



Empirical Analysis of Productivity among Broiler Farmers[#]

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ABSTRACT

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Broiler production supplements income of smallholder farm households. Profitability and productivity and analysis are important considerations in measuring efficiency or performance of a farm business; hence, improved output and income are not only a function of increase in the scale of production, but also how efficiently the resources are being utilized. This study therefore estimates the profitability and level of productivity among broiler farmers in Jos North, Plateau State, Nigeria. Multistage sampling technique was employed to select respondents for this study. Primary data collected were analysed using descriptive statistics, farm budgeting model and Total Factor Productivity (TFP) analysis. The study revealed that the net farm income of broiler production was ₦96,900/flock size; suggesting a relatively profitable venture with prospects for improved economic potentials. The estimated percentage profit margin was 45.6%; indicative of the percentage net margin accruable to the farmer from the estimated gross margin and benefit-cost ratio was 0.84. Furthermore, most (54.3%) of broiler farmers were sub-optimally productive as their TFP indices were below the optimal scale; attributable to sub-efficient input mix and cost of production inputs. In addition, constraints of broiler production in the study area included the following; high cost of feeds (92.9); high cost of chicks (85.7%); financial constraints (80%); high cost of poultry equipment (55.7%); high cost of medication (35.7); disease outbreak (28.6%) and inefficient market system (21.4%). Improving access to and subsidy of poultry feeds, chicks, production inputs and credit, extension, medical services and cooperative formation for market linkages are strongly recommended.

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Introduction

Livestock production is an important sub sector in agriculture (USDA, 2013). Livestock farming also supplements the income of small and marginal farm households (USDA, 2013). Livestock production encompasses selection, breeding, care and marketing of animal products and by products. Among livestock based vocations; poultry occupies a pivotal position because of its enormous potential to bring about rapid economic growth. The term poultry applies to wide variety of birds of several species including chickens, guinea fowls, pigeons, geese, swans, Peafowl, and other game bird (FAOSTAT, 2009; USDA, 2013). Poultry farming is the most commonly practiced livestock farming in many parts of the world. Broilers have emerged next to milk as a contributor to the output from livestock sector in recent years. Nigeria has great potentials to produce a wide range of livestock on its climate and agro-ecological conditions. A constant threat to human survival has been apparent difference between the rate of food production and human

population growth. The need to meet protein requirements from domestic sources demand intensification of production of poultry meat derived from poultry birds; poultry has a shorter lifecycle and is much more prolific than larger livestock, apart from the fact that poultry production is being conceived to be a technically easy venture and most available source of animal protein. Poultry constitute by far the largest group of livestock consisting of chicken, ducks and turkey, in total poultry product (eggs and meat) constitute about 30% of all animal protein consumed worldwide within the last 10 years, this proportion is predicted to increase to 40% over the years (Peterman, 2003). Throughout the developing world many people living in rural areas keep small flock of scavenging poultry, these birds are usually chickens and have an important role to play in poverty alleviation and food security by providing poultry meat for family consumption and for sale to provide additional income, or for social obligation; poultry production also provides manure and

are active in pest control, in many countries the birds are owned and managed by women and children (Tauson, 2005). The socio-economic importance of the diversified products derived from poultry farming are enormous; for instance broiler, meat and the dropping which are further used to improve soil fertility. Moreover, the marketability of domestic fowls and broiler is faster and easier compared to other animal owing to its affordability. Poultry is also kept for generation of revenue and employment; they provide raw materials for many industries. For instance; the yolk is used in the manufacture of paint, soap and shampoo, while the feathers are used making pillows, mattresses and cushions (Emingers, 1997; Okon, 1995).

Broiler farmers usually make rational decisions for future investment in their enterprises based on previous production performance. Cost and returns are important considerations, as they are used as a basis to measure efficiency or performance of a farm business. Sanni and Ogunidipe (2003) suggested that broiler farmers selected within the local government area should pay particular attention to major cost components by seeking efficient ways of maximizing and utilizing limited farm resources. Thus, Haruna *et al.* (2002) concluded that improved output and profitability in poultry production is not only a function of increase in the scale of production, but also how efficiently the resources are being utilized. The ban on importation of poultry products by the Federal Government of Nigeria caused a turnaround in the poultry industry. This growth partly due to the ban can also be attributed to improved disease control and the use of veterinary services by lots of farmers, (CBN, 2004). However, poultry production in Nigeria still has a long way to go to fulfill its role as a valuable tool of socio-economic improvement of the rural population. Despite growth in the broiler production industry in Nigeria, local demand has not been matched by local supply (Tijjani *et al.*, 2006). It is against this background that this study examines the profitability and productivity among broiler farmers in Jos north Local Government Area (LGA) of Plateau State. Rapid increase in human population results to an increase in demand for poultry products such as meat and eggs. To meet the animal protein needs of the growing Nigerian population over the years has been insurmountable; demand for the products have continued to outstrip supply. These have been attributed to factors such as cost of production input, inadequate technology, inaccessibility to extension services, etc. This study therefore estimates the profitability and level of productivity among smallholder broiler farmers in the study area and will attempt to find answers to the following research questions;

- Is broiler production profitable?
- What is the level of broiler productivity in the study area?
- What are the constraints of broiler production?

Materials and Methods

Study Area

This study was carried out in Jos North Local Government Area (LGA) of Plateau State, Nigeria. It is located between longitude 8°40'N & 9°50'E and latitude 9°40'N and 10°45'E (NBS, 2010). Jos North LGA has a near temperate climate, though located in the tropics. It has an average temperature of between 18°C-30°C, with an

altitude of 1,500 meters above mean sea level and annual rainfall of 1,300mm -1,500mm per annum (NBS, 2010). It has a population of 429,300 and a total area of 291km²(NPC, 2006). The LGA has one district (Gwong district) and fourteen (14) wards namely Naraguta A, Naraguta B, Abba na Shehu, Ibrahim Katsina, Ganagare and Tudun wada, Janta ,Garba Daho, Tafawa Balewa, Jos Jarawa, Ali Kazaure, Sarkin Arab, it has an upland area with undulating hills mountains, out crops, forest reserves, rivers, settlements, fertile agricultural land for dry and rainy season farming (FAOSTAT, 2009).

Sampling Techniques

A multistage sampling technique was employed to select respondents for this study. The first stage involved the purposive selection of 4 wards (Naraguta B, Salisu Adamu, Ali Kazure, Garba Daho) out of the 14 wards in the study area, due to the prevalence of poultry farmers in this area. The second stage involved the random selection of 4 communities in each of the 4 wards. In the last stage, from compiled lists of broiler farmers a random selection of 10% population from a sample frame of 709 households was selected to give a sample size of 70 farm households.

Validation of the Research Instrument

Content validity was used to measure the adequacy of the instrument items in this study. Content validity in this context sought to determine the relevance and adequacy of items included in the instruments. Using the Jury Method (Kerlinger, 1973), the entire instrument was subjected to the scrutiny of relevant experts. Each of the experts was requested to independently give his expert opinion on the relevance and adequacy of the items with respect to the objectives of the study. Various questions of the data collection instrument were scrutinized in terms of how relevant they are to the specific objectives of the study as well as how the prepared questions exhaustively cover the specific objectives of the study. Furthermore, the data collection instrument was examined against the background of its adequacy in regard to the accomplishment of the objectives of the study.

Instrument Reliability Test

An instrument is considered reliable when it consistently produces the same result when applied to the same sample many times (Osuala, 2005). The test-retest method of affirming instrument reliability was employed for this study. It was computed by calculating the correlation coefficient between two distributions of test scores obtained at two different times on the same respondents. The instrument was trial tested on 20 respondents drawn from two wards in the Local Government Area viz: Naraguta B. and Salisu Adamu. The information obtained from the responses to the instrument was analysed using product-moment correlation analysis. High value of mean product-moment correlation coefficient of 0.715 indicated high reliability of the instrument.

Method of Data Collection

The data collected for this study was obtained from primary sources. The primary data for this research was collected through the use of well-structured questionnaires. However interview schedules were also conducted on face to face basis.

Analytical Techniques

Primary data collected was analyzed using descriptive statistics, farm budgeting model and Total Factor Productivity (TFP) analysis. Descriptive statistics (frequency counts and percentages) was used to identify the constraints of broiler production. The farm budget technique (costs and returns analysis) was used to determine the costs, returns and profitability of broiler production in the area. The Total Factor Productivity (TFP) analysis was used to estimate agricultural productivity by comparing an index of agricultural inputs to an index of outputs.

Farm Budget model

The farm budget model adopted for this study was the costs and returns analysis. Indicators such as net farm income, percentage profit margin and benefit-cost ratio were analyzed. The budgetary techniques are presented in equation (1);

$$\text{Net farm income (N.F.I)} = \text{GFI} - \text{TC} \quad (1)$$

Where;

GFI = gross farm income

TC = Total cost; expressed mathematically in equation (2)

$$\text{TC} = \text{TVC} + \text{TFC} \quad (2)$$

TVC = Total variable cost (₦) (feed, medication, labor, day old chicks and litter)

TFC = Total fixed cost (₦) (depreciation cost of poultry pen, poultry equipment's and farm tools).

The straight line method of evaluating depreciation cost (₦) will be used to estimate the depreciation of farm assets (farm tools and equipment's). The straight line method of depreciation is specified in equation (3);

$$D = \frac{P - S}{N} \quad (3)$$

Where;

D = Depreciation;

P = Purchase price of the assets;

S = Salvage value of the assets; and

N = Number of years of life of the assets

To further substantiate the profitability of this enterprise, profitability ratios such as: percentage (%) profit margin and benefit-cost ratio were analysed and specified in equations (4) and (5) respectively;

$$\text{Percentage (\%)} \text{ Profit margin} = \frac{\text{Net farm income}}{\text{Total revenue}} \times 100 \quad (4)$$

$$\text{Benefit-cost ratio (BCR)} = \frac{\text{Net farm income}}{\text{Total cost}} \quad (5)$$

Total Factor Productivity

Total factor productivity (TFP) is a method of calculating agricultural productivity by comparing an index of agricultural inputs to an index of outputs (Fakayode et al., 2008). This can be computed following Key and McBride

(2005) as the ratio of the output to the total variable cost (TVC), specified implicitly in equation (6):

$$\frac{\text{TFP}}{\text{TVC}} = \frac{Y}{\sum P_i X_i} \quad (6)$$

Where:

Y = quantity of output;

TFP = Total Factor Productivity

TVC = total variable cost;

P_i = unit price of the ith variable input; and

X_i = quantity of ith variable input.

This methodology ignores the role of total fixed cost (TFC) as it does not affect either the profit maximization or the resource-use efficiency conditions (Fakayode et al., 2008), expressed mathematically in equation (7);

$$\text{TFP} = \frac{Y}{\text{AVC}} \quad (7)$$

The interpretations of TFP index are given as follows;

(< 0.1) = Sub-optimal;

(1.0 – 1.09) = Optimal; and

(≥ 1.10) Super-optimal.

Results and Discussion

Cost and Returns of Broiler Production

Table 1 revealed that the net farm income of broiler production in the study area was ₦96,900/flock size, suggesting that broiler production was a relatively profitable venture with prospects for improved economic potentials. The estimated total variable and total fixed costs were ₦108,600/flock size and ₦7000/flock size respectively, suggesting that a significant proportion of the gross farm income (total revenue) was expended as production cost. The estimated total cost for broiler production was ₦115,600/flock size. Cost of feed (36%) and day old chicks (34.5%) constituted the most significant production cost components. The estimated percentage profit margin was 45.6%, which suggests the percentage net margin accruable to the farmer from the estimated gross margin. The benefit-cost ratio was 0.84, which is indicative that for every naira (₦1) invested in broiler production ₦0.84 can be accruable in return. These ratios are indicative of the profitability index of broiler production in the study area. This corroborates with the findings of Sani et al., 2007; Jellason and Sani, 2007 who also reported similar result on the profitability of broiler production.

Total Factor Productivity of Broiler Production

The summary statistics of the total factor productivity result in Table 2 revealed that most (54.3%) of broiler farmers were sub-optimally productive as their TFP indices were below the optimal scale, which indicated sub-optimal input mix allocation in the production process; 28.6% were found to be optimally productive as indicated by their TFP indices and 17.1% were super-optimally productive as their TFP indices were above the optimal scale. The low productivity could be attributed to sub-efficient input mix and cost of production inputs, which yielded low output in respective broiler farms in the study area. This corroborates with the findings of Fakayode et al., 2008; Ojo, 2003; Farrel, 2005; Aboki et al., 2013 who also reported similar results in their study on Agricultural Productivity Profiles.

Table 1. Cost and Returns of Broiler Production/Average Flock Size (₦/100 Birds)

	Variables	Amount (₦/100 birds)	Percentage
	Variable Cost (₦)		
A	Feeds	41,600	36
	Medication	5000	4.3
	Labour	10,000	8.7
	Equipment's/Litter	12,000	10.4
	Day old chick	<u>40,000</u>	34.5
	Total variable cost	<u>108,600</u>	93.9
	Fixed Cost (₦)		
B	Depreciation cost of asset	<u>7,000</u>	6.1
	Total Fixed Cost	<u>7,000</u>	
C	Total Cost (TVC + TFC)	115,600	100
D	Total Return (₦) (@15% mortality @7 weeks) (@₦2,500 per bird)	212,500	
E	NFI (₦) = TR – TC	96,900	
F	Percentage (%) Profit margin		45.6
G	Benefit cost ratio	0.84	

Source: Field Survey, 2019

Table 2. Distribution Based on Total Factor Productivity of Respondents

Variable	Frequency	Percentage (%)
Sub-optima (<1.00)	38	54.3
Optima (1.00 -1.09)	20	28.6
Super-optima (>1.10)	12	17.1

Source: Field Survey, 2019

Table 3. Constraints of Broiler Production in the Study Area

Constraints	Frequency	Percentage (%)
High cost of feeds	65	92.9
High cost of breeding stock (chicks)	60	85.7
Financial constraints	56	80
Cost of poultry equipment	39	55.7
High cost of medication	25	35.7
Diseases outbreak	20	28.6
Inefficient market system	15	21.4

Source: Field Survey, 2019

Constraints of Broiler Production

Table 3 revealed that the constraints of broiler production in the study area included the following; high cost of feeds (92.9%); attributable to the high cost of poultry feed production by firms. Also, most of the farmers wish to wait for government subsidized and qualitative feeds which are grossly inadequate or nonexistent. High cost of breeding stock (chicks) (85.7%); attributable to poor access, non-subsidization and production costs of breeding stock (chicks) by agricultural firms. Financial constraints (80%); attributable to poor access to financial institutions and agricultural credit among the respondents; hence their meager savings are not sufficient to cater for all their poultry farm activities. High cost of poultry equipment (55.7%); attributable to the cost of poultry technology fabrication by firms; also, poor access to agricultural technology/inputs may result to inflated costs of poultry equipment's and tools. High cost of medication (35.7%); attributable to high cost of veterinary medicine research and services. Disease outbreak (28.6%); attributable to adoption of poor farm practices among the respondents. Inefficient market system (21.4%); attributable to poor and inadequate market linkages among respondents in the study area. All the constraints identified

by the farmers significantly affected broiler production in the study area. This result is in line with the findings of Oluymi, 1979; Ikhatua, 2000; Ojo, 2003; Hodges, 2009; Aboki *et al.* (2013) who opined similar constraints in poultry production.

Conclusion and Recommendations

This study analyzed broiler productivity among smallholder farmers in Jos north, Plateau State, Nigeria. The results revealed that broiler production was relatively profitable in the study area; with possibilities for further increase in output and farm income. Furthermore, the result revealed that most of the broiler farmers were sub-optimally productive as their TFP indices were below the optimal scale. The low productivity could be attributed to sub-efficient input mix and cost of production inputs. All the constraints identified by the farmers were economically important and significantly affected broiler production in the study area; hence effort should be made to minimize the constraints faced by the farmers. Based on the findings of this study, the following recommendations are made for policy actions to improve output and income derivable;

- Formulation of policies to subsidize high cost of poultry feed production by firms.

- Formulation of policies to subsidize and improve access to breeding stock (chicks) in the study area.
- Implementing strategies that will make credit facilities accessible and affordable to the farmers through cooperative formation and financial inclusion policy.
- Formulation of policies to encourage development and supply of modern production technologies using indigenous methods.
- Formulation of policies that will improve poultry farmer's access to extension and medical services.
- Formulation of policies to disseminate and improve adoption of management practices and measures for efficient pest and disease control.
- Improving market linkages that efficiently and optimally to maximize profit; through formation of farmers group or cooperatives that will handle supply and distribution of agricultural commodities.

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Author A designed the study, managed the literature searches, handled the computation of the statistical analysis and wrote the protocol and first draft of the manuscript. Author A also read and approved the final manuscript.

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