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Full Length Research Paper

Determinants of flock size in broiler production in Kaduna State of Nigeria

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This study was conducted to estimate the determinants of flock size in broiler production in Kaduna State, Nigeria. Structured questionnaire and interview schedules were used to collect data from 120 broiler producers randomly selected from 10 purposively selected villages from the study area based on large number of producers in the area. The data were analyzed using frequency distribution and multiple regression analysis. The results of the study revealed that producers' household income, years of broiler producing experience, cooperative membership and major occupation showed direct relationship with their flock size and were significant at 1% test level. The number of years spent in school by the producers directly influenced their flock size and was significant at 5% test level. The producers' age, sex, marital status and family size showed an inverse relationship with their flock size but were not statistically significant. The results also revealed that the producers' flock sizes were constrained by seasonal and irregular broiler demand which were mainly high during festivals (most especially at Easter, Sallah and Yuletide). High feed and chick cost, unavailability and untimely delivery of farm inputs and inadequate capital and poor extension services were other constraints. These constraints, if addressed, would lead to increase in broiler flock size in the study area and also increase the producers' disposable income and well-being.

Key words: Determinants, flock size, broiler production, semi-log function, production constraints.

INTRODUCTION

The challenges of food insecurity and hunger worldwide and particularly in developing countries like Nigeria have continued to receive attention from experts and Governments (FAO, 2003; Babatunde et al., 2007). Consequently several conferences and World Food Summits on human nutrition have brought to fore for debate the issue of eradicating extreme poverty and hunger. FAO (1995) asserted that the most critical in the global food basket crises is animal protein.

Studies by Okayeto (1992), CBN (1993), Egbunike (1997) and Ojo (2003) revealed that in spite of the numerous human and natural resources of Nigeria, it still remains among the least consumers of animal protein in Africa. More so, that the protein intake of an average Nigerian is about 53.8% with only 6.0 to 8.4 g/head/day of animal origin. The studies further revealed that North America, Western and Eastern countries consume 66, 39 and 33 of animal protein per head per day, while an average Nigerian consumes 7.5 g which is below the recommended level of 27 g/head/day.

To increase protein intake in Nigeria, it therefore calls for urgent need to increase broiler production at both household and commercial holdings. Oluyemi and Roberts (2000) and Isika et al. (2006) postulated that poultry was strategic in addressing animal protein intake shortage in human nutrition because of its high fecundity, fast growth rate, short generation interval and unparallel competence in nutrient transformation to high quality animal protein. The industry has a significant effect on national economy. A report by Okonkwo and Akubo (2001) show that about ten (10) percent of Nigerian populations are engaged in poultry production, mostly on subsistence and small or medium – sized farms. Poultry production in addition contributes to the nation's gross domestic product (GDP), it provides gainful employment

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and income to sizeable proportion of the populace (Rahman and Yakubu 2005). This will go a long way to alleviate poverty and improve the welfare of the populace (Adebayo and Adeola, 2005). The poultry industry has become a diverse industry with a variety of business interests such as egg production, broiler production, hatchery and poultry equipment business (Oluyemi and Roberts, 1979).

Broiler production involves the keeping of chickens of heavy meat breeds for the purpose of getting good quality meat products usually sold live or processed at ten to twelve weeks of age (Amos, 2006). Broiler production is carried out in all parts of the country with no known religious, social or cultural inhibitions associated with their consumption. Specifically, investment in broiler enterprises is attractive because the production cost per unit is low relative to other types of livestock, poultry meat is very tender and broiler enterprises have short production cycles (Nwajiuba and Nwoke, 2000). The high demand for poultry products, the success of exotic breeds and the ease of mastering the techniques of poultry production among other factors has made it developed to the status of agribusiness in Nigeria as distinct from subsistence production (Nwajiuba and Nwoke, 2000; Sani et al., 2000).

According to Badejo (1983), Wong (1991), Ogundipe (1996) and Aduku and Dafwang (2002), broiler marketing is a very challenging task for any sizeable broiler production outfit in Nigeria that, no farmer should invest in it unless he has a fair knowledge of market outlet and the size of their demand. Other studies by Adepoju (1999), Hassan (2002) and Adebayo and Adeola (2005) revealed that, socio–economic factors affecting poultry production in Nigeria cut across age, educational level, input, access to extension services, access to veterinary services, finance, labour, infrastructure and government policy. Adebayo and Adeola, (2005) reported that educational level of producers had positive and significant relationship with average production (Y) while age has negative and non-significant relationship with the average production of the respondents. They attributed the significant relationship between educational level and average production to high need of sound knowledge and efficient management of poultry business to ensure high output and profitability in the business.

Furthermore, finance and inputs had significant relationship with average production of the respondents. This was attributed to the fact that only few producers had access to credit facilities or loan from financial institutions. The rest of the factors viz, access to extension and veterinary services, labour and market had negative and non-significant relationship while infrastructure facilities and government policy had positive and non-significant relationship with average production.

The major problems militating against the economic production of broilers in this study range from poor market access, high feed and chick costs, untimely delivery of farm inputs, inadequate capital and poor extension services. These factors brought about uncertainty in poultry production. Poultry products were a times not available in the markets and a times they were there in abundance. This study therefore broadly aimed at examining the determinants of flock size in broiler production in Kaduna State. The specific objectives were to:

(i) Describe the socio-economic variables determining the flock size of broilers producers in the study area
(ii) Estimate the relationship between the socio-economic characteristics of the broiler producers and their flock size
(iii) Describe the factors directly involved in broiler production in the area
(iv) Determine broiler production constraints in the study area.

METHODOLOGY

Study area

This study conducted in 2004 was conducted in Kaduna South and Chikun LGAs of Kaduna State, Nigeria. Kaduna State is located in the Northern guinea savannah ecological zone of Nigeria. It lies between latitude 9°N and 12°N and longitude 6°E and 9°E. The state occupies a land area of about 45053 square meters and a population of 3.9 million (FOS, 1996). Kaduna South LGA has a population figure of 313,516 while Chikun LGA has a population figure of 298,131 respectively. Kaduna South and Chikun local government areas are agrarian, well suited for the production of arable crops such as maize, millet, cassava and ginger because of the favourable climatic conditions. The mean annual rainfall of the study area is between 1450 and 2000 mm with a mean daily temperature regime ranging from 25 to 43°C. The areas chosen for this study are in the southern part of the state. The people are predominantly peasant producers cultivating food and cash crops. They embark on small, medium and large – scale livestock production such as rearing of chickens, ducks, goats, sheep and pigs as well as marketing of their products. The people live mostly in organized settlements, towns and cities (NBS, 2005).

Sampling procedures and sample size

For this study, multistage sampling technique was used to select the study area and sample size. Kaduna South and Chikun Local Government Areas were purposively selected due to the high population of broiler producers in the LGAs. Five villages each were purposively selected from the two LGAs based on the high number of broiler producers in the respective villages. The villages selected include Romi, Yelwa, Ungwan Sunday, Narayi/High Cost and Sabon Tasha for Chikun LGA while Television, Barnawa, Kakuri (Kurmin Gwari), Dan Quarters and Tudun Wada were the villages selected for Kaduna South LGA respectively. The pre–study visit to the respective study areas informed the population of 160 broiler producers out of which a sample size of 120 respondents was randomly drawn from broiler producers in the study area (62 broiler producers were selected from Kaduna South Local Government Area while 58 broiler producers were selected from Chikun Local Government Area). The difference in sample size between the two LGAs is because of the unequal population of poultry producers in

the two LGAs.

Data collection

The primary data collected include the socio-economic characteristics of the broiler producers (such as age of producers, sex of producers, marital status, family size, household income (N), years of schooling, years of experience in broiler production, cooperative membership and major occupation), the input and output data [consisting of feed intake (Kg/9 weeks/100 birds), family labour (man-hour/9 weeks/100 birds), hired labour (man-hour/9 weeks/100 birds), flock size (no. of chicks kept/9 weeks), costs of medication and consumables (N/9 weeks/100 birds) and other cost(N/9 weeks/100 birds comprising of depreciation allowance on housing and equipment and transportation cost), prices of outputs and inputs, systems of rearing as well as problems affecting the economic production of broiler in the study area. The data were collected by means of structured questionnaire and interview schedules administered to one hundred and twenty sampled broiler producers. On the other hand, the secondary data were obtained from relevant publications. Data collected covered the 2004 production cycle. The value of output was obtained by adding cash receipts from the sale of broiler birds produced, values of consumption and gift and values of by-products such as broiler droppings (manure) and empty bags of feed.

Analytical tools

Data collected were analyzed using descriptive and inferential statistics. The descriptive statistics used include frequency distribution, mean, percentages, range, standard deviation and coefficient of variation while inferential statistics used is the student t. Multiple regression models were also used to determine the relationship between some socio-economic factors and their broiler flock size as well as identifying factors directly bearing on the broiler production process in the study area. Net farm income (NFI) analysis was used to estimate the cost, return and profitability in broiler production.

Out of the four functional forms tested (that is, Linear, Semi-log, Cobb- Douglas and Quadratic functional forms) the semi logarithmic functional form provided the best fit for the relationship between the socio-economic factors and broiler flock size of the producers, while the Cobb-Douglas functional form provided the best fit for the estimation of the inputs - output relationship in the broiler production process in the study area. The functional forms selected were based on the values of the coefficient of multiple determinations (R2) and F- value, the signs of the regression coefficients and the significance of the t–values. The estimated parameters α and βi were used for further analysis.

Socio-economic regression model

The priori model for the socio-economic factors and flock size regression analysis was formulated as follows:

$$Y = f(x1, x2, x3, x4, x5, x6, x7, x8, X9, ei) \quad (1)$$

Where,
Y = Flock size (Number of broilers produced/9wks/100birds)
X1 = Age (years)
X2 = Sex (Dummy 1 = male; 0 = otherwise)
X3 = Marital status (Dummy 1 = married; 0 = otherwise)
X4 = Household size (number of persons in the household)
X5 = Household income (Non farm income of producers)
X6 =Years spent in school (years)
X7 = Years of broiler keeping experience (years)
X8 = Co–operative membership (Dummy 1 = membership; 0 = Otherwise)
X9 = Major occupation (Dummy 1 = broiler keeping; 0 = otherwise)
ei= Error term

The semi logarithmic functional form selected is specified as:

$$Y = \text{Log } \alpha + \beta\ 1\ \text{Log}X1 + \beta\ 2\ \text{Log}\ X2 + \beta\ 3\ \text{Log}\ X3 + \beta 4\ \text{Log}\ X4 + \beta\ 5\ \text{Log}\ X5 + \beta\ 6\ \text{Log}\ X6 + \beta 7\ \text{Log}X7 + \beta\ 8\text{Log}X8 + \beta\ 9\ \text{Log}X9 + ei \quad (2)$$

Where,
Y = Flock size (Number of broilers produced)
X1-X9 = Variable inputs as already defined above
α = Intercept (Constant term)
β 1 = Regression coefficients
ei= Error term.

Broiler production model

On the other hand, the production technology of the producers was implicitly specified by the Cobb-Douglas production as follows:

$$Y = \alpha\ X1\beta 1\ X2\beta 2\ X3\beta 3\ X4\beta 4\ X5\beta 5X6\beta 6ei \quad (3)$$

In logarithmic form, the equation is of the form:

$$\text{Log } Y = \text{Log } \alpha + \beta 1 \log X1 + \beta 2 \log X2 + \beta 3 \log X3 + \beta 4 \log X4 + \beta 5 \log X5 + \beta 6 \log X6 + ei \quad (4)$$

Where,
Y = Flock size (Number of chicks/9wks)
X1 = Feed (kilogram/9 weeks/100birds)
X2 = Family labour (man-hours/9 weeks/100birds)
X3 = Hired labour (man-hours/9 weeks/100birds)
X4 =Values of broilers produced (Naira/9 weeks/100birds)
X5 =Medication and utilities (N /9 weeks/100birds)
X6 = Other costs (N /9 weeks/100birds)
ei = Error term
α = Constant or intercept
β1- β6= parameter estimates

In the course of production, the broiler producers possessed varying flock size which its use as one of the exogenous variables could cause problem of multi-collinearity with feed, labour and other variables making the regression coefficients invalid and unreliable. In other to avoid this problem, flock size was fixed at 100 birds for every producer. The values of variables that changes in a short-run were converted to per 9 weeks basis for uniform unit of measurement among the respondents. Each respondent specified his/her income level per annum, but this was converted to per month basis.

Net farm income (NFI) analysis

NFI analysis was used to compute the costs, returns and profitability of broiler production in the area. The unit of estimation is Naira per 100 birds. The net farm income model is represented as follows:

$$NFI = TR - TC \quad (5)$$

Where,

NFI = Net farm income in Naira
TR = Total receipts/returns to broiler output in Naira
TC = Total cost of production (TVC + TFC)
TVC = Total variable cost in Naira
TFC = Total fixed cost in Naira

RESULTS AND DISCUSSION

Socio-economic characteristics of broiler producers

Table 1 showed that the average years of producers in the study area was 35. This shows that majority of broiler producers in the study areas were in their productive age and so, could accept and adopt poultry production innovations faster as well as invest more on broiler production 'if all things being equal'. It was also observed that majority (54%) of the broiler producers in the area were females. The dominance of females in the enterprise may foster a more careful and more accurate husbandry practices. The average number of persons in the producers' household was 6. This implies that, there would be enough work forces to supply the most needed labour requirement for broiler production activities in the study area, thus reducing the extra-cost of hiring labour. It could be deduced from the study that the average year of schooling by the producers in the study area was 12. It therefore implies that the broiler producers were formally educated. Education is not only an important determinant of adoption of an innovation but also a necessary tool for successful implementation of innovation for profitability. Thus, a certain level of literacy is required for management and production of poultry (broilers).

Majority of (57%) of the producers in the study area were not members of poultry co–operative society while 43% of the producers were members. Consequently, the non-members might be faced with problems of inability to pool their limited productive resources together to enjoy the benefit of economies of scale. Besides, they may be constrained by poor inputs supply; poor marketing, inadequate finance and information that would have helped them to carry out improved poultry husbandry practices for higher output and returns. The analysis of the study reveals that majority of the respondents (about 53%) were civil servants. The result implies that broiler production in the study area is a secondary occupation to support the meager income of the producers who are mainly civil servants. Consequently, the producers may not pay adequate attention to more careful and sensitive management practices involved in broiler production because of their job demand.

The result from the study indicates that the average year of experience in the area was 5. This shows that broiler keeping in the 2 LGAs studied was still at its infant stage and so may not yield optimum returns that will justify investment in the short run. This may also affect their flock size since they may be avoiding risk factors that may likely run down the business. However, with more years of production the producers may learn from experience better broiler production techniques. The result equally showed that majority of the respondents (87%) employed both family and hired labour in their production process while 13% of them employed purely family labour. None of the respondents exclusively employed hired labour. This could be because the household size of the respondents was large enough to make available enough man-hours of family labour with a resultant reduction in cost of hired labour. The study also revealed that majority of the respondents (83%) had broilers ranging from 100-500 followed by 13% in the range of 501 to 1000 broilers while 4% had a flock size in the range of 1001 to 1500 broilers. Based on the mean distribution of the combined flock population of 426 broilers, broiler producers in the study area was classified as small or medium - scaled. This conforms with the criterion of flock classification presented by famous poultry scientists like Oluyemi and Roberts (1979), Coy (1982), Omotosho and Ladele (1988), Michael et al. (1992), Adepoju (1999), Ogundipe and Sani (2002), Ojo (2003), Laseinde et al. (2005) and Amos (2006). This may be attributed to the fact that, this enterprise is at its infancy in the study area and so most producers are cautious of the high risk associated with the business, poor market outlets or perhaps because they took the business as secondary.

Multiple regression analysis for socio-economic determinants of broiler production

The R-2 value was found to be 0.802, which means that about 80% of the variation observed in the flock size of the broiler producers in the study area was accounted for by all the variables included in the regression equation (Table 2). The F- value of 54.446 was significant at 1% level of significance indicating that independent variables included in the socio-economic model were important in explaining the variation in the flock size of the producers. The regression analysis showed that the producers' household income, years of experience in broiler production, cooperative membership and major occupation positively contributed to their flock size and were significant at 1% test level, while age, sex, marital status and household size of the producers showed an inverse relationship with their flock size and were not significant. The number of years spent in school by the producers directly influenced their flock size and was significant at 5% test level respectively. This implied that, the older the producers and the more their household size, the less would be their flock size. It also shows that married and male producers kept less flock size in the study area. This implies that unmarried and female producers dominated the broiler production industry in the area.

The positive relationship between the producers'

Table 1. Socio-economic characteristics of broiler producers in the study area.

Variable	Frequency	Percentage
Age		
21-30	32	26.70
31-40	60	50.00
41-50	28	23.00
Total	120	100.00
Mean	36 years	
Sex		
Male	55	45.80
Female	65	54.20
Total	120	100.00
Household size		
1-10	117	97.50
11-20	3	2.50
Total	120	100.00
Mean	6 persons	
Years in School		
1-7	23	19.17
8-14	58	48.33
15-21	39	32.50
Total	120	100.00
Mean	12 years	
Broiler producers cooperative membership		
Member	51	42.50
Non – Member	69	57.50
Total	120	100.00
Mean	6	
Major occupation		
Broiler Keeping	25	21.00
Crop Farming	6	5.00
Livestock Farming	7	6.00
Trading	18	15.00
Civil Service	64	53.00
Total	120	100.00
Mean	12	
Years of experience in broiler production		
1-5	81	69.50
6-10	31	25.80
11-20	8	6.70
Total	120	100.00
Mean	4 years	
Source of labour		
Family Only	15	12.50
Hired Only	00	00.00
Both	105	87.50
Total	120	100.00

Table 1. Contd.

Stock population		
100-500	99	82.50
501-1000	16	13.30
1001-15000	5	4.50
Total	120	
Mean	426 broilers	

Source: Field Survey (2004).

Table 2. Multiple regression estimates of socio-economic factors affecting broiler production in the study area.

Variables	Regression coefficient	Standard error	t-value	Level of significance
Age	- 41.864	74.072	- 0.565	0.573ns
Sex	- 14.129	20.747	- 0.681	0.497ns
Marital status	- 21.200	22.131	- 0.958	0.340ns
Family size	- 11.736	31.760	- 0.370	0.712ns
Household income	66.951	18.957	3.532	0.001*
Years spent in school	36.262	30.758	1.179	0.05**
Years of experience	369.236	26.556	13.904	0.0001*
Cooperative membership	17.790	20.374	0.873	0.384*
Major occupation	129.940	25.172	5.162	0.0001*
Constant	-727.316	328.034	- 2.217	0.029

Source: Field Survey (2004), R^2 = 0.817, R^{-2} = 0.802, F = 54.446*; *, ** = Significant at 1 and 5% levels of significance, ns = Not significant.

household income and the flock size implies that the more the household income, the more the productive resources the farmer may employ in the production process. Consequently, the more will be the number of broilers that they may stock. The number of years the producers spent in school also showed a positive relationship with their flock size implying that spending more years in school does not only make the producers formally educated but literate to make better production decisions for increased broiler output and profitability. The years of experience in poultry production equally indicates a positive relationship with the number of broilers produced in the study area indicating that the more years they put in the production process the more experienced they become and the more they would increase their flock size depending on the prevailing circumstances. This agrees with the adage which says constant and correct practice make perfect. This result is consistent with those of Adepoju (1999), Hassan (2002), Ojo (2003) and Adebayo and Adeola, (2005).

The results also reveal that belonging to poultry cooperative society could help to increase the flock size of producers in the area. This is because the producers could pool together their limited productive resources such as land, feed mills, hybrid chicks, brooding and rearing equipment and finance to produce more broiler output. Cooperative membership benefits an individual producer by helping to reduce cost of production due to discounted benefit from bulk purchase of productive resources. Besides, the individual farmer stands the chance of learning new and improved poultry production methodologies. Furthermore, the result reveals that practicing broiler production as a main occupation positively increases the flock size of producers (Table 2). This is consequent to the fact that the producers would put in their best resources of feed, labour, capital and management to increase their scale of operation thereby increasing their household income and improving their welfare.

Input and output levels for broiler production

The maximum number of broilers kept by producers per 9 weeks in the study area was 1,500 while the minimum was 110. The stocking level varied greatly among broiler producers with the coefficient of variation of 63% (Table 3). The study also revealed that the maximum levels of productive resources employed in the production process include 10,500 quantity of feed (kg), 290 quantity of family labour (man-hours), 145 quantity of hired labour (man-hours), 298,605 as cost of medication and consumables (N) and 132,268 as sundry cost of broiler production (N) with 1,188,890 (N) as the maximum value of broilers produced in the study area respectively while the minimum include 770 quantity of feed (kg), 21

Table 3. Input and output levels for broiler production in the study area.

Parameter	Output	Input					
	Value of broiler (₦)	Feed (Kg)	Family labour (Man-hour)	Hired labour (Man-hour)	Flock size (No. of chicks)	Medication and consumable costs (₦)	Other costs (₦)
Maximum	1,188,890	10,500	290	145	1,500	298,605	132,268
Minimum	79,000	770	21	11	110	21,898	5,790
Average	335,754	3,064	79	40	426	86,254	23,235
Standard deviation	213,803	1,921	51	25	268	53,837	17,272
Coefficient of variation (%)	64	63	65	63	63	62	74

Source: Field survey data 2004.

Table 4. Estimated production function for broiler production in the study area.

Variables	Regression coefficient	Standard error	t-value	Level of significance
Feed	1.605	0.097	2.112	0.05**
Family labour	0.341	0.574	1.217	0.10***
Hired labour	0.425	0.592	1.107	0.05**
Value of broilers produced	0.006	0.641	3.117	0.05**
Medication and consumables	-1.303	0.610	2.134	0.10***
Other costs	-0.051	0.072	0.709	0.87*
Constant	1.023	3.018	0.080	0.936

Source: Field Survey (2004), R^2 = 0.861, R^{-2} = 0.848, Σb_i = 1.023, F = 8.73*; *,**,*** = Significant at 1, 5, and10% levels of significance, respectively, Ns = Not significant, Dependent variable = Flock size (Number of birds stocked).

quantity of family labour (man-hours), 11 quantity of hired labour (man-hours), 21,898 as cost of medication and consumables (N) and 5,790 as sundry cost of broiler production (N) with 79,000 (N) as the minimum value of broilers produced in the study area respectively. The respective coefficients of variation were 63% for feed, 65 and 63% for family and hired labour, 62% for medication and consumable cost and 74% for other costs of production (Table 3). This shows a high variation between inputs especially other costs of production and output among broiler producers in the broiler production process in the study area. This confirmed that there were different categories of poultry (broiler) farms in the study area confirming the assertion that poultry farms in Nigeria are categorized into small, medium and large-scale categories (Laseinde et al., 2005; Amos, 2006).

Production function analysis for broiler production

The R-2 for the estimated production function for broiler production in the study area was 0.848 implying that about 85% of the total variation in the value of broilers produced is accounted for by the predictive variables included in the model. The F-value of 8.73 was significant at 5% level indicating that independent variables included in the model were important in determining the flock size of broilers produced in the study area (Table 4). The results of the study also showed that feed, family labour, hired labour and value of broilers produced related positively with the flock size while cost of medication and consumables and other costs related negatively with flock size in the study area. This implied that the higher the quantities of quality feed, man-hours of family labour and hired labour and value of broilers produced in the production process the higher the flock size. Feed, hired labour and value of broilers produced were significant at 5% level of significance, family labour and medication and consumables costs were significant at 10% test level while other costs of production was significant at 1% test level respectively. In other words, the more the stock of birds in relation to inefficiently allocated inputs in the production process, the less will be the value of matured broiler with resultant effect on flock size. The estimated coefficients represent the elasticities of production (because the lead equation chosen was the Cobb-Douglas equation). The sum of elasticity of production in the area was 1.023 showing approximately constant return to scale (RTS). This implies that 1% increase or decrease of the productive resources used in the broiler production process will lead to 1.01% increase or decrease in the flock size of matured broilers produced, ceteris paribus (Table 5). According to Udoh et al. (2001a), the presence of constant returns to scale in

Table 5. Cost and returns analysis in broiler production per 100 birds per 9 weeks.

(A) Variable cost	Amount (₦)	Cost (%)
Cost of feed	27,518.33	40.97
Cost of labour	1,687.71	2.51
Cost of chicks	11,000.00	16.38
Cost of medication	9,540.49	14.21
Cost of consumables	10,733.07	15.98
Cost of transport	3,577.69	5.33
Total variable cost	64,057.29	95.38
(B) Fixed cost		
Depreciation on housing	1,092.42	1.63
Depreciation on equipment	2,010.28	2.99
Total fixed cost	3,102.70	
Total cost of production	67,159.99	100
(C) Returns		
Sales of matured broilers	6,9619.52	
Sales of manure	8,838.79	
Sales of empty feed bag	441.69	
Total returns	78,900.00	
(D) Net farm income per 100 birds	11740.01	
(E) Net farm income per bird for 1 production cycles	117.40	

Source: Field Survey (2004). The straight-line method was used to compute the depreciation allowance for the fixed inputs (housing and equipment) used.

small farm business may be caused by the use of labour intensive simple technology in production. It therefore suggests that the benefits of technical economies of scale may not be realized at the level of broiler production in the study area. Feed appears to be the major determinant of flock size with an elasticity of 1.605. This is in line with the concept of weight gain in broiler production and physiology of feed conversion in poultry production. Broilers that are well fed *ad libitum* gain weights faster and attain marketable weights early and are sold at higher unit prices.

Cost and returns analysis in broiler production

All the producers had an average of two production cycles. Table 5 showed that total production cost per 100 broilers in the study area was N67,159.99 while the total revenue per 100 broilers was N78,900.00. The analysis showed that broiler producers earned N11,740.01 per 100 as net profit. This shows that broiler production in the study area was profitable. Since broiler production is a short gestation enterprise lasting for about three months for a production cycle, it therefore means that repeating the production cycle about three to four times in a year depending on level of demand will sustain the producers economically and dietarily in the study area.

Feed cost formed the highest (41%) cost component determining flock size in this study agreeing with the works of famous poultry scientists such as Oluyemi and Roberts (1979), Downey and Trocke (1981), Coy (1982), Omotosho and Ladele (1988), Michael et al. (1992), Adepoju (1999), Ogundipe and Sani (2002), Ojo (2003), Laseinde et al. (2005) and Amos (2006). This implies that feed is a very important variable in any poultry production schema and as such demands optimum allocation and efficient utilization if profit is to be maximized. The authors also reported that the net profit for broiler production range from N94 - N120 per bird per production cycle.

The cost of housing 100 broilers within the average production period of 9 weeks was N5,462.10 (1.63%), while the depreciation allowance computed using the straight-line method was N1,092.42. Housing cost is the least cost component in the production process. This shows that housing though significant to broiler production does not constrain stocking capacity of broilers to the producers in the area. Perhaps, this might be the reason why majority (95%) of the producers practiced deep litter system at low cost conveniently.

Broiler production practices of the respondents

The study revealed that majority (60%) of the respondents did not adhered to the standard practice of

Table 6. Broiler production practices of respondents in the study area.

Practice	Best(f)	%	Poor (f)	%
Housing and equipment	48.00	40	72.00	60
Feeding and water supply	63.60	53	56.40	47
Flock medication	72.00	60	48.00	40
System of husbandry	90.00	75	30.00	25
Record keeping	37.20	31	82.80	69
Total	310.80	259	289.20	341
Percentage		51.8		48.2

Source: Field Survey (2004).

housing and equipment required for broiler production while 40% of them met the standard (Table 6). Perhaps this was why housing constituted the least cost item in the production schema but contributed positively to stocking of more flock size in the study area. The result shows that two types of feed were used in the study area. They include broiler starter fed to broilers from day old up to four weeks and broiler finisher fed to them from the fifth week until the broilers are ready for slaughter or sale. However, some farmers supplemented the recommended feed with locally formulated feed to reduce feed cost. About 53% of the producers used the conventional feed for their broilers while 47% used the unconventional (home made) feed. The result indicates that broilers raised in the area were fed *ad libitum* served quality water. Majority (70%) of the producers over-filled the feeders with feed and used spoilt feeders, which resulted to feed wastage at increased price. Consequently, the more the wastages the less will be the net profit and the stocking capacity of the respondents will be reduced.

It was also observed that majority (60%) of the producers strictly adhered to vaccination schedules and other veterinary services to the broilers kept in the area while the remaining 40% were careless about their flock medication. The consequence was mortality rate of up to 10% as distinct from 3% of the adherent scenario. 75% of the respondents used deep-litter system 25% of the respondents stocked their birds in cages kept inside the poultry pens or moved from one place to the other (fold system). None of the producers used free-range system. The benefit of this scenario is fast finishing of the stock with the possibility of more production cycles before the end of the year. The record keeping practice of the respondents was poor. Majority (69%) of the respondents do not have comprehensive records but only depended on scanty recording, experience and memory for information on the production and management activities. However, the few (31%) that kept records were more guided and accurate in their production practices and management decisions and are more aware of when and where appropriate to stock and market at reasonable prices. The computation of the percentage adoption of the respective broiler production practices revealed that about (52%) of the respondents adopted best practices capable of increasing broiler stocking capacity in the area whereas 48% of the respondents were insensitive to the adoption of broiler production best practices in the study area (Table 6). This confirms the result of the study which revealed that broiler production in the area is at infancy.

Problems of broiler production

Marketing of broiler products was the main problem (37%) affecting broiler production in the study area. This is characteristic of small scale holding. This was consistent with the findings of Badejo (1983), Wong (1991), Ogundipe (1996) and Aduku and Dafwang (2002) (Table 7). This was a critical determinant of broiler flock size during the two production cycles of Easter and Christmas in the area. The least (4%) problem factor was drug and vaccine failure. Other factors include high feed cost and irregular feed supply (25%), high cost of Day-Old-Chicks (23%), inadequate capital (12%) and inadequate extension services (11%) respectively.

CONCLUSION AND RECOMMENDATIONS

Attempt has been made to highlight the socio – economic characteristics of broiler producers that determine their flock size in the study area. The result showed that the most significant socio-economic variables that directly influence the producers flock size were household income, years of schooling, years of experience in broiler production, cooperative membership and the major occupation of the producers, feed quantity and cost, man-hours of both family and hired labour and value of broilers produced, while age, sex, marital status, costs of flock medication and consumables and sundry cost, the producers' household size inversely influence their flock size and were not significant except costs of flock medication and consumables and sundry cost which as significant at 10 and 1% test level,. Therefore, as the producers' income increases their flock size would also increase. Moreso, as they stay longer in the broiler

Table 7. Problems militating against broiler production in the study area.

Problems	Frequency	%
Inadequate market	44	37.00
High feed cost and irregular feed supply	25	21.00
High cost of day-old-chicks	23	19.00
Inadequate capital	12	10.00
Inadequate extension services	11	9.00
Failure of veterinary drugs and vaccines	5	4.00
Total	120	100.00

Source: Field Survey (2004).

production industry, they would gain more experience thereby stocking more broiler birds, adopting the best production practices and making better profit. Having smaller household size, couple with local feed formulation to reduce feed cost, government and private organizations participation in timely and subsidized input supply and forming broiler producers and marketers cooperative, the producers' flock size would reasonably increase. Poultry producers should be granted access to loan facilities from financial institutions by simplifying the lending terms such as favorable interest rates and using guarantors instead of landed property for collateral security. Extension activities should be increased in the study area and they should focus on training of the producers on the improved production management practices to enable the use of the available resources efficiently and increased productivity with a resultant impact on flock size.

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