TEMPORAL PRICING EFFICIENCY IN ONION MARKETING IN NORTHWESTERN NIGERIA

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CITATION: Dogondaji, S.D*., Baba, K.M.and Mohammed, I. (2009)
Temporal Pricing Efficiency In Onion Marketing In Northwestern Nigeria
Int'l Journal of Agric. and Rural Development. 12(1): 100-105

ABSTRACT

The study examined the temporal pricing efficiency for onion marketing in Sokoto and Kebbi States, Northwestern Nigeria. Data on onion retail price variations were collected fortnightly for a period of 12 months (June 2002 to May 2003) from 16 market locations, eight each in Sokoto and Kebbi States. Data on storage cost were collected through the administration of a structured questionnaire to 80 sampled onion traders. The data collected were analysed using simple linear regression analysis. The estimated storage cost was compared with price increase per month, estimated from the regression equation, to reach decision on temporal pricing efficiency. Results of the study revealed that the coefficient of determination R^2 for all the market locations were between 0.602 and 0.973, indicating that the independent variable explained between 60.2% to 97.3% of variations in the dependent variable in the models. Result of the study also revealed that average seasonal price increase per kilogramme per month, was in excess of average storage cost per kilogramme per month. It was, thus concluded that there was no temporal pricing efficiency for onion marketing in the study area.

INTRODUCTION

Onion (*Allium cepa* L.) ranks second in importance after tomato among the vegetables in Nigeria (Hussaini *et al.*, 2000). Commercial production of onion in Nigeria is limited to the Savannah region of the north, where it is grown mainly as a dry season vegetable under irrigation in the *fadama* areas (Inyang, 1966; Ayodele, 1993).

Sokoto and Kebbi States among other northern states are endowed with *fadama* areas (low-lying land near river, stream or pond) where substantial quantities of onion are grown under irrigation during the dry season. The bulk of the onion grown in these states are sold to consumers within and outside the production areas. Onion therefore is an important item of trade between production and non-production areas within the north and between the northern and southern states of the country.Njoku (1994) observed that the quantity of onion available for consumption and the price paid by consumers depend on how efficiently the marketing system for the commodity functions. A striking feature of onion marketing, according to Azucena (1993) is the price fluctuation due primarily to variation in supply and the non-availability of a system for the delivery of market information.Empirical studies on agricultural marketing in Nigeria indicated a considerable variation in prices over space, time and form far in excess of storage costs (Adeyokunnu, 1980). Lack of standardized measures of quantity and quality, and lack of official up-to-date market information were also reported by Adeyokunnu (1980) as some of the observed impediments to effective temporal arbitrating. Ejiga (1981) argued that efforts to satisfy the wishes of consumers with respect to space, form and time are among the vital functions of marketing performed by middlemen. Bressler and King (1970) explained that pricing efficiency studies attempt to appraise the system by comparing actual prices with the ones that are generated by perfectly competitive markets. Lutz *et al.*, (1995) suggested that in a highly competitive system, temporal arbitrage should reduce price differences between markets to the level of storage costs. Under this theoretical construct, according to Ejiga (1988), it is expected that an efficient market will establish prices that are interrelated through time by cost of storage

In Sokoto and Kebbi States, northwestern Nigeria, cultivation of onion in commercial

quantity is limited to the dry season (September / December to April). However, trading in the commodity in the two states is a year round activity. This makes storage of onion an important activity in the study area. It is in view of this, that this paper examined the temporal pricing efficiency in the marketing of onion in northwestern Nigeria. Onion is in focus because of its position as an important vegetable that is widely utilized and the nature of its production which allows for seasonal price variation.

Findings of the study may provide useful information that could be used to improve the marketing of onion in the study area, particularly as it relates to temporal pricing efficiency.

METHODOLOGY

The study covered Sokoto and Kebbi States in northwestern (10°40' 13°55'N, 3°30' 7°06'E) Nigeria (Singh, 2000). The two states have combined population of 4,421,579 (FGN, 1991). The area falls within semi-arid sub Saharan region, where the mean annual rainfall (400 700 mm) is frequently erratic and poorly distributed (Singh, 1995). Farming is the major occupation of the inhabitants of the two states. Onion retail prices were collected fortnightly from eight urban markets and eight rural markets, four each from Sokoto and Kebbi States from June 2002 to May 2003. Urban markets covered were Sokoto, Gada, Goronyo and Bodinga in Sokoto State and Aliero, Jega, Birnin Kebbi and Argungu in Kebbi State. Rural markets were Kware, Wurno, Sabon Birni and Tambuwal in Sokoto State, and Dodoru, Ambursa, Bayawa and Danko in Kebbi State. Market classification into urban and rural markets was based on the classification established by the Sokoto and Kebbi States Agricultural Development Projects. Markets for the study were selected purposively based on the level of onion trading activity and accessibility.

Data used for the analysis were average monthly onion retail price in naira per kilogramme. Seasonal rise was estimated using a regression model of the form:

$$Pt = a + \beta T + u \quad (1)$$

Where Pt = price per kilogramme of onion at time t,

T = time in months starting from the month with the lowest average price.

β = slope parameter estimated

a = intercept

u = error term.

The model was fitted for each of the market locations.

To determine the storage cost, a pre-tested structured questionnaire was administered to 80 onion traders randomly selected from the eight urban markets used for the study. Ten onion traders (five wholesalers and five retailers) were interviewed from each of the eight markets. Thirty nine percent of the traders interviewed stored onion in the year 2002. Data collected were used to estimate onion storage costs for the year 2002 storage season. The estimated storage cost was compared with the price rise per month, estimated from the regression equation (1) to reach a decision on temporal pricing efficiency.Elements of storage costs considered were the cost of storage facilities (storage structures used for more than one year were depreciated using the straight line method), storage losses, handling and transportation costs and interest on money invested by the traders. Ejiga (1981) suggested that interest cost enters storage cost because goods in store is money tied up. Nigeria Agricultural Co-operative and Rural Development Bank charges 8% interest on micro-credit. It was this rate that was used to compute the interest on money invested. Storage cost was estimated in naira per kilogramme per month.

RESULTS AND DISCUSSION

Storage cost

Elements of storage cost were the depreciation on storage facilities that last for more than one year and the cost of construction of storage facilities that are used up in one year. Other cost items considered were handling charges, storage losses incurred and interest on money invested in onion storage. The distribution of cost items in onion storage by respondents is presented in Table 1.

Storage structures that were depreciated include *rudu*, *dabi* and mud houses with thatch or zink roofs. Storage structures that last for only one year and for which the construction cost was used is the *bukka* or *kutubi*. Summing up the cost of construction and depreciation, the average cost of storage structures was estimated at N6,750.50. Average handling cost amounted to N8,989.58 and it includes the cost of transporting the onion from the farm or market to the store, cost of sorting and store arrangement.

Causes of storage losses were rotting,

dehydration and sprouting of stored onion bulbs. Storage losses were valued using the average price per bag of onion at the beginning of the storage season. The interest that would have been generated by the money invested on storage was also counted as a part of storage cost.

The respondents stored between 2,256 67,680 kg of onion for a duration of 3 - 6 months. Average storage cost was N77,015.08 or N3.96/kg/month.

Table 1: Average cost of onion storage among respondents

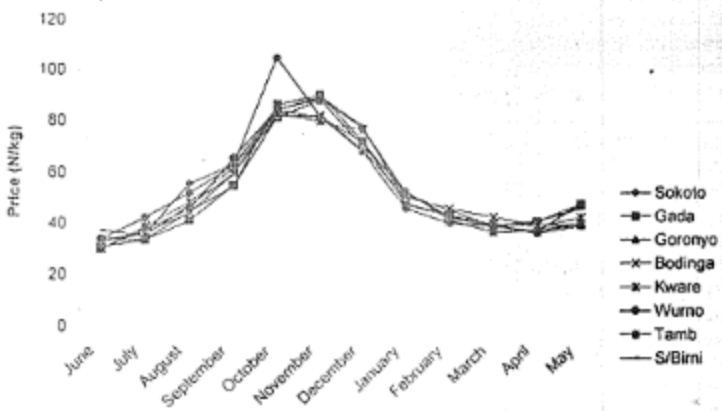
Cost items	Average cost (₦)	% of total
Cost of storage structure/depreciation cost	6,750.50	8.77
Handling cost	8,989.58	11.67
Value of storage losses	36,075.00	46.84
Interest on money invested in onion storage	25,200.00	32.72
Average storage cost	77, 015.08	100.00
Average storage cost per kilogram per month	3.90	

Source: Field Survey 2002/2003

Onion retail price movements

The months of August, September, October and November represents the scarcity period for onion in the study area, as such retail prices are at their peak during this period. Onion retail prices obtained from markets in Sokoto State shows that the least price of N29.87/kg was obtained in June 2002 at kware market (figure1). Price increases were recorded at the various markets studied, with the highest retail price of N105/kg recorded in October 2002 at Tambuwal market.

The trend was the same in Kebbi State. From the eight markets studied, the least price of N 31.05/kg was obtained at Dodoru market in April 2003 (figure 2). This period coincides with the harvest season when retail prices are low. However, one kilogramme of onion sold for as high as N110.00 in Bayawa market in the month of November. The month of November used to be the peak of the scarcity period and harvest of the dry season crop start late November to early December in Kebbi State.



June 2002 - May 2003

Fig. 1: Onion retail price movements for markets in Sokoto State

Seasonal price increase

Retail onion prices collected fortnightly from 16 market locations in Sokoto and Kebbi States were used to estimate the seasonal price increase and the result is presented in Table 2.

Table 2 shows that the coefficients of determination R^2 for all the market locations was between 0.602 and 0.973, indicating that the independent variable adequately explained the dependent variable in the models. The F-values for all but one market location were significant. Table 2 further shows that the slope coefficients for all the market locations were positive. Coefficient for one of the market locations was insignificant where as the coefficients for five locations were significant ($p<0.01$) and the remaining 10 locations were significant ($p<0.05$). This implies a direct relationship between retail price of onion and period of storage. The result shows that slope coefficients ranged between 7.38 at Argungu to 18.764 at Dodoru markets. This implied that the price rise was between N 7.38/kg/month at Argungu market and N 18.76/kg/month at Dodoru market.

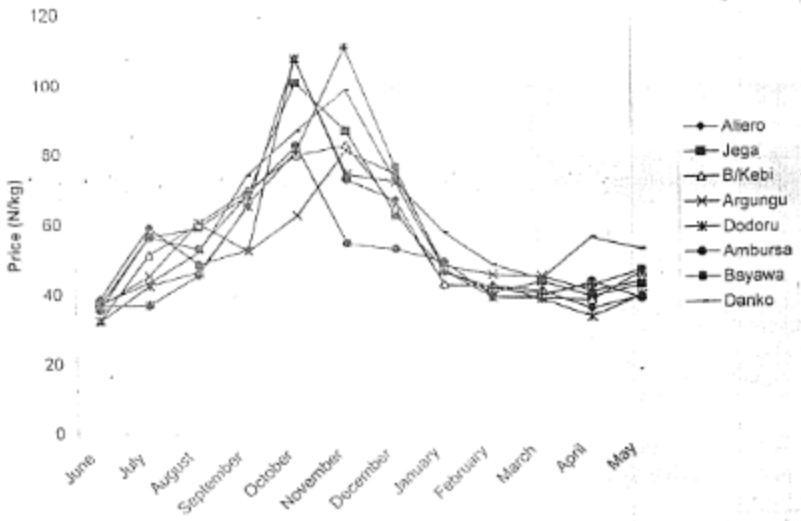
The average storage cost was estimated at N3.90/kg/month. A comparison of the average storage cost with the average seasonal price rise for the Sokoto and Aliero market locations shows that the excess of seasonal price rise over storage cost was N9.042/kg/month and N9.17/kg/mongh for the two markets respectively. The excess of price rise over storage cost goes to cover the entrepreneur's profit and costs other than the storage cost. These other costs could include the cost of empty sacks, sorting, bagging, loading, offloading, transportation, commission and market tax.

Table 2 Regression results for average seasonal retail prices for onion in Sokoto and Kebbi States (June 2002- May 2003)

Market	Intercept (a)	t-value for intercept	Slope	b	R^2	F-value
Sokoto	-49.478	-3.586**	13.002	7.656***	0.951	58.620***
Gada	-57.543	-3.155**	13.404	6.371***	0.910	40.592***
Goronyo	-35.817	-2.360	10.443	5.967***	0.899	35.600***
Bodinga	-39.967	-3.005	11.350	7.399***	0.932	54.739***
Kware	-51.354	-4.366	12.986	8.969***	0.964	80.444***
Wurno	-51.637	-4.762	13.001	10.395***	0.964	108.052***
Tambuwal	-70.630	-2.282	16.245	4.263**	0.858	18.177***
Sabon Birni	-43.157	-2.810	12.024	6.786***	0.920	46.054***
Aliero	-43.870	-0.876	13.130	2.129***	0.602	4.534
Birnin Kebbi	-20.136	-2.186	9.682	9.115***	0.954	83.078***
Argungu	-6.880	-0.491	7.380	4.562**	0.839	20.810**
Jega	-40.370	-1.666	12.770	4.366**	0.837	19.066**
Dodoru	-88.536	-2.442	18.764	4.084**	0.893	16.676*
Ambursa	-24.470	-1.551	10.400	5.356**	0.905	28.689**
Bagawa	-63.178	-3.063	14.754	6.201**	0.906	38.452***
Danko	-45.1825	-4.806	12.937	11.931***	0.973	142.357***

*** Coefficients significant ($p<0.01$)
** Coefficients significant ($p<0.05$)
* Coefficients significant ($p<0.10$)

Onion storage is a risky business and the entrepreneur may risk the possibility of losing all or ubstantial part of the stored onion within a short period of time if proper storage conditions are not met. Nevertheless, the least seasonal price rise difference of N3.48 may be reasonable, but a difference of up o N14.86 over storage cost appears to be fairly excessive even when the demands of other costs are onsidered. This implies that onion retailers are making excessive profit by selling at prices far in excess of the storage cost, thereby over exploiting the consumers.



June 2002 May 2003

Figure 2 Onion retail price movements for markets in Kebbi State

5 It may therefore, be concluded that there was no temporal pricing efficiency for onion in the study area. This may be a common occurrence in food markets in Nigeria and other developing countries as observed by Adeyokunnu (1980) who reported that food marketing in Nigeria is inefficient and Southworth *et al*., (1979) who reported high seasonal price rise for maize and yam in Ghana's Atebubu District. However, Afolami (2000) reported that no excessive profit was made by maize traders in Nigeria when monthly price rise was compared with storage costs, thus suggesting some level of temporal pricing efficiency for the commodity and for the period covered by the study.

CONCLUSION

Average storage cost incurred by respondents was N 3.90/kg/month . The average price increase per kilogramme per month for all the markets studied ranged between N7.38/kg/month at Argungu market to N18.764/kg/mongh for Dodoru market. The seasonal price increase in most of the markets was in excess of storage cost, thus suggesting the non-existence of temporal pricing efficiency for onion marketing in the study area.

The introduction of an efficient storage technology, affordable to the farmers is suggested. This may reduce the extent of storage losses and improve the all year round supply of the commodity, there by reducing the rate of seasonal price increase.

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International Journal of Animal Science, Volume 2, Number 1, 2010

INPUTS ACQUISITION AND UTILIZATION AMONG CROP – LIVESTOCK FARMERS IN SOKOTO STATE

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ABSTRACT

The study was conducted to examine resource acquisition and utilization by crop-livestock farmers in Sokoto State. In order to achieve this objective, one hundred and eighty farmers were randomly selected from six Local Government Areas of the State. Data collected were analyzed using descriptive statistics. The results showed that the major source of inorganic fertilizer and chemicals was the market, representing about 30 per cent for fertilizer and 14.4 per cent for chemicals, respectively, while the major source of organic manure was farmer's own animals representing about 58.3 per cent. About 46 % of the farmers had between 1 - 4 plots, 36.1 % between 5 - 8 and only 1.7 % have 13 plots or more. The results further showed that 11.6 % used both hired and family labour, 65.5 % family labour and 22.7 % used hired labour. The major problems identified were inadequate fertilizer and chemicals. It was recommended that government should create a favourable competitive atmosphere that will bring in many inorganic fertilizer and chemicals manufacturers in the country as this will lower the prices and make the commodities affordable to the farmers.

Keywords: Inputs; Labour; Fertilizer; Manure and Chemicals

INTRODUCTION

The human population in West Africa has risen rapidly in the past decades and this is expected to continue. This population increase has culminated into an increase in demand for food crops and livestock products. Today, grazing lands are diminishing and fallow periods are either non-existing or shortening. The traditionally specialized production systems of shifting cultivation and nomadism are being replaced by more sedentary forms of crop-livestock production that involve permanent cultivation and reduced grazing. This trend has transformed the production of crops and livestock separately into an integrated system (crop-livestock production), which provides the farmer an opportunity to utilize crop residues, power and manure on his farm and thus increase his level of output. Therefore, crop-livestock system involving complementary interactions between crop and livestock is gaining increasing importance in the area due to the benefits that the farmer stands to gain. According to Powell and Williams (1993), crop-livestock production systems are being developed in response to the growing demand for food and efficient utilization of natural resource base. The crop-livestock system is widely practised by the farmers in order to cope with the risks and uncertainties of agricultural production that depends largely on an unpredictable rainfall pattern (Mohammed, 2000). Farmers keep few livestock in addition to the production of arable crops such as millet, sorghum and cowpea. Small ruminants and poultry are kept as a source of income, while large ruminants and donkeys are sources of farm power and means of transportation in the rural areas. Crop residues serve as a source of feeds to the animals in the dry season.

METHODOLOGY

Sokoto State is located in the Sudan savanna zone in the extreme north-western part of Nigeria between longitudes 4^0 8' and 6^0 54'E and latitudes 12^0 0' and 13^0 58'N (Mamman *et al*., 2000). The target population for the study were settled farmers growing crops and keeping livestock together in Sokoto State. Sokoto State comprises of twenty-three Local Governments Areas. Among these, six Local Government Areas were randomly selected. These included Tambuwal (Barkeji, Sanyinna and Nabaguda), Rabah (Maikujera, Rara and Rabah), Wamakko (Gumbi, Gwiwa and Sire), Tangaza (Sononi, Gidan – madi and Sabro), Illela (Amarawa, Ambarura and Sabaru) and Tureta (Tsamiya, Lamba and Yargwalli). In each of the Local Government Areas, three villages were selected and in each of the villages, ten farmers were selected using multi – stage-sampling technique. From the villages selected, 180 farmers were randomly selected. The list of all the villages was collected from all the Local Government Areas from which three villages were randomly selected in each Local Government Area. Similarly, list of farmers was obtained from the village heads and ten farmers were also randomly selected. Data for the study were obtained through a

questionnaire administered by the researcher and research assistants. Data were collected for a period of one year i.e. from November – October. Farmers were visited monthly throughout the data collection period. The analytical tools employed in achieving the stated objectives were descriptive statistics i.e. frequencies and percentages.

RESULTS AND DISCUSSION

Table 1 represents the distribution of farmers according to number of plots owned. About 46 % of the farmers had between 1 - 4 plots, 36.1 % between 5 - 8 and only 1.7 % have 13 plots or more.

Table 1: Distribution of respondents based on number of the plots

Number of Plots	Frequency	Percentage
1 – 4	83	46.1
5 – 8	65	36.1
9 – 12	29	16.1
13 and above	3	1.7
TOTAL	**180**	**100**

It is obvious that land resource in the area is undergoing serious fragmentation, which is quite incompatible with modern agricultural mechanization. This could cause poor yield because of the difficulty in carrying out farm operations at the same time due to the scattered distribution of the plots. Table 2 shows the distribution of the farmers according to method of land acquisition. It shows that all the farmers obtained certain portion of their land through inheritance. Leasing was the least popular mode of land acquisition by the farmers.

Table 2: Distribution of respondents according to mode of land acquisition

Mode	Frequency	Percentage
Gift	31	17
Inheritance	180	100
Leasing	25	14
Purchase	62	34
TOTAL	**298***	**100**

*Multiple Responses

Table 3 represents the distribution of respondents based on size of land owned. Forty five percent of the farmers had between 1 - 5 hectares of land. This shows that farmers had their land scattered and this does not favour mechanization. It is obvious from the table that farmers in the area were small-scale farmers having a relatively small area of land to cultivate. This situation could constitute a serious hindrance to mechanized agriculture.

Table 3: Distribution of respondents according to size of land

Size (ha)	Frequency	Percentage
1 – 5	81	45.0
6 – 10	45	25.0
11 – 15	28	15.6
16 – 20	14	7.8
21 and above	12	6.7
TOTAL	**180**	**100**

Inorganic Fertilizer, Chemicals and Manure Utilization

Table 4 depicts distribution of respondents based on sources of inputs. The major source of inorganic fertilizer and chemicals was the market, representing about 30 per cent for fertilizer and 14.4 per cent for chemicals, respectively, while the major source of organic manure was farmer's own animals representing about 58.3 per cent.

Table 4: Distribution of respondents according to sources of Inputs

Source	Frequency	Percentage
Inorganic Fertilizer		

Government	23	12.7
Market	54	30
Market and Government	11	6.1
Zero application	92	51.1
Manure		
Market	55	30.5
Own farm	105	58.3
Own farm and Market	20	11.1
Chemicals		
Market	26	14.4
Government	0	0.0
Zero application	154	85.5

On the other hand, a good number of respondents did not apply fertilizer (51 %) and chemicals (85.5 %). This may be due to their high cost or non-availability at the time when farmers needed them. Government accounts for a low percentage in the provision of fertilizers to the farmers and zero per cent in the case of chemicals. This finding reveals that government is still yet to create a favorable competitive atmosphere that will bring in many inorganic fertilizer manufacturers in the country as this will lower the price.
Table 5 shows the distribution of respondents based on the level of input usage. It is clear from the table that farmers do not have good access to fertilizers and chemicals either because of their high cost or non-availability in the near markets at the time farmers need them and this might have accounted for the application of 25.7 kg/ha as against the recommended dose of 600 kg/ha for millet/sorghum/cowpea mixture. (Raemaekers, 2001).

Table 5: Distribution of farmers according to average inputs utilisation

Type of Input	Quantity
Insecticides(litres)	0.022
Fertilizer(kg/ha)NPK	25.7
Manure (kg/ha)	1924

*Multiple Responses

However, farmers applied 1,924 kg/ha of manure, which is above the recommended dose of 1,680 kg/ha (McIntire *et al*., 1992). Manure and fertilizers may be complements or substitutes depending on the stage of intensification and crop-livestock interaction (McIntire *et al*., 1992; Sanni *et al*., 2004; Jabbar, 1993).
Farmers in the area predominantly use manure on their farms because it is cheaper than inorganic fertilizer and is readily available. WattsPadwick (1983) reported that organic materials applied in bulk could improve soil texture, promote better absorption of moisture, reduce run-off and prevent crusting of soil surface. In Asian and African countries such as Thailand, Somalia and Senegal, manure has sustained cereal yields at 1.5 - 2 t/ha for four to five decades with minimal use of artificial fertilizers (Guzman and Petheram, 1993; McIntire *et al*, 1992).

Labour activities of farmers
Table 6 represents the distribution of respondents based on type of labour used. The table (6) shows that 11.6 % used both hired and family labour, 65.5 % family labour and 22.7 % used hired labour. This shows that family labour still predominates in agricultural activities in the area.

Table 6: Distribution of respondents according to type of labour used

Type	Frequency	Percentage
Family	118	65.5
Hired	41	22.7
Family and Hired	21	11.6
TOTAL	**180**	**100**

Table 7 shows the distribution of farmers according to average family labour size available to them. It is obvious from the table that the average family labour size available to the farmers was 5.75 male adult equivalents.

Table 7: Average family labour size of farmers

Male	No. of persons	Male adult equivalent	Female (No. of persons)	Male adult equivalent	Total male-equivalent
7 - 14 (years)	2	1	1	0.5	1.50
15 – 60	3	3	1	0.75	3.15
60 and above	1	0.5	0	0	0.50
TOTAL		**4.5**		**1.25**	**5.75**

The average labour utilization for various crop-livestock activities per season is shown in Table 8. Cleave (1974) reported that labour input in man-days is the product of the number of men employed by the average hours worked by each. Therefore, labour force of three men implies that three men are employed full-time throughout the day. Labour is measured as a flow over a given period of time. It is obvious from Table 8 that the average labour utilization for feed preparation and herding were higher in the dry season than in the wet season. This is because farmers spend more time in feed preparation and grazing due to poor availability of pastures in the grazing areas during the dry season. For example, animals take longer time to graze. In the wet season, there is abundant pasture supply, and the animals get almost all their requirements in the grazing areas. In the case of milking and sanitation, animals produce more milk during this period and therefore more time is spent on this activity. Correspondingly, sanitation takes more hours as the animals eat more they pass more faeces. On the other hand, weeding consumes more labour (47.9 %) in crop production than any other activity. This is because it is done two or more times in a year, depending on the level of weeds in the field and income of the farmers.

Table 8: Average labour utilization for various crop-livestock activities per season

Activity	Man-days			
	Dry Season	Wet Season	Total	Percentage
Livestock activities/ TLU				
Feed preparation	10.38	6.48	16.85	4.35
Herding	180.00	135.00	315.00	81.2
Milking	12.86	20.57	33.43	8.6
Sanitation	8.64	13.82	22.46	5.8
TOTAL	**211.88**	**175.87**	**393.74**	**100**
Crop activities/ha	Family	Hired	Total	Percentage
Fertiliser/manure appl.	0.88	0.0	0.88	2.8
Harvesting	2.10	1.40	3.50	11.18
Land preparation	3.9	2.6	6.50	20.8
Planting	2.63	0.0	2.63	8.4
Processing	1.68	1.12	2.80	8.9
Weeding	8.25	6.75	15.00	47.9
TOTAL	**19.44**	**11.87**	**31.31**	**100**

CONCLUSION

It is obvious that land resource in the area is undergoing serious fragmentation, which is quite incompatible with modern agricultural mechanization. This could cause poor yield because of the difficulty in carrying out farm operations at the same time due to the scattered distribution of the plots. Also, farmers do not have good access to fertilizers and chemicals either because of their high cost or non-availability in the near markets at the time farmers need them.

RECOMMENDATIONS

Government should encourage commercial banks and other funding agencies to provide loans to the farmers so as to alleviate their problem of inadequate funds to buy inputs. Farmers should also form cooperative

societies and be contributing money so as to serve as a source of loan to them. In the case of inadequate fertilizer, government should create a favourable competitive atmosphere that will bring in many inorganic fertilizer manufacturers in the country as this will lower the prices and make the commodity affordable to the farmers.

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FIRB/IRDI /2010 /122

African Journal of Agricultural Research and Development, Volume 4, Number 1, 2011
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PROFITABILITY OF BROILER PRODUCTION IN SOKOTO METROPOLIS

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ABSTRACT

An investigation was conducted to ascertain the profitability of broiler production in Sokoto metropolis. In order to obtain reliable results, 60 broiler farmers were randomly selected form 10 areas within Sokoto metropolis. Data were collected from February to March, 2003. The farm budget model was employed to determine the profitability of broiler production in the study area. Results revealed that broiler production is a profitable venture in the study area as all the respondents ran their broiler enterprises profitably. An average gross income of ₦162, 007.80 per respondent and ₦911.77 per bird was realized and a mean NFI of ₦86, 703.86 per respondent and ₦487.96 per bird was realized by broiler farmers in the study area. The average total cost of production in the study area was ₦75, 303.22 per respondent and ₦423.51per bird. The mean variable and fixed costs are ₦71, 637 and N3, 665.56 per respondent, and N403.81 and N20.63 per bird, respectively.

Key words: profitability, costs, broiler production

INTRODUCTION

According to Yusuf et al (1993), profitability in broiler enterprise has encouraged more investment into the sector. Efficiency of feeds and labour utilization are very important means of increasing profits in any broiler enterprise (Nworgu et al, 1998). The profit level depends on the system adopted, while the management system adopted by any poultry farmer depends on the purpose for which the birds are reared and capital resources at the farmer's disposal. In his view, Portsmouth (1978) observed that broiler production is a highly specialized industry involving very high production cost and profit margins. In their research, Ewa et al (1999) reported that supplementing protein in the diets of broiler chicks is a necessary step in promoting the growth rate and facilitating higher returns. Rapid growth and efficient feed conversion are essential for economic success in broiler production (Kekeocha, 1984, Oluyemi and Roberts, 1985). Nwajiuba (1998) reported that cost reduction holds most promising for improving the profitability of poultry enterprises. Reducing production costs, particularly feed cost should be a point for policy intervention. Dafwang (1987) reported that broiler production has the fastest rate of return of all poultry enterprises. Any attempt to increase profit must therefore strive to minimize feed cost

METHODOLOGY

The investigation was conducted in Sokoto Metropolis. Ten areas were purposively selected based on the intensity of broiler production. These areas selected within the Sokoto metropolis include; Arkilla, Aliyu Jedo, Bado, Gwiwa, GRA, Kofar Atiku, Mabera, Minanata, Runjin Sambo and Unguwar Rogo. The simple random sampling technique was employed to select six broiler farmers from each of these areas. This gives a sample size of sixty 60-broiler farmers. The data used in this research were collected through the use of well-structured questionnaire. Data were collected for four (4) weeks, from February to March, 2003 on a daily basis. The farm budget model was used to compute the profitability of broiler production in the study area. The farm budget model used to compute the profitability of broiler production in the study area is of the form:

NFI = GI – TC

Where: - NFI = Net farm income or profit, refers to the difference between gross income and total cost of broiler production in the study area.

GI = Gross Income. This represents the sum of the total value of all the broiler birds at the end of production period in the study area.

TC = Total Cost. This represents all the expenses incurred in broiler production by farmers in the study area. This includes fixed and variable costs.

Fixed cost in this study refers to depreciation on housing, which includes feeders, waterers and other facilities used in the poultry house. The straight-line method was used to compute the depreciation on housing. While the variable cost in this study refers to all the inputs used in the production of broilers in the study area. These include cost of chicks (X_1), cost of feeds (X_3), cost of medication (X_4) and cost of labour (X_5).

RESULTS AND DISCUSSION

Costs and returns of broiler production

Table 1 depicts the minimum, maximum and mean costs and returns per respondent and per bird of broiler production in the study area.

Table 1: Mean costs and returns of broiler production

Mean costs and returns	Minimum ₦	Maximum ₦	Mean per respondent ₦	±	Standard deviation	Mean per bird ₦
Revenue	65,800	672,000	162,007.08	±	120,934.21	911.77
Variable cost:						
Feed cost;						
Starter mash	3,800	45,000	10,764.82	±	8,271.00	60.58
Finisher mash	7,840	110,000	24,269.83	±	16,015.43	136.59
Chicks	12,000	150,000	28,330.16	±	24,153.15	159.44
Medication	1,500	27,000	5,212.00	±	3,816.54	29.33
Labour	1,900	11,600	3,060.83	±	1,346.37	17.22
Production period (weeks)	8	16	12.12	±	1.90	0.068
Total variable cost	17,280	190,600	71,637.64	±	51,915.41	403.18
Fixed cost						
(Depreciation on housing including feeders, waterers and others)	2,500	6,333.33	3,665.56	±	798.28	20.63
Total cost	35,000	349,933.33	75,303.22	±	52,942.60	423.81
Net farm income(NFI)	20,590	322,066.67	86,703.86	±	70,659.97	487.96

Source: Field Survey, 2003.

Oluyemi and Roberts (1985) observed that chick cost accounts for higher percentage of total production of broilers. However, this is not the case with broiler production in the study area because chick cost accounts for a mean of ₦28, 330.16 per respondent, which is only 37.62% of the total cost of production. The mean cost per bird was ₦159.44. The result of this study is in line with the report by Nwajiuba (1998), which stated that the cost of feed is considered high by most poultry farmers. Larry (1993) stated that 65.45 - 69.33% accounts for feed cost in broiler production. The findings of this study do not agree with Larry's report as feed accounts for only a mean cost of ₦ 35,034.65 which is 46.52% of the total production cost per respondent and ₦ 197.17 per bird. The cost incurred in finisher mash was higher compared to that of starter mash because more quantity of finisher mash was used by the farmers in the production of broilers in the study area, because the birds consumed more feeds during the finisher stage of growth and development.

The farm budget model was employed to estimate the various costs and returns in broiler production in the study area. These are the results obtained from the use of the farm budget model.

Total cost (TC)

The average total cost in the study area was ₦75, 303.22 per respondent and ₦ 423.81 per bird. The mean variable and fixed costs are ₦ 71,637.64 and ₦ 3, 665.56 per respondent, and ₦ 403.18 and ₦ 20.63 per bird, respectively.

Gross income (GI)

An average gross income of ₦ 162,007.08 per respondent and ₦ 911.77 per bird was realized in the study area. A mean NFI of ₦ 86, 703.86 per respondent and ₦ 487.96 per bird was realized by farmers in the study area.

Net farm Income (NFI)

The net farm income (NFI) represents the difference between the gross income and the total cost of broiler production in the study area. Table 2 shows the mean net farm income (NFI) according to location. Results of the study revealed that there is a difference in the net farm income (NFI) between the various locations. The difference between NFI obtained by farmers from the various locations could be attributable to the fact that these locations with higher profits were more popular in broiler production in the study area. It is also possibly attributable to the fact that the locations with higher mean NFI kept and sold more broiler birds than the others in the study area. This agrees with the report by Oluyemi and Roberts (1985), which stated that profit margin per bird, is determined by the number of birds kept. The study also revealed that broiler production is profitable in the study area as all the respondents ran their broiler enterprises profitably. This agrees with the report by Yusuf *et al* (1993), which stated that broiler production has the fastest rate of return of all the poultry enterprises.

Table 2: Mean NFI according to locations

Location	Mean flock size	Mean / bird (₦)	Mean (₦)	±	Standard Deviation
Arkilla	300	449.91	120,727.22	±	129,023.35
Aliyu Jedo	153.66	407.86	58,189.44	±	26,549.41
Bado	125	475.39	54,828.45	±	25,810.97
Gwiwa	225	594.35	123,527.14	±	93,714.65
GRA	195	487.92	88,477.50	±	55,742.09
Kofar Atiku	120.83	532.65	58,591.66	±	18,415.20
Mabera	314.16	465.62	130,763.01	±	80,661.57
Minanata	132	462.29	56,554.16	±	16,728.41
Runjin Sambo	240	535.64	115,521.58	±	97,097.33
Ungwar Rogo	143.33	452.32	59,858.33	±	31,774.43

Source: Field Survey, 2003.

CONCLUSION

This study examined the profitability of broiler production in Sokoto metropolis. Results showed that broiler production is a very lucrative business in the study area. The average total cost of production incurred in broiler farming in the study area was ₦ 75, 303.22 and ₦ 423.81 per bird. The mean variable cost was ₦ 71, 637.66 while the mean fixed cost amounted to ₦ 3, 665.56. The average gross income was ₦ 162,007.08 in the study area. This gives a mean gross income of ₦ 911.77 per bird. The average net farm income (NFI) was ₦ 86,703.86 per respondent and N487.96 per bird.

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FIRB-WOR-2010-051