Analysis of Profitability and its Determinants in Small Scale Turkey Production in Anambra State, Nigeria

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Abstract: *The study analysed the profitability of turkey production and its determinants in Anambra State, Nigeria. This was borne out of the deficit reported on the animal protein supply and consumption of the people in the area.The data used were obtained from a cross-sectional survey of turkey farmers in the state. Multi-stage sampling technique which included purposive and simple random techniques were used to select 83 farmers for the study. The data collected were analysed using descriptive statistics, ordinary least square (regression), budgetary tools and profitability ratios. The results showed that majority of the farmers were 43.9 years, attended secondary education, had turkey farming experience of 11.5 years and a household size of 6 persons on the average. The budgetary estimation showed a Net return of ₦1, 498.27,Profitability Index (PI) of 0.57, Return on Investment (RoI) of 56.67%, Capital Turn-Over (CTO)of 1.57 and a Gross ratio of 0.64. These results, with a Z-value of 42.49 (P<0.01) indicated that the enterprise was profitable. Experience, stock size, and cost of medication were the positive determinants of profitabilityof the enterprise in the area,(P<0.05).Hence, farmers are encouraged to invest more in the production of turkey birds.*

Keywords: Turkey production, Costs and returns,profitability, determinants

1. Introduction

The livestock industry has been an important agricultural subsector of the Nigerian economy considering its contribution to the Gross Domestic Product (GDP) and the importance of animal protein in the diet of the people. Mgbakor and Nzeadachie, (2013), reported that "animal protein provides man with high quality food nutrients for growth and tissue development; it determines the level of nutrition of the populace and the health of the work forces, which, in turn, determines the development of a nation and its economy". Parallel to this, Bloom, Canning and Sevilla (2001) reported that good health has a positive, sizeable, and statistically significant effect on aggregate output and economic growth. On the other hand, Food and Agriculture Organization, (FAO), (2015) reported that low intake of protein is capable of predisposing victims to weight loss, weakness, fatigue, poor appetite and anaemia.Therefore, the importance of animal protein which is a major constituent of balanced diet in the meal of the people cannot be overemphasised.

The major sources of animal protein in Nigeria, according to Ajala, Nwagu, Sekoni and Adeshinwa (2007), include Cattle, sheep, goat, swine and poultry. However, Ume, Ezeanoand Obiekwe, (2018) opined that in the livestock industry, poultry birds are most capable in providing dietary protein intake in most developing countries due to their intrinsic features. These, according to Ezeano, Ume, Okeke, and Gbughemobi(2017) include that they have fast growth rate, high feed conversion efficiency, low production cost per unit relative to other types of livestock, ability to be marketed at different ages, are commonly used in ceremonies,and have short production cycle. In addition, Aboki, Jongur and Onu (2013), reported that the meat is very tender, and acceptability to consumers is high regardless of their religious beliefs. More so, FAO (2010) opined that "poultry meat is rich in proteins and is a good source of phosphorus and other minerals, and of B-complex vitamins. Poultry meat contains less fat than most cuts of beef and pork. Poultry liver is especially rich in vitamin A. It has a higher proportion of unsaturated fatty acids than saturated fatty acids. This fatty acid ratio suggests that poultry may be a healthier alternative to red meat. These intrinsic features of poultry birds endeared it as a veritable source of animal protein in the people's diet.

In Anambra State, Nigeria, poultry production is spread round every part as a result of its economic viability and potentials in wealth creation and provision of employment especially for the rural dwellers. Therefore, the potentials of poultry production, if properly harnessed, will not only increase farmers' income, it will also boost the animal protein supply in the area, thereby closing the deficit.

2. Statement of the Problems

It is common knowledge that cattle, sheep, goat, pig and poultry are the most common primary sources of animal protein in Nigeria. However, Ike and Udeh (2011) reported that the daily estimated per capita animal protein consumption in Nigeria was 17gm,below the FAO stipulation of 36gm. Ume, Ezeano, Dauda and Okeke (2016) reported that the animal protein supply in the Nigerian diet especially in the rural areas have remained inadequate. Therefore, what is needed is a strategy that could be adopted to solving this problem, and poultry production stands a better option. This is because, it has been adjudged the most capable in bridging the animal protein supply gap in developing countries due to its intrinsic features, and according to FAO (2015), broilers and turkeys are the most common poultry species. On the other hand, Ukwuaba and Inoni (2012) opined that investmentin poultry enterprise is attractive because the production cost per unit is low compared to other types of livestock. Therefore, the problem for which solution is sought is that of balancing the deficit in

the supply of animal protein using poultry species production.

However, poultry production in Nigeria is not without problems. Ike and Ugwumba (2012) asserted that "prohibitive increases in the cost of inputs especially that of feeds and drugs are among the constraints in commercial broiler production. That feed and medication costs have risen above the reach of most farmers, thereby drastically reducing their profit margin".It is in lieu of this that this study was carried out to ascertain whether or not the profitability level of turkey enterprises in Anambra State is enough motivation towards reducing, if not completely bridging, the animal protein supply deficit.

Although some research activities on economics of poultry production are recognised, studies on turkey production, especially its profitability in Anambra State are still scanty. Hence, there was need to investigate the profitability of turkey production which is a condition necessary for more investmentsin the business under competitive environment. Thus, it was the firm belief that this research would provide answers to the above raised issue on profitability to encourage more investments in the enterprise.

The objectives of the study were to estimate the costs and returns of turkey production, and determine the factors that influenced the profitability of the enterprise.Specifically, the study estimated the cost and return in turkey production, and examined the factors which affected profitability of the enterprise in the area, (socio-economic factors – age, sex, education, household size, production experience, stock size and type of labour), and (costs of factors of production – poults, heat source, feeding, medication, labour and fixed inputs).

The following hypotheses were formulated and tested for the study:
Ho1: there is no significant difference between the cost and return in turkey production.
Ho2: socio-economic characteristics of the farmers and production factors have no significant influence on the profitability of turkey production in the area.

3. Materials and Methods

The study area: the study was carried out in Anambra state, Nigeria. Anambra sate is one of the five states located in the South-eastern region of Nigeria. The state is located between Latitude $6^{o}20^{1}$N and Longitude $7^{o}00^{1}$E with a total land area of four thousand, eight hundred and forty-four square kilometres (4,844 km$^{2)}$), and a population density of about eight hundred and sixty persons per square kilometres (860/Km^{2}). According to the National Population Commission (NPC, 2017), Anambra state has an estimated population of about (5million) people whose major economic activities, apart from farming (crops and livestock) include trading and manufacturing.

Sampling technique and Sample size: Anambra State has four agricultural zones namely – Aguata, Anambra, Awka and Onitsha, into which her 21 Local Government Areas (LGAs) were grouped. A multi-stage sampling procedure was used in selecting the respondents used for the study. Since poultry production was spread round the state, the four agricultural zones of the state were selected in the first stage. In the second stage, the LGAs of Aguata, Oyi, Dunukofia and Ihiala were selected from each of the zones respectively. Simple random sampling technique was used in the third stage in selecting a total of seventeen (17) communities from across the four selected LGAs in a proportionate manner. Lastly, random sampling technique was then applied in the selection ofeighty-three (83) turkey farmers from across the selected LGAs also in a proportionate manner.

Method of Data Collection: The data were collected with the aid of a structured questionnaire from the literate farmers while interview schedule was used to elicit information from the illiterate farmers. Data were also collected from the few records kept by some of the farmers.

Methods of Data Analysis: The objective on cost and returns of the enterprise was achieved using the budgetary toolof:
Net revenue= Total Revenue – Total Cost (Alufohai and Ahmadu, 2012)   (eqn.1)

Profitability Ratios:The following profitability ratios were estimated:
1) Profitability Index =NFI÷TC (eqn. 2
2) Return on Invest. (RoI) = NFI÷TC X 100(Emokaro and Eweka, 2015) (eqn. 3)
3) Capital turn over (CTO) =TR÷ TC (eqn. 4)
4) Gross ratio = TC ÷ TR (Ajala et al., 2007) (eqn. 5)
5) Fixed ratio = TFC÷ TR (eqn.6)
6) Operating ratio= TVC÷ TR (Olorunwa, 2018) (eqn. 7)

Where: TR = Total revenue (₦) = price of the outputs (turkey birds and the manure generated), TC = Total cost (₦) = Total variable cost (TVC = costs of inputs) + Total fixed cost (TFC = depreciation).

The objective on the determinants of profitability were achieved using the Ordinary Least Square (OLS) regression model stated in the explicit form as follows:
$$P = B_0+B_1X_1+B_2X_2+B_3X_3+B_4X_4+B_5X_5+\ldots\ldots.B_{13}X_{13}+ e$$
(eqn.8)
Where:P = Profitability,

X_1 to X_{13}= Age of farmer, Sex,Level of education,Family size, Experience (in years), Stock size, Source of labour, Price of chicks/poults(₦),Cost of brooding (₦), Cost of medication (₦), Cost of feeding (₦), Cost of labour (₦), Cost of fixed inputs (₦), Constant,

B_1 to B_8 = Coefficients, e = Error term.

Test of Hypotheses
1) The hypothesis which stated thatthere is no significant difference between the cost and return in turkey production was tested at 1% probability level using the Z-test stated below:

$$Z = \frac{X_1 - X_2}{\sqrt{\frac{\sigma_1{}^2 + \sigma_2{}^2}{n_1}}}$$
(Alufohai and Ahmadu, 2012) (eqn.9)

Where:

Z = Computed z-value for judging the significance of the mean difference

X_1 = Mean Total revenue,

X_2 = Mean Total Cost

σ_1^2 = Standard variance for Total revenue,

σ_2^2 = Standard variance for Total cost,

n = Sample size

2) That which stated that "socio-economic characteristics of the farmers and production factors have no significant influence on the profitability of turkey production in the area" was also tested at 1% using the F-statistics from the regression analysis expressed in equation 8.

4. Results and Discussion

Costs and Returns of Turkey Production: Table 2.0 showed the average costs and returns from producing and selling a unit of turkey birds in Anambra State.

Table 2: Budgetary analysis of Turkey Production in Anambra State

Category	Value per bird (₦)	% of Total Cost (Per bird)
Variable cost		
Day old chicks/poults	583.00	22.05
Brooding	39.61	01.50
Vaccination	55.00	02.08
Drugs	68.00	02.57
Feeding and additives	1,721.14	65.10
Water	09.20	00.35
Litter materials	03.00	00.11
Labour	145.00	05.49
Total variable cost	**2,623.95**	**99.25**
Fixed cost (depreciation)		
Poultry house	14.38	0.54
Drinkers	0.84	0.03
Feeders	1.61	0.06
Heat source(s)	0.77	0.03
Jerrycans, Buckets and basins	0.91	0.04
Wheel barrow and spade	1.24	0.05
Total fixed cost	**19.75**	**00.75**
Total cost (TC)	**2,643.70**	**100.00**
Revenue from broiler/turkey	4,101.97	
Revenue from droppings	40.00	
Total revenue	**4,141.97**	
Net return	**1,498.27**	

Source: Computed from field survey, 2019

From Table 2.0, the estimated total cost of producing a turkey bird was ₦2, 643.70 with a total variable cost of ₦2, 623.95 out of which ₦1, 721.14 (65.1% of the total cost) was spent on feeding. This agreed with the findings of Olorunwa (2018), and Maikasuwa et al., (2014) that feeding poultry birds accounted for over 50% of the total cost of production in Lagos and Kebbi States, Nigeria, and that of Gillespie and Flanders (2010), which reported that the feed input could account for up to 70% of the total cost of poultry production. The average revenue recorded was ₦ 4, 141.97, while ₦1, 498.27 was realised as the net profit. These results further showed that the profitability rate was 0.57 and the return on investment was 56.67%. This implied that for every naira invested in the production of turkey birds, about 57kobo returned to the farmer as reward for management. The capital turn-over of 1.57 indicated that every naira invested in turkey production yielded a cash flow of ₦1.50kobo. These findings also agreed with that of Maikasuwa *et al.*, (2014) that the profitability rate of turkey production was above 0.30, indicating that turkey farming was a profitable and viable enterprise.

Profitability ratios

1. $\text{Profitability index (P.I.)} = \dfrac{257,702.44}{454,716.40} = 0.57$

2. $\text{Return on investment} = \dfrac{257,702.44}{454,716.40} \times \dfrac{100}{1} = 56.67\%$

The above ratios indicated that for every naira invested in the production of turkey birds, about 57kobo returned to the farmer as reward for management.

3. $\text{Capital turn over (CTO)} = \dfrac{712,418.84}{454,716.40} = 1.57$

This ratio implies that every naira invested in turkey production yielded a cash flow of ₦1.50kobo.

4. $\text{Gross ratio} = \dfrac{454,716.40}{712,418.84} = 0.64$

This implies that 64% of the total revenue generated from the sales of the outputs was used to pay off the entire costs incurred in the production.

5. $\text{Fixed ratio} = \dfrac{3.397.00}{712,418.84} = 0.01$

The fixed ratio indicated that 1% of the total revenue could pay for the depreciation of the fixed assets used in the production.

6. $\text{Operating ratio} = \dfrac{451,319.40}{712,418.84} = 0.63$

This ratio showed that 63% of the total revenue was used to pay for the operating (variable) costs. The above results, therefore, showed that turkey production in the area was both profitable and viable.

Table 3: Z Test Result on Hypothesis 1

		Paired Samples Test							
		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
	Total Revenue – Total cost	74913.50986	14855.42007	1763.01401	71397.28930	78429.73042	42.492	70	.000

Source: Computed from field survey, 2019

Hypothesis 1 (Decision): the hypothesis which stated that there is no significant difference between the cost and return in turkey production was tested with Z statistics. As shown in table 3, the z-value of 42.492 was significant at 1% probability level (p<0.01). The null hypothesis was therefore, rejected, implying that the difference in the cost and return of turkey production in Anambra State was significantly different from zero.

Determinants of Profitability of Turkey Production in Anambra State
The determinants of profitability in turkey production are presented in Table 4.

Table 4: Multiple Regression on thedeterminants of Profitability of Turkey Production

Variable	Parameter	Coefficient	Std. error	T-value
Constant	β_0	.625	.289	2.519**
Age	β_1	-.152	.005	-2.659***
Sex	β_2	.007	.005	.234
Level of Education	β_4	.013	.010	.159
Household size	β_3	.033	.001	1.033
Experience	β_5	.232	.002	2.261**
Stock size	β_6	.255	.000	4.321***
Source of labour	β_7	-.124	.011	-2.530**
Cost of Poults	β_8	.028	.000	.559
Cost of Brooding	β_9	-.129	.000	-2.645**
Cost of Medication	β_{10}	.070	.000	2.184**
Cost of Feeding	β_{11}	-.087	.000	-2.645**
Cost of water	β_{12}	-.029	.000	-1.022
Cost of litter materials	β_{13}	-.027	.000	-.996
Cost of Labour	β_{14}	-.098	.000	-2.014**
Fixed cost	β_{15}	-.007	.000	-.229
F-ratio	-	-		99.859***
R Square		.965	.021	-
Adjusted R Square		.955	-	-

Dependent Variable: Profitability
Note: ***, ** indicate statistical significance at 1.0 and 5.0 percent respectively.

The result showed an adjusted R^2 value of 0.955 indicating that 95.5% of the variations observed in the profitabilityof turkey production were accounted for by the explanatory variables included in the regression model.

Table 4 showed that age had an inverse relationship with the profitability of the farmers at 1% level of probability. This implied that profitability of the farmers reduced as they grew older. This could be due to the fact that, the mental and physical capacity required in farming decreases with older age as asserted by Ume, Ezeano, Onunka and Agu,(2018), who also reported that age was negatively related to production.

The result also revealed that years of experience in the production of turkey birds had direct relationship with the profitability of the enterprise at 5% probability level, implying that profitability increased as the years of the turkey farmers' experience increased. This result conformed to the findings of Ezeano, Ume, Okeke and Gbughemobi (2017), which stated that experience in farming helped farmers to maximise their output through efficient input utilisation.

As expected, the number of birds kept by the farmers positively affected their profitability at 1% probability level. This could be because, increases in the stock/farm size reduces the unit cost of production which, in turn, increases profitability of the enterprise. This finding also conformed to that of Hassan (2017), which stated that farm size had positive relationship with profitability in poultry farming.Also revealed in Table 4 was the effect of source of labour used in production, whichhad an inverse effect on the profitability of turkey production at 5% probability. This implied thatprofitability decreased as an additional labourer was employed in the production.

Cost of medication had a direct relationship with the profitability of turkey production at 5% probability, despite being a cost variable. This implied that profitability of the enterprise increased as more money was spent in the purchase of drugs and vaccines administered to the birds. This positive relationship could be because, the more the farmer purchased drugs and vaccines and effectively administered them to the birds, the more productive the birds became. This result is in disagreement with the findings of Umeh, et al., (2018) who reported that drug and medication coefficient had a negative relationship withprofit in pig production.

Also as expected cost incurred in feeding the birds was in the opposite direction with the profitability of the enterprise at 5% probability, as shown in table 4. This indicated that profitability of the enterprise decreased as more feeds were purchased for the feeding of the birds. Nevertheless, this result could be attributed to the fact that many of the turkey farmers in the area, in a bid to save cost, mixed/replaced a fraction of the poultry feed with brewers' dried grains (spent grain). This finding is consistent with the findings of Bandara and Dassanayake (2006), who posited that "the effect of feed price had a great negative impact on profitability because, feed price varied according to the brand, the distance between the farm and the market and the dealer.The farmers who bought in bulk had price advantage, while on the other hand, farmers who were used to buying feed at several times per one production cycle did not get the price advantage and also incurred more transport cost. It also agreed with Altahat et al., (2012), who reported that feed price was found to be the factor which had the highest negative impact on the profitability of broiler production.

The result further revealed that cost of brooding also had negative impact on profitability with the coefficient of -0.129**, implying that profitability moved in opposite direction with the cost of producing the heat used in brooding the birds. This also conforms to a priory expectation as it is a cost variable.

Cost of labour also had an inverse relationship with profitability of turkey production at 5% probability, implying that, hiring additional labour or paying higher wages reduced profitability of the enterprise. This is in agreement with Ajala, et al., (2007), who reported that unavailability and high cost of hired labour made turkey production less profitable as a result of urban drift of able bodied youths.

Although the sex of the farmer, his household size, level of education, and costsof Day old poults, fixed assets, water and litter materials had some degrees of influences on the profitability of turkey production in Anambra State, their effects were, however, not significantly different from zero at 5% level of probability.

Hypothesis 2 (Decision): the F-value of 99.859 which was significant at 1% probability indicated that the independent variables included in the model had overall impact in explaining the variations in turkey profitability in the area. Therefore, the hypothesis which stated thatsocio-economic characteristics of the farmers and production factors have no significant influence on the profitability of turkey production in the area was rejected,implying that the socio-economic characteristics of the farmers and production factors determined the profitability of turkey production in Anambra State.

5. Conclusion and Recommendations

In conclusion, the production of turkey birds in Anambra State was profitable at the rate of 1.57, as the net profit is significantly different from zero. Age, experience, stock size, type of labour, costs of feed, labour, medication and brooding were found to have significant influences on profitability.

Therefore, it is recommended that farmers and investors are hereby encouraged to invest more in turkey production so as to harness the huge profit potentials of the enterprise which would, in turn, increase the supply of poultry meat and animal protein in the area.

References

[1] Aboki, E A, Jongur, A U and Onu, J I (2013). Productivity and technical efficiency of family poultry production in Kurmi local Government Area of Taraba State, Nigeria. *Journal of Agriculture and Sustainability 4(1):52-66.*

[2] Ajala, M K, Nwagu, B I, Sekoni, AA and Adeshinwa, A O K (2007). Profitability of turkey production in Zaria, Kaduna state Nigeria. *Asian Journal of Information Technology,* 6(1): 27-33.

[3] Alufohai, G O and Ahmadu, J (2012). Economics of processing fresh fruit bunches (FFB) into palm oil, In Ovia North East Local Government Area of Edo State, Nigeria. *Journal of Agriculture and Biodiversity Research.* Available online at http://www.onlineresearchjournals.org/JABR; accessed November 6th 2018.

[4] Altahat, E, AL-Sharafat, A, and Altarawneh, M (2012). Factors affecting profitability of layer hens enterprises. *American Journal of Agricultural and Biological Sciences* 7 (1): 106-113. ISSN 1557-4989; Accessed 21ST June, 2019.

[5] Bandara, RA, and Dassanayake, D M (2006). A quantative analysis on factors affecting profitability of small-scale broiler production. *Journal of Agricultural Science* 2(5):45-50; accessed 21sth June, 2019.

[6] Bloom, D.E, Canning, D., and Sevilla, J. (2001). The effect of health on economic growth: theory and evidence. Working paper, National Bureau of Economic Research, Cambridge. Available at www.nber.org/papers/w8587; accessed on 19th September, 2019.

[7] Emokaro, C O, and Eweka, K I, (2015). A Comparative Analysis of Profitability of Broiler Production Systems in Urban Areas of Edo State, Nigeria. *Journal of Applied Sciences and Environmental Management,* volume 19 (4) 627 – 631.

[8] Ezeano, C I, Ume, S I, Okeke, C C, and Gbughemobi, B O (2017). Socio economic determinant factors to youths' participation in broilers production in Imo State of Nigeria. *International Journal of Research & Review;* 4(1); 136 - 142. www.ijrrjournal.com.

[9] F.A.O. (2015): FAOSTAT Statistics Division of the food and agriculture organ. http://FAO.Stat:FAC.org.

[10] Gillespie, J R and Flanders, F B (2010). Modern livestock and poultry production. Cengage Learning, p. 693. Accessed June 23 2019.

[11] Hassan, A. M, (2017). Analysis of Socio-Economic determinants of broiler production in Egypt: A case study of Sharkia Province. *Scholars Journal of Economics, Business and Management;* 4(8B):570-576.

[12] Ike, P.C., and Udeh, I., (2011). Comparative Analysis of Allocative Efficiency in Input use by Credit and Non Credit User Small Scale Poultry Farmers in Delta State, Nigeria. *Asian Journal of Agricultural Sciences* 3(6): 481-486

[13] Ike, P.C. and Ugwumba, C.O.A. (2012). Profitability of Small Scale Broiler Production in Onitsha North Local Government Area of Anambra State, Nigeria. *International Journal of Poultry Science;*10 (2): 106-109.

[14] Maikasuwa, MA, Ala, A.L, and Baba M D (2014). Economic analysis of turkey production in Zuru Emirate, Kebbi State, Nigeria. *International Journal of Modern Research and Reviews* volume 2, Issue 7, pp. 229-234.

[15] Mgbakor, M N, and Nzeadachie, E C (2013). Economic analysis of broiler production (a case study of Orumba South L.G.A of Anambra State, Nigeria). *American-Eurasian Journal of Agronomy,* 6 (2): 25-31. DOI: 10.5829/idosi.aeja.2013.6.2.1102. Accessed 20th May, 2019.

[16] Nwagu, B I (2002). Production and management of indigenous poultry species – Training Manual. National Animal Production Research Institute (NAPRI), Federal Ministry of Agricultural and Rural Development, ABU Zaria.

[17] Okoruwa, V O, Obayelu A E, and Ikoyo-Eweto E, (2006); Profitability of semi-intensive egg production in South-west and South-south zones of Nigeria. *Nigerian Journal of Animal Production*, 33: 118 -125.

[18] Olorunwa, O J, (2018). Economic analysis of broiler production in Lagos State Poultry Estate, Nigeria. *Journal of Investment and Management*. Vol. 7, No. 1, pp. 35-44. Doi:10.11648/j.jim.20180701.15.

[19] Ukwuaba, S.I. and Inoni, O.E. (2012). Resource-Use Efficiency in Small-Holder Broiler Production in Oshimili North Local Government Area, Delta State. *International Journal of Poultry Science;* 11 (11): 700-70.

[20] Ume, S.I., Ezeano, C. I., Dauda, E and Okeke, C. C. (2016). Technical Efficiency of Rabbit Production among Small Holder Farmers in Ivo Local Government Area of Ebonyi State, Nigeria. Impact Factor 3.582 Case Studies Journal ISSN (2305-509X) – Volume 5, Issue 11; pp 69 – 75. Available online at http://www.casestudiesjournal.com

[21] Ume, S. I., Ezeano, C. I. and Obiekwe, N. J. (2018). Analysis of Determinant Factors to Loan Repayment among Broiler Farmers in Enugu State, Nigeria. *International Journal of Environmental & Agriculture Research* (IJOEAR) Vol-4.