcher. Multistage random sampling technique was used in selecting 100 respondents (50 dairy producers and 50 dairy marketers). Descriptive statistics, Net Processing Income and Marketing Efficiency were used to analyse the data collected. The study revealed that majority (32%) of the producers were adult farmers (51-60 years) who were married (86%). Majority (66%) have no formal education. Household size ranged from 1-10 persons constituting the majority (58%) with 98% female producing an average of 5.9 litres of milk per household from mean of four lactating cows per household. The study also revealed that the dairy marketers were middle aged farmers (31-40 years). Forty – four percent were married (78%) and the majority (86%) have no western education with (88%) female. An average processor realized Net Income of N92.51 per litre, hence dairy products processing was profitable in the study area. An average marketer at rural and urban market had a marketing efficiency of 101.1% and 103.4% respectively which implied that the market was efficient. Problems identified by dairy product producers included grazing route (56%), diseases (50%), water sources (36%) and bush burning (30%) while the problems identified by the marketers of dairy products included high cost of transportation (46%), marketing outlet (38%) and poor consumer price (28%). It was recommended that Government should make extension workers available to the study area to change the orientation of the nomads such that they will be willing to imbibe improved production and processing techniques.

Keywords: Profitability; dairy products; socio-economic; Small scale farmers, marketers, constraints

INTRODUCTION

One of the major food problems in Nigeria is the gross deficiency in protein intake, both in quantity and quality. The low protein intake has been responsible for reduced human productivity with high incidence of in-

fant mortality, severe malnutrition and general weakening of human body which predispose people to diseases, low health status, and shorter lifespan (Mbanasor, 2002). For instance, the average consumption of animal protein per day is lower than the minimum 35 grams recommended by the Food and Agriculture Organisation (FAO) for daily maintenance of the health of the population (Bincan 1990). Country specific analysis of FAO data for 1988-1990 also found that Nigeria was among the list of countries whose fat-to-energy ratio (FER) fell below the minimum recommendation of 15% dietary energy supply from animal fat (FAO, 1994). Dairy products provide the most important amino acid required for body building as well as tissues repairs in human beings. Animal protein equally supplies its own level of energy required for daily activities. It is also essential for the synthesis of certain hormones, enzymes and body products in both man and animals. Nigerians have been observed to consume more of plant protein, which has been found to be of lower quality than animal protein (Osotimehin *et al*., 2006).

Dairy products for human consumption and for the manufacturing of milk, cheese butter e.t.c. are obtained from many domestic livestock. About 90% of the total worlds milk supply comes from domestic cattle. Dairy products in developing countries hardly meet the demand of the increasing population. Consequently, they are the most important source of domestic milk in Nigeria (Yahuza, 2001). This is because of low production as a result of unimproved genetic stock, and poor animal husbandry practice and poor nutritional state of the dairy animals. Development of dairying is more difficult in Africa than elsewhere because the constraints and problems faced in Africa are more severe. However, there are potentials and opportunities for dairy development in some areas and the economic climate is currently much more conducive to indigenous production than it was in the past (Hans, 1990). The dairy industry provides a means of livelihood for a significant proportion of rural pastoral families in the sub-humid and semi-arid ecological zones of Nigeria.. Nigeria has 15.2 million cattle, 28 million goats and 23 million sheep (FAO, 2006).

Local milk production in Nigeria is mainly from indigenous cattle breeds which are kept primarily by about 6 million pastoralist tribesmen most of whom are Fulani. Over 95% of the approximately 13 million heads of cattle in Nigeria are indigenous breeds. Average milk production per cow is about 0.74 litres per day, ranging from 1.27 litres during the wet season to 0.36 liters during the dry season, resulting in an estimated local milk production of roughly 450,000 t per annum (Hans, 1990). Organized, non-traditional milk production and processing, is undertaken by state governments through parastatal or limited-liability companies. However, organized milk processing under government control is very limited in both absolute and utilized capacity, despite a whole series of attempts to re-establish milk-collection Centres during the 1970s and 1980s. Milk production under modern intensive and semi-intensive systems in Nigeria contributes only about 3% of the national output of milk. In addition to government-owned dairy plants private dairy firms have sprung up over the years. However, virtually all the dairy firms in Nigeria have either shut down or are having serious problems (Hans, 1990).

Nevertheless, the principal limiting factors to breeding for increased dairy production in

the tropics continued to be disease and nutrition: largely due to inadequate feeding, slow growth of cattle in the tropics. , mature late, have long calving intervals and high susceptibility to disease (Ojo, 1990).

Lack of organized system of collecting, processing and marketing of dairy products constitute a major problem in the study area. Poor milk collection system, including low producer prices, and partly due to the segregated nature of the urban market, up to 90% of the fresh milk produced by the Fulani herds men do not find its way to milk processing plants. Consequently, the markets for traditionally produced (Fulani) fresh milk are localized. Surplus milk either sold directly to consumers as fresh milk in markets near the source of production or converted into butter or sour milk or clarified butter or ghee. Since liquid, wholesome milk is unstable under heat, delays render it insipid and unsalable. Pastoralists do not refrigerate or preserve their milk; therefore, the shelf-life of fresh milk is short, usually less than three hours. This situation makes most women walk several kilometres on foot the to next town in search for market for milk and its products. In the milk marketing, it may spell the difference between business success and business failure and this also raises questions about the economic viability (profitability) of dairy production among the nomads. For these reasons the economic performance of domestic dairy production in the study area has been very poor.

Furthermore the local cow genotype (*Bos indicus*) that contributes about sixty-five percent of the milk is multipurpose. Yielding only about 0.7 litres per day, the local breeds are not, therefore, good milkers. Genetic improvement of the local breeds relies on natural cross- breeding. High calf mortality (20-25 percent) and long calving interval (20-26 months), slow maturation, and low productivity of the local breeds of cattle add to these problems (World Bank, 1993).
Therefore this research will enhance the understanding of the problems of production and profitability of dairy products marketing in Igabi local government area.

MATERIALS AND METHODS

Study Area

The study was carried out in Igabi local government area of Kaduna state. The study area is located in the northern part of Nigeria between latitude 09^0 02' N, 11^0 33' N and longitude 06^0 10' E and 08^0 50' E'. Igabi covers 2,336 km^2 and has a population of 430,229 person. The male population is 219,269, while the female population is 210,960 (KDSG, 2006). Igabi local government area has two distinct seasons, the dry season and the rainy season. The study area experiences high temperature all year round, which is a characteristic of the tropics. The mean daily temperature in the area can be as high as 34°C between months of March and May. Temperature could be as low as 20°C during the December to January. This low temperature is intensified by humidity due to the dry harmattan wind. .From November to February the cold dry harmattan wind blows across the area (KDSG, 2006). The local government area is located in the Sudan savannah which covers both the eastern and western part with prevailing vegetation of short trees is sparsely distributed. The plants here are drought resistant. A common tree here is the baobab which in appearance resembles an oak tree. Also found are acacia trees. (KDSG, 2006). The primary occupation of the people is farming. Livestock keeping is a common activity in most households in the area ranging from poultry, cow,

goat, sheep and ram. The semi intensive and intensive livestock management systems are common while the extensive is rare. Igabi local government is an agrarian based economic with agriculture as its major economic activity which serves the bedrock of other activities. These activities include food and cash crop production, livestock rearing, poultry trading and crafts making. The major system of farming practiced is the subsistence farming by peasant farmers with few people who invested in commercial farming who produces large quantity of agricultural products. A little dry season farming is practiced in the area by people living close to the rivers in the study area. Tomatoes, pepper, vegetables, onions, okro and sugar-cane are grown in the Fadama areas. Animal rearing is also an important occupation which is carried out in form of subsistence mixed farming apart from the Fulani in the area that depend largely on cattle rearing. These animals supplies organic manure to farm lands, provide income and also are used for consumption. Animals such as cattle, goats, pigs, sheep and poultry are predominant animals reared in the area. Trading activities also form another vital occupation that combines both agricultural and non-agricultural commodities made from crafts. (KDSG, 2006).

Sampling Techniques

Five villages were purposively selected from Igabi local government area due to intensive nature of dairy production and marketing. The selected villages included Rigachukun, Rigasa, Sabon birni, Afaka and Dankande. Estimated 100 dairy producers and 100 marketers households were identified out of which, in each household, one producer and one marketer respectively were randomly selected to give 50 dairy producers and 50 dairy marketers mostly women selected for this study.

Method of Data Collection

Data were collected using structured questionnaire. Detailed information was collected on production, use and marketing of milk butter and cheese. Respondents provided information on sales, locations and price received for their products.

Tools of Analysis

Descriptive statistics was used to achieve the socio-economic characteristics of producers of dairy products and marketers, organization of dairy products marketing and basic problems and solutions to dairy products production and marketing. Net Income was used to achieve the costs and return to dairy products processing while Marketing Efficiency (ME) was used to determine the performance evaluation of the marketing.

Net Income (NI)

Net Income (NI) was used to analyze and provide information of cost and returns of processing activities, which is profitability in processing dairy products.

NI=GR-TC
Where:
NI= Net Income
GR= Gross Revenue (which is obtained by multiplying total output from dairy product by unit price of the output per litre).
TC= Total Costs of processing per litre
TC = TVC+ TFC
Where:
TVC= Total Variable Cost (which includes cost of fresh milk/ litre, fuel wood, transportation).
TFC= Total Fixed Cost (which include cost of calabash, pots and spoons) (Olukosi, *et. al*., 2006)

Marketing efficiency:

Marketing efficiency is the maximization of ratio of input to output. (Olukosi *et al*., 2005). It is the most frequently used method of measuring the market performance. It is determined using.

$$ME = \frac{V}{C} X\ 100$$

Where ME= Marketing Efficiency

V= Value added by marketing = price received by marketers for the sales of the product in (Naira) - price paid by marketers for purchase of product

C= Cost of marketing = cost in (Naira) of transportation, market levy, cost of loading and offloading.

Decision rule: If ME is equal to or greater than 100%, the market is efficient.

But if ME is less than 100%, the market is not efficient. (Olukosi *et al*., 2005).

RESULTS AND DISCUSSION

Socio economic characteristics of dairy producers

The socio-economic characteristics of dairy producers in the study were summarized in Table 1. These include distribution according to age of dairy producers, marital status, level of education, average household size and scale of production. Distribution of respondents according to age revealed that majority of the respondents age is between the range of 51-60 consisting 32%, 20-30 range constitute 24% of the respondents, 41 -50 range constitute 18% of the respondent. The relatively low percentage of cattle herders in the age bracket of 61 – 70 years and 20 – 30 years 16% and 10% respectively indicate that cattle production is unattractive to both elderly and youths. This may be due to the strenuous nature of cattle herding since herders have to move from place to place. This work tallies with the findings of Osotimehin *et al*. (2006) who reported that majority (55%) of his respondents are within the age bracket of 40-60 years. Distribution of respondents according to marital status also showed that 86% of the respondents were married while 14% of the respondents were single. This may be due to the importance of marriage in any society. Distribution of respondents according to level of education shows that majority of the respondents have neither formal nor religious education which constitute 66%, then 22% of the respondents have koranic education, while 8% and 4% of the respondents undergo adult literacy and secondary education respectively. One of the limiting factors in dairy production is the low literacy level of the nomad which hinders their rate of adoption of improved technology in cattle production and milk processing. This result agrees with Osotimehin *et al*. (2006) who reported that all the sampled nomads had no western education. One of the major factors limiting the productivity of operators in the small scale dairy enterprise was their low literacy level, which might make it difficult for them to fully appreciate the need to adopt improved milk processing and handling techniques (Igwe, 2002). Since education is of great importance to agricultural development, the Nigerian government has been making frantic efforts to reduce the high illiteracy level prevalent among the nomads. One of such efforts is the establishment of the Nomadic Education Programme to cater for the educational needs of these important pastoralists. Distribution of respondents according to family size reveals that majority of the respondents house hold size is in the range of 1-10 persons constituting 66%, 11-20 range consisting 32% of the respondents, then 31-40 and 23-30 range constitute 4% of the respondents each while 40 and above range constitute 2% of the respondent. This

may be due to polygamous marriage of the respondents. This is in agreement with Osotimehin *et al*. (2006) revealed that majority (57 %) of the nomads had over six members. The bulk of the labour input in the small scale dairy processing enterprise is supplied by family labour. The availability of labour is therefore directly related to the family size (Osotimehin *et al*., 2006). Majority (98%) of the dairy producers are female while only 2% are male. All (100%) of dairy producers operate at small scale level. The result from Table 2 revealed that producers were having minimum of three lactating cows and maximum of six lactating cows per household and were producing an average of 5.9 litres of milk daily of which an average of 0.49 litre was consumed and 5.41 litres were marketed daily.

Table 1: Socio-economic characteristics of the dairy producers (n=50)

Variables	Frequency	Percentage
Age		
20-30	12	24
31-40	8	16
41-50	9	18
51-60	16	32
61-70	5	10
Marital status		
Single	7	14
Married	43	86
Level of education		
Primary	-	-
Secondary	2	4
Post secondary	-	-
Adult literacy	4	8
Koranic	11	22
No western nor religious	33	66
Household size		
1-10	29	58
11-20	16	32
21-30	2	4
31-40	2	4
>40	1	2
Sex		
Male	1	2
Female	49	98
Scale of production		
Small scale producers	50	100
Large scale producers	-	-

Field survey, 2009

Table 2: Average lactating cows daily milk production, quantity of milk consumed and marketed per household

Variables	Minimum	Maximum	Mean
Lactating cows (Numbers)	3	6	4
Daily milk production(Litres)	3.23	7.15	5.96
Quantity of milk consumed (litres)	0.25	0.37	0.49
Quantity of milk marketed (litres)	3.12	7.18	5.41

Field survey, 2009

Socio Economic Characteristics of Dairy Marketers

The socio-economic characteristics of dairy marketers in the study area were summarized in Table 3. These include distribution according to age of dairy marketers; marital status and level of education .Distribution of respondents according to age shows that 44% of the respondents were in the age range of 31-40, 38% of the respondents were in the age range of 20-30, while 18% of the respondents were in the age range of 41-50. Distribution of respondents according to marital status reveals that 78% of the respondents were married, while 22% of the respondents were single. Distribution of respondents according to educational status shows that 66% of the respondents had neither formal nor religious education which constitutes the majority, while 22% of the respondent had koranic education. Low literacy level of the marketers makes them not to fully appreciate the need to adopt improved milk processing and handling techniques. Majority (88%) of the marketers are female while 12% are male.

Table 3: Socio-economic characteristics of dairy marketers (n=50)

Variables	**Frequency**	**Percentage**
Age		
20-30	19	38
31-40	22	44
41-50	9	18
Marital status		
Single	11	22
Married	39	78
Level of education		
Primary		
Secondary		
Post secondary		
Adult literacy		
Koranic	7	14
No western nor religious	43	86
Sex		
Male	6	12
Female	44	88

Field survey, 2009

Organization of Dairy Product Marketing

The organizations of dairy product marketing in the study were summarized in Table 4. These include distribution according to method of processing dairy product, method of preserving, method of transportation, location of sale and milk condition before sale.

Distribution of respondent according to method of processing dairy product shows that 58% of the respondent processed dairy products through sieving, boiling and fermentation method, while 42% processed dairy products through sieving, stirring, and fermentation method. Improved processing technique could be more efficient. Distribution of respondent according to method of preservation reveals that all the respondents (100%) preserves dairy product using calabash which is a traditional method. This may be due to readily availability and cheapness of the calabash at cheaper rate compared to the cold storage which is more costly and requires source of power such as electricity for it to function. Adoption of improved storage such as cold storage facility could improve the shelf life of dairy products. Because if dairy products is preserved using calabash, the maximum shelf life is 3 days, but if preserved in cold storage with constant source of power can last for one month Distribution of respondent according to method of transportation shows that 76% of the respondent transport dairy product on foot, then 16% of the respondent used both motorcycles and cars which was served by all the villages as means of transportation, while 8% of the respondent used both foot, motorcycles and cars. The result from Table 5 shows that the average distance of transportation by respondents was 10 km. One of the major limiting factors in dairy marketing is cost of transportation which makes nomads to trek from far distance to the market. Distribution of respondent according to location of sale shows that 63% of the respondent choose village such as Rigachukun, Afaka and Dankande the location of sale, while 37% of the respondent choose urban centre as the location sale such as Rigasa and Sabon birni. Distribution of respondent according to milk condition before sale shows that 88% of the respondents sell their milk product fermented, while 12% of the respondents sell their milk product fresh.

Net Income

In order for any entrepreneur in the agricultural sector to make any meaningful progress in what he embarks upon, certain indicators have to be observed to show the performance either in terms of success or otherwise of the venture. Therefore, Net Income was used to analyze the data collected on costs and returns in small scale dairy product processing in the study area. The distribution of costs and returns in dairy product processing per litre is presented in Table 6. Information on the costs of processing dairy product by the respondents per litre presented in Table 6 revealed that the average cost of processing incurred per litre was N 112.99 per litre. The total variable costs dominated the processing costs accounting for 82.4% while the total fixed costs constituted 17.6% of the processing costs. This implies that who want to be cost efficient have to reduce total variable cost, especially the cost of fresh milk that is (33.3%) of the total cost. The Gross Revenue was N 205.00 per litre and a confirmation of profitability of dairy product processing is shown by a Net Income of N 92.51 per litre. This implies that small- scale dairy product processing in the study area is profitable although the full potential of the enterprise is yet to be maximized. This is in agree-

ment with the findings of Osotimehin *et al*. (2006) who discovered a net income of N7, 918.00 per milk processor per month in Ijumi Local Government Area of Kogi state which was also profitable.

Table 4: Organization of dairy marketing (n=50)

Variables	Frequency	Percentage
Method of processing dairy products		
Sieving, boiling, fermentation	21	42
Sieving, stirring, and fermentation	29	58
Method of preservation		
Cold storage	-	-
Calabash storage	50	100
Others	-	-
Method of transportation		
Trekking	38	76
Vehicles	8	16
Both	4	8
Location of sale		
Urban center	6	37
Village	44	63
Milk condition before sale		
Fresh	6	12
Fermentation	44	88

Field survey, 2009

Table 5: Average distance of transportation by marketers

Transportation	Minimum	Maximum	Mean
Distance (Km)	7	13	10

Field survey, 2009

Marketing Efficiency for processed fresh milk

The result as presented in Table 7 shows that the purchase price and total marketing cost of processed fresh milk from rural markets was N204.20 and N 57.36 which resulted in a marketing efficiency of 101.1%. However while for urban markets as shown in Table 8, the purchase price and total marketing cost of processed fresh milk was N206.10 and N 64.06 which resulted in a marketing efficiency of 103.4%. This implied that the marketing is efficient of processed fresh milk in the study area, but that of the urban market was higher than that of the rural market.

Table 6: Summary of costs and returns in dairy processing per litre

S/N	Items	Value(N/Litre)	Percentage
	Cost Component		
	Variable Cost		
I	Cost of fresh milk	37.64	33.3
Ii	Cost of fuel wood	2.67	2.4
Iii	Cost of transportation	52.8	46.7
	Total Variable Cost (TVC)	93.11	82.4
	Fixed Costs		
Iv	Depreciation on calabash (big)	9.74	8.6
V	Depreciation on calabash (small)	4.20	3.7
Vi	Depreciation on pots	4.50	4.0
vii	Depreciation on spoons	1.44	1.3
	Total fixed cost (TFC)	19.88	17.6
	Total cost (TC) = (TVC + TFC)	112.99	100
	Revenue Component		
Viii	Sales from nono	120.50	
Ix	Sales from maishanu	70.00	
x	Sales from cheese	15.00	
	Gross Revenue (GR)	205.50	
	Net Income (NI)	92.51	

Source: Field Survey, 2009.

Table 7: Marketing Cost and Efficiency of Processed Milk per Litre in Rural markets

Components	Cost (N/ Litre)	%TMC	%TC
Purchase price of products (Nono, maishanu and cheese)	204.2	-	78.1
Transport for marketing of product	48.22	84.1	18.4
Haulage (loading and uploading)	4.23	7.4	1.6
Market levy	4.91	8.6	1.9
Total Marketing Cost (TMC)	57.36	100%	
Total Cost (TC)	261.56		100%
Sales of the product (Nono, maishanu and cheese)	262.19		
Marketing efficiency (%)	101.1		

Source: Field survey Data, 2009

Table 8: Marketing Cost and Efficiency of Processed Milk per Litre in Urban markets

Components	Cost (N/ Litre)	%TMC	%TC
Purchase price of products (Nono, maishanu and cheese)	206.10	-	76.3
Transport for marketing of product	53.28	83.2	19.7
Haulage (loading and uploading)	5.36	8.4	2.0
Market levy	5.42	8.5	2.0
Total Marketing Cost (TMC)	64.06	100%	
Total Cost (TC)	270.16		100%
Sales of the product (Nono, maishanu and cheese)	272.35		
Marketing efficiency (%)	103.4		

Problems of Production and Suggested Solutions of Dairy Products

The problems of production of dairy products in the study area include grazing route, diseases, bush burning and water source and the suggested solutions to the problems include government intervention through establishment of new grazing routes, improved veterinary services and construction of dams. Table 9 shows that majority of the respondents 56% identified grazing route as a problem, then 50% of the respondents who identified diseases as a problem, followed by 36% of the respondents identified water source as a problem, while 30% identified bush burning as a problem. This result is in agreement with FAO (2002) that stated that among the problems of dairy milk producers are grazing routes for their livestock and sudden livestock diseases. Result in Table 9 also shows that 56% of the respondents suggested government intervention, 50% of the respondent suggested provision of grazing routes, 36% of the respondents suggested construction of dams, while 30% suggested improved veterinary services.

Table 9: Problems of production of dairy products and suggested solutions to the problems

Problems	Frequency	Percentage	Solutions	Frequency	Percentage
Grazing route	28	56	Government intervention	28	56
Diseases	25	50	Provision of new grazing route	25	50
Bush burning	15	30	Improved veterinary services	15	30
Water source	18	36	Construction of dams	18	36
Total	86*	172*		86*	172*

Source: Field survey, 2009 * multiple response

Problems of Marketing Dairy Products

The distribution of respondents according to problems of marketing are presented in Table 10. These include market outlet, cost of transportation and low consumer price. Result from Table 8 shows that 38% of the respondent identified marketing outlet as a problem, 46% of the respondent identified cost of transportation as a problem, while 28% of the respondent identified poor consumer price as a problem. This finding is in line with FAO (2007) that stated that the problems of marketers of dairy milk are lack of ready market, low milk price by consumers as market constraints.

Table 10: Problems of marketing of dairy products

Problems	Frequency	Percentage
Marketing outlet	19	38
Cost of transportation	23	46
Poor consumer price	14	28
Total	56*	112*

*multiple response, Field survey, 2009

CONCLUSION

This empirical study is on profitability of dairy products processing and marketing among small scale producers and marketers in Igabi Local Government Area, Kaduna State, Nigeria. The study revealed that small - scale dairy producers in the area was mostly carried out by female predominantly practised by adult farmers of which majority of the respondents were married having no formal education and having household size ranging from 1-10 persons. For the dairy marketers, study also revealed that marketing was carried out by female who were middle aged and are still active. Majority of the marketers were married having no formal education. Dairy products processing and marketing was a profitable and efficient enterprise in the study area. An average processor realized Net Income of N92.51 per litre, while the marketers had an efficiency of 101.1% and 103.4% for rural and urban markets respectively. However more returns could be realized by adopting improved processing techniques, and this could be facilitated through well planned educational process because majority of the nomads were not formally educated. In the production aspect the limiting factors continues to be diseases, lack of grazing route, water source and bush burning.

RECOMMENDATIONS

*Government should provide adequate grazing reserves as well as construction of dams which will help in boosting dairy production.

*Government should make extension workers available to the study area to change the orientation of these nomads such that they will be willing to imbibe improved production and processing techniques.

*There should be an effort to providing appropriate technology in dairying.

*The participation of the nomads in the search for better solution of dairy production, processing and marketing is very important, so as to yield a more sustainable improvement

*The government should provide means of accessibility and availability of cold storage for preservation of milk at cheaper price.

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