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Resource-use Efficiency in Small Scale Broiler Production in Owerri Municipal Council of Imo State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author MOO designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors EEU and FNA managed the analyses of the study. Author IIU managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

The study analyzed the resource use efficiency in small scale broiler production in Owerri Municipal Council of Imo State. Data were collected with well structured questionnaire from 40 randomly selected broiler farmers. The questionnaire were analyzed with the appropriate statistical and econometric tools. The result showed that the small scale broiler producers were profitable in the study area. Feed cost was very high consisting of 39.37% of the total cost and 44.63% of the variable cost of production. Farm size, labour, feed cost, medication are all important factors affecting the net revenue of the farmers in the study area. The net revenue of the broiler farmers was estimated at N140,989.56 per farmer per year implying that small scale broiler production is profitable. The farmers were inefficient in the use of resources such as land, labour, capital, feed, medication and other inputs. The benefit cost ratio was estimated at 2.22, implying that for every one naira invested in small scale broiler production in the study area, 11 kobo was gained thus

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profitable. The major constraints to small scale broiler production are lack of credit and the incidence of pest and diseases. Agricultural policies and programmes should focus on improving the farmers' access to credit and appropriate technology the farmers' access to credit and appropriate technology should be developed to reduce losses through the incidence of pest and diseases.

Keywords: Resource; allocative efficiency; benefit cost ratio.

1. INTRODUCTION

Livestock is very important to the socio-economic development of Nigeria. It contributes about 9-10% of agricultural GDP [1]. Moreover, Nigeria's chicken population is about 150.682 million [2] of which 25% are commercially farmed, 15% semi-commercially, and 60% in backyards. Consequently, livestock represents an important source of high quality animal protein, providing about 36.5 per cent of the total protein intake of Nigerians. It is one of the highest investments in agriculture with net worth of N250 billion. Agriculture in Nigeria (September, 2018). Retrieved from http://Agriculturenigeria.com. Poultry production is one of the most important economic activities of small scale farmers in Imo State. According to (FAO, 1999), poultry production forms an important component of livestock sub-sector in Nigeria and forms the largest group consisting of chicken, ducks and turkey. The importance of poultry production to the Nigeria economy cannot be over emphasized; this is because it has become popular among small holder farmers which have also contributed immensely to the economy of Nigeria. According to Ologbon and Ambali [3], poultry contributes to about 15 percent of the total annual protein intake with 1.3 kg of its products consumed per head annum.

This contribution is not unconnected to the significant improvement this industry has undergone through the availability and use of improved vaccines which has reduced mortality rate (CBN, 1999). Poultry keeping provided a method by which rapid transformation in animal consumption was achieved in Nigeria, this is because there were no social and cultural inhibitions associated with its consumption. This transformation could also be achieved if the productive process associated with its production is modernized.

Poultry production enjoyed a decade of boom between the mid 1970's and 1980's as against cattle, goats and sheep. The population of the industry grew from less than 1 million in the mid 1960's to over 40 million by the early 1980's [4]. The progress of the industry, broiler inclusive was accelerated by the various interventions of the government in the areas of training, and input supply. Unfortunately, those giant strides achieved by the industry went southward due to policy inconsistencies from the government.

Inspite of those achievements livestock supply has remained low. Presently, another challenge in this era of food insecurity has been how to feed the ever growing population in developing countries as opposed to the arithmetic progression of food supply. It would be important to note that to achieve optimal production in broiler production, production resources should be used efficiently.

Efficiency is an input-output relationship. In 1957, Farrell decomposed efficiency into two elements, the technical and the allocative efficiencies. Allocative efficiency or price efficiency quantifies the firm's success in choosing an optimum combination of inputs [5]. Consequently, how efficient were small scale broiler farmers in the study area? and what were the measure of their allocative efficiencies?

Given these background, the study examined whether resources were efficiently utilized by these farmers, their socio-economic characteristics, their benefit cost ratio, cost and returns, the factors affecting the net revenue of the small scale poultry producers and their allocative efficiencies.

2. MATERIALS AND METHODS

The study was carried out in Owerri Municipal Council of Imo State; Nigeria. The area is bounded by Owerri North and Owerri West Local Government Areas of Imo State. It has five villages commonly called "Owere nchi ise". It has favourable warm temperatures and sufficient moisture. Owerri Municipal is located between latitudes 80º 30' and 7º 15' N and longitude 50^0 15' and 5º 30ºE. It has a mean annual rainfall that varies from 2010 mm – 2500 mm and a

mean temperature of 26º to 28ºC [6]. The soil type is acidic while the topography is virtually flat in the council.

Data for this study were from primary and secondary sources. The primary data were aided by the use of well structured questionnaire. Purposive sampling technique was used to select four out of the five villages in Owerri Municipal. The villages selected were Umuonyeche, Umuororonjo, Amawom and Umuoyima. The purposive selection was as a result of easy access to access to farmers in the areas selected. The sampling frame was the list of broiler farmers in the selected villages compiled with the assistance of Agricultural extension agents and the officials of the poultry farmers association in the villages. From this sampling frame a total of ten farmers were randomly selected from each of the four villages giving a total sample size of 40 small scale broiler farmers. Data used for this study were analysed by the use of descriptive statistics, cost and return analysis, Benefit cost ratio and multiple regression technique.

Specifically, descriptive statistics such as percentages and frequency counts were used to analyze the socio-economic characteristics of the broiler farmers, gross margin model was used to determine the profitability of the farmers, multiple regression model was used to determine the factors affecting the net revenue of the broiler farmers and ratio of marginal value product of the broiler output to the marginal factor cost of the broiler inputs. The profitability of the small scale poultry producers are specified thus:

$$GM = TR - TVC$$

$$\text{(Profit) Net Income} = GM - TFC$$

Where,

GM = Gross Margin
TR = Total Revenue
TVC = Total Variable Cost
TFC = Total Fixed Cost

The factors affecting the net revenue of small scale broiler producers were analyzed using multiple regression model. The model is specified thus,

$$Y=F\ (X_1, X_2, X_3, X_4, X_5, X_6, e)$$

Where

Y=Net Revenue (Naira)
X_1=Farm Size (Number of birds)
X_2=Labour (Naira including family and hired labour)
X_3=Capital input (Naira including depreciation in farm Implements)
X_4=Feed (Naira)
X_5=Medication (Naira)
X_6=Other Costs (Naira)
e=error term

The multiple regression models were fitted for inputs using the linear, semi log, exponential and double log. The lead equation of the four functional forms was selected based on the value of multiple coefficient of determination (R^2) as well as the sign and significance of the regression parameters. The resource use efficiency of the small scale broiler farmers was determined by determining the allocative efficiencies of the inputs.

$$\text{Allocative efficiency} = MVP_i / MFC$$

The marginal value product (MVP_i) of each input will be obtained by taking a partial derivative of the revenue function with respect to input that is

$$MVP_i = b_i Y / X_i$$

Where

bi = regression coefficient of the ith input
Y=total revenue
X_i=quantity of ith input used.

MVC and MFC were calculated to know whether the inputs used were optimally, over or under utilized [7].

Decision rule, if:

MvP/MFC>1(resources were under utilized)
MvP/MFC<1(resources were over utilized)
MvP/MFC=1(resources were optimally utilized)

The return on naira invested was also used to establish profit. This is the ratio of gross revenue to total cost. It is also called Benefit Cost ratio BCR commonly used for project evaluation. This concept was also applied by [8].

The Decision rule is specified thus;

BCR > 1 =Profit
BCR = 1 =Break even
BCR < 1=Loss

3. RESULTS AND DISCUSSION

3.1 The Socio Economic Characteristics of the Small Scale Broiler Farmers

The socio economic characteristics of small scale broiler producers as presented in Table 1.

Table 1. Socio economic characteristics of the small scale broiler farmers

Items	Frequency	Relative frequency
Age		
Less than 20	0	0
21 – 40	8	20
41 – 60	18	45
61 and above	14	35
Total	**40**	**100**
53.5 years		
Pattern		
Individual	28	70
Partnership	12	30
Total	**40**	**100**
Market outlet		
At home/Farm	30	75
Nearby Market	10	25
Distant Market	0	0
Total	**40**	**100**
Labour type		
Family Labour	28	70
Hired Labour	12	30
Total	**40**	**100**
Farm size (No of birds)		
≤ 100	19	47.5
101 – 200	12	30.0
201 – 300	6	15.0
301 – 400	2	5.0
401 – 500	1	2.0
500 and above	0	0.0
Total	**40**	**100**

Mean = 159 (Birds)
Source: Author's Computation

A good knowledge of the farmer's socio economic characteristics can be resourceful in interpreting operating systems of the farmers as well as the output of these farmers. The results showed that the ages of the farmers range from 41 to 60 years and a mean age of 53.5 years. The farmers within this age range constitute 54% of small scale broiler producers in the study area. This indicated that they are middle aged and are therefore considered energetic and active. By virtue of their age, they are capable of carrying out tedious farm activities. This is consistent with the findings of (Olagunju and Ajiboye, 2010). The farmers are predominantly males, constituting 55% of the broiler farmers. This did not mean that women were not engaged in broiler keeping but form 45% of the total population of broiler farmers in the area. The ownership pattern were mainly individual ownership which was about 70% of the broiler producers in the area.

About 75% of the farmers sell their birds at home or on the farm while 25% of them sell at nearby markets implying that transportation cost would be minimal. The broiler farmers in the study area had a flock size of less than 100 to 200 birds and a mean of 159 birds per farmer. This is in line with the result of [9].

3.2 Profitability of Small Scale Broiler Production

The Cost and return analysis of small scale broiler producers in the study area has been presented in Table 2.

Return per Naira Invested

GR / TC= 2.22
GR = Gross Revenue
TC = Total cost

The Table showed that the total cost incurred in broiler production per farmer per year is ₦114,707.44 which include the capital operating expenses and fixed costs. The total variable cost amounted to ₦101,176.94 with 88.21% of it accounting for the bulk feed cost accounted of the cost, for 44.63% of the cost and 39.37% of the total cost. This implied that they are very important cost component in the study area and cannot be overlooked. The entire production yielded a net profit of ₦40,989.56, implying that the small scale producers of broilers earned a profit in the study area. This is consistent with the findings of Ike and Ugwumba [10] who also posited that broiler production is profitable. Though small scale broiler production generated profit, there is need to increase the scale of operation to minimize cost. The mean net revenue of the bird was ₦971.83 per bird. The return on naira invested showed that for every one naira invested in broiler production, there is a profit of ₦0.11k or 11k thus establishing the fact that broiler production is still profitable at the present scale of operation in the study area.

3.4 Factors Influencing the Net Revenue of Small Scale Broiler Producers in the Study Area

The result of factors influencing the net income of small scale broiler producers in the study area is presented in Table 3.

The results of the multiple regression analysis showed that the exponential function was the lead equation based on it having the highest value of the coefficient of multiple determination (R^2), more significant variables, the highest F – value and conformity to a prior theoretical expectation. The results showed that farm size (X_1), labour (X_2), feed cost (X_4) and medication (X_5) are significant at 1% while capital (X_3) is significant at 5% level. This indicated that input (X_6) was not an important determinant of net return in broiler production. The coefficient of multiple determination, R^2 of 0.74 indicated that about 74% changes in the net return of broiler farmers were explained by the explanatory variables and F – value of 16.00 is significant. The coefficient of the farm size (X_1) was positive and significant implying that the larger the farm size, the larger the net income. The coefficient of labour was negative implying that the larger the expenses on labour (X_2), the smaller the net income. The coefficient of capital input (X_3) was positive implying that the more the capital input, the more the net income. Feed cost (X_{10}) had a negative sign meaning that the higher the expenses on feed, the lower the net income. This is also the case with medication (X_5) which was negative and significant. This result was in line with the findings of Altahat et al. [11].

3.5 Estimation of the Allocative Efficiency of Small Scale Broiler Farmers

The allocative efficiency indices for the inputs used are presented in Table 4.

The Table 4 showed that the allocative efficiency indices for all the inputs. The results revealed that none of the farmers achieved absolute allocative efficiency in the use of any of the resource inputs. This was because the ratio of the MVP to MFC was less than unity. This result suggests that increasing the farm size until MVP becomes equal to MFC could increase profit on the other hand reducing the costs of labour, feed, medication would increase profit. This finding was consistent with the findings of [9], Oladecbo and Ambe-lamidi (2007) and Vincent et al. [12].

3.6 Constraints to Increased Broiler Production

The major constraints to small scale broiler production was lack of credit the incidence of pest and diseases, the high cost of feed and limited market for the scale of the broilers produced. This implied that if broiler farmers had access to credit and subsidized input like feed, their profitability will be increased.

Table 2. Cost and return analysis of small scale poultry producers

Item	Amount	% in cost	% in total cost
Total Revenue (TR)	255, 697.50		
Variable Cost (VC)			
Day old chicks	34, 481.25	34.01	30.06
Feed	45,159.00	44.63	39.37
Medication	4, 427.50	4.38	3.86
Labour expense	12,417.19	12.27	10.83
Miscellaneous	4,691.50	4.64	4.09
Total Variable Cost (TVC)	101,176.94	99.93	
Cross Margin(GR- TVC)	154,520.56		
Fixed Cost (FC)			
Depreciation	13,530.50		
Total Fixed Cost	13,530.50		11.79
Total Cost (TC)	114,707.44		100
Mean net revenue	140,989.56		
Mean net revenue per bird	971.83		

Source: Author's Computation

Table 3. Factors influencing the net income of small scale broiler farmers

Variables/statistics	Linear	Semi log	Double log	Exponential
Farm size (X_1)	21.0694	3.8867	0.0648	0.0089
	(2.5914)**	(4.3085)**	(2.1457)*	(4.2381)**
Labour (X_2)	- 17.1167	- 1.4291	- 0.0713	- 0.0072
	(- 1. 0751)	(- 1.3428)	- (0.0609)	(- 3.2727)**
Capital input (X_3)	10.3825	9.3042	0.0529	0.0069
	(1.1674)	(1.1463)	(-4.598)**	(2.4643)*
Feed (X_4)	- 13.1064	- 7.4821	- 0.0492	-0.0094
medication (X_5)	(-3.9756)**	(- 0.9964)	(-4.5981)**	(- 3.2414)**
	- 16.4193	-3.115	0.0671	0.0075
	(-1.0969)	(-1.0839)	(-1.2684)	(-3.125)**
other inputs (X_6)	(- 12.1824	- 4.9882	- 5.0593	- 0.0058
	(-1.0992)	(-1.2792)	(-.50684)	(-1.234)
Constant	1164.982	408.3319	43.0679	39.1182
R^2	0.4536	0.3937	0.8427	0.7442
F – value	4.5542	3.5661	7.4186	16.002
Sample size	40	40	40	40

Source: Author's Computation
Figures in parenthesis are t- ratios
*** = P.0.01 and * = P.0.05*

Table 4. Allocative efficiency indices for broiler farmer

Variables	MPP (b_i)	Means	MVP ₦	MFC ₦	WT	Decision
Farm size	0.0089	0.07	32,510.11	10,000,000	0.0033	Over utilized
Labour	0.0072	16.556	111.199	750	0.148	Over utilized
Capital	0.0069	13,530.5	0.0069	1.00	0.0069	Over utilized
Feed	0.0094	1881.67	1.277	1200	0.00106	Over utilized
Medication	0.0075	4427.5	0.007	1.00	0.0075	Over utilized
Other costs	0.0058	4691.5	0.0058	1.00	0.0058	Over utilized

Source: Author's Computation

4. CONCLUSION AND RECOMMENDATION

The results obtained from the analysis revealed that small scale broiler production was dominated laymen of middle age. Small scale broiler in Owerri Municipal Council of Imo State was profitable with a net income of 140, 989.56 per year per farmer. Farm size, labour, capital, feed and medication are important factors affecting the net income of broiler farmers in Owerri Municipal Council. The farmers did not achieve absolute allocative efficiency in the use of their resources rather they over utilized the inputs.

One of the major constraints undermining small scale broiler production is high cost of feed. Government should make conscious efforts to make funds available to researchers who want to discover affordable feed formulation techniques for poultry. Improved extension services should also be made available to the farmers by appropriate agencies to reduce the high mortality rate of these birds due to lack of knowledge and experience on the part of the farmers.

There was also need for government to make sufficient resources available to farmer's organizations. These financial institutions should provide farmers with low interest rate credit facilities to enable them secure adequate farm resources. This will increase their profits.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Food and agricultural organisation of the united nation (FAO). Poultry Meat and Eggs: Agribusiness Handbook. Rome, Italy; 2006.

2. UNDP. Annual Report 2006: Global Partnership For Development; 2006.
3. Ologbon AC, Ambali I. Poultry enterprise combination among small scale farmers in ogun state, nigeria: Technical efficiency approach. Journal of Agriculture and veterinary Sciences. 2012;8.
4. Adene DF, Oguntade AE. The structure and importance of commercial and rural based poultry industry in Nigeria. Nigerian Poultry sector report, FAO (Rome) study; 2006.
Available:http://www.fao.org/docs/eins/upload/214281/review Nigeria
5. Farrell M. The measurement of productivity. Journal of royal statistical society. 1957;120(3):253-2811.
6. Imo State tripod vision: State Economic Empowerment and Development Strategy (SEEDS): Published by State Planning and Economic Development Commission, Imo State; 2006.
7. Olayide SO, Heady EO. Agricultural production economics. University publishing house, University of Ibadan. 1982;108-114.
8. Olasunkanmi NO, Yusuf O. Resource use efficiency in small scale catfish farming in Osun State, Nigeria.sky. Journal of Agricultural Research. 2014;3(1):037-045.
9. Ukwuaba I, Inoni OE. Resource use efficiency among small-holder broiler farmers in oshimili north local government area of Delta state. International Journal of Poultry Sciences. 2012;11(11):700-705.
10. Ike PC, Ugwumba COA. Profitability of small scale broiler production in Onitsha North Local Government Area of Anambra State. International journal of poultry Science. 2011;10:106-109.
11. Altahat E Ali, Sharafat A, Altarawneh M. Factors affecting profitability of layer hens enterprises. American Journal of Agricultural and Biological Sciences. 2012; 7(1).
12. Vincent NBK, Lagart MK, Ngeno EK, Kipsat MJ. Resource use efficiency in poultry production in Bureti District, Kenya. Paper presented at the joint conference of 3rd African Association of Agricultural Economist (AAAE) and 48th Agricultural Association of South Africa (AEASA), Cape Town, South Africa. 2010;19-23.

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