



Economics of Small-Scale Broiler Production under Fadama III Project in Dutse Local Government Area, Jigawa State, Nigeria

Ahungwa¹, G.T; Badamasi¹, S. and Abdulkarim², A.

¹Department of Agricultural Economics, Federal University Dutse, P.M.B 7156, Dutse, Jigawa State.

²Sarkin Yamma Community College of Education, Tilden Fuluni, Toro, Bauchi State.

ABSTRACT

The research was conducted to examine the economic viability of broiler production enterprise under Fadama III project scheme, with a view of economic diversification and investment opportunities in Dutse Local Government Area, Jigawa State. In pursuance of this objective, 50 registered broiler farmers were selected through stratified sampling technique in three council wards (Kudai, Modobi and Limawa) of Dutse LGA. Data collection was achieved through face to face questionnaire guided interview. Data were then analyzed using profitability and regression analyses. The profitability indices depict that variable cost accounted for about 54% of the total cost with the cost of feed representing 21% of variable cost. Nevertheless, a gross return of ₦198,170.00 and a net return of ₦23,545 were realized on the average, showing that every ₦1 invested returned ₦1.13, which proved that the enterprise is a profitable venture with promising returns on investment. The estimates of regression analysis show that day old chick, water supply, and labour were the most significant determinants of profitability margin of broiler enterprise in the area. Resource use efficiency reflected overutilization of labor, veterinary services and water while feed and day-old chicks were underutilized. It is recommended that increased stocking rate, reduced use of labour and reliance on the use of local materials for pen construction can greatly minimize cost of production.

Key words: Economics, Small-scale, Broilers, Production, Fadama III Project.

INTRODUCTION:

Economic diversification implies the movement into new fields as well as stimulation and expansion of existing traditional products. The Nigerian economy is overwhelmingly dependent on oil, which accounts for 81% of government revenue and more than 97% of export earnings (Vanguard, 2017; Agbaese *et al.*, 2014). Many policies pursued by successive regimes in the last decades devastated the traditional agrarian economy and crippled growth in the non-oil sectors. The fundamental problem with the Nigerian economy is its failure to diversify. Instead of investing oil revenues in multi-sector economic growth or poverty alleviation, past governments frittered away national profits through unsustainable import reliance, including agricultural commodities that the nation has comparative advantage in, poorly sustained policies, and corruption. Thus, diversification presents the most competitive and strategic option for Nigeria in light of her developmental challenges and given her background. Nigeria as a nation is faced with the twin challenges of food security and poverty (Ahungwa *et al.*, 2014). Attempts over the years to meet the ever-increasing demand for protein to meet the citizens' need remains a far cry from the WHO, FAO and UNU (2007) recommendation of 54g protein minimum intake per person, of which 20g (37.04%) is recommended to come from animal source. At the moment, Nigeria's per capita daily protein is estimated to be 45.4g (Iyangbe and Orewa, 2009). However, eggs and poultry meat are beginning to make a substantial contribution to relieving the protein insufficiency in many African countries and poultry production is considered as an important subsidiary occupation that supplements the income of smallholder farm families and rural households (Taru, *et al.*, 2010).

Among the livestock-based vocations, poultry production has assumed an important role as a commercial activity with enormous potentials for rapid economic growth (Ekunwe *et al.*, 2006). According to Assa (2012), poultry production is one the fastest growing component of global meat production, with developing and transitional

economies assuming a leading role. The importance of poultry production lies in the quality of products and quick income stream it provides to humans. Thus, poultry farming has become foremost among the subsidiary occupations of farmers to supplement their incomes because of its assured quick returns; minimum space and investment requirement; ease of practice by ordinary farmers and possession of greater feed converting efficiency than other livestock enterprises (Rajendran and Mohanty, 2003). Despite these overt benefits, almost 80% of poultry production in Nigeria and Africa as a region is found in the rural and peri-urban areas, where birds are raised in small numbers by the traditional extensive or semi-intensive, low-input–low-output systems (Sonaiya, 1997; and Gueye, 1998). Of the total chicken population of 307 million in 2012 estimated in 2012, native birds accounted for 91.9%, hybrid chicken 2.54% and exotic breeds 4.56% (Central Statistical Agency, 2014). In the views of Oluyemi and Roberts (2000), there is urgent need to increase broiler production both at household and commercial holdings. This call is strategic in addressing animal protein intake shortage in human nutrition due to the fast growth rate, short generation interval and unparalleled competence in nutrient transformation to high quality animal protein of broiler birds (Isika *et al.* (2006).

Jigawa as a state is blessed with large expanse of agricultural land, rivers and flood plains, suitable for crops, livestock and fish production. On account of this, over 80% of the State's total land mass is considered arable, which makes it one of the most agriculturally endowed States in Nigeria (Sanusi *et al.*, 2014). About 90% of the 4.3 million people of Jigawa State (NPC, 2006) are predominantly engaged in Agriculture, making the sector the major source of livelihoods, food security and poverty reduction. However, successive government policies over the years such as the State Economic Empowerment Development Strategy (SEEDS1) and the Comprehensive Development Framework (CDF) that have been in operation since 2006 (MTSS, 2014) were tilted to arable crops and livestock (ruminants) production with little or no policy measure for poultry production.

In spite of these noble initiatives, the state is characterized with high poverty rate which limits farmer's capacities to access and apply agricultural inputs to large-scale practices, lack of land rights for herdsman and shrinking of grazing reserves resulting to incessant farmers-herdsman friction, limited research and extension as well as poor linkages between research institutes, government agencies and farmers coupled with low level of private sector investment in large scale agricultural production. Thus, diversification of the economic mainstream to broiler production will to a large extent boost the income stream of the people, improve food security and nutrition status, reduce excessive pressure on land resources as well as an improvement in private sector participation through input supply, hence the need for the study to examine the economic plausibility, opportunities and efficacy of resource use in broiler enterprises in the state.

METHODOLOGY

The study was conducted in Dutse Local Government Area, Jigawa State, which is located on latitude 11.70⁰N and longitude 9.34⁰N (Gender Baseline Survey, 2006). The Local Government has an estimated population of 246,143 people based on the 2006 census records, comprising mainly of Hausa and Fulani who depend almost wholly on agriculture for their livelihood. It is estimated that over 80% of the households derive their income from farming, including animal husbandry as a primary occupation (Sanusi *et al.*, 2014). The 2007 Nigerian Poverty Assessment recorded the incidence of poverty and severity in the State as 90.9% and 24.6 % respectively (NBS, 2010). The LGA experiences an average rainfall of 650mm annually; the rain normally starts in May and ends in October of each year. Temperature also changes from minimum of 10°C (harmattan) to maximum of 42°C (between March – September) with an average relative humidity of 12% annually (CDF, 2010). These changes in climatic factors have both positive and negative influence on poultry production. These influences can fit broadly into one of two categories; low productivity as a result of disease outbreak or increase cost of production.

The study employed a multi-stage sampling approach in which a purposive sampling technique was employed to select the Local Government. The selection was done owing to the fact that the LGA is not just the administrative headquarter of the State, but the commercial nerve of the state where most businesses and the consuming population is concentrated. The second stage involved also a purposive selection of three wards with the highest concentration of broiler farms - Kudai (23), Limawa (24), and Kachi (29) wards, based on the number of registered broiler farmers under Fadama III project and the statistics available at the State Agricultural Development Authority. The last stage employed a stratified random selection of up to 65% broiler entrepreneurs based on the volume of production and the number of producers in the selected wards. Thus, 15 respondents were selected randomly from Kudai, 19 from Kachi and 16 from Limawa wards, amounting to 50 respondents.

Data analysis was done using Profitability analysis, implicitly expressed as;

$$\pi = P_b Q_b + P_l Q_l - \sum_{i=1}^n (P x_i X_i)$$

Where,

π = Profit (₦/year/farm);

P_b = Per unit price of live broiler (₦/kg);

Q_b = Quantity of live broiler (kg/year/farm)

P_l = Per unit price of used litter and droppings/excreta (₦/kg);

Q_l = Quantity of litter (wastes) (kg/year/farm);

P_{xi} = Per unit price of i^{th} (variables) inputs used in the broiler farm (₦/kg);

X_i = Quantity of i^{th} (variables) inputs used in kg; and

TFC = Total fixed cost involved in broiler farm (₦/year/farm).

The Net Farm Income model was stated as;

$$NFI = GM - TFC$$

Where,

$$GM = TVP - TVC$$

Where;

NFI = Net Farm Income (₦)

GM = Gross Margin

TVP = Total Value Product

TVC = Total Variable Costs, and

TFC = Total Fixed Costs

With these relationships, the resources use efficiency was determined thus;

$$\text{Resource Use Efficiency, } RUE = \frac{MVP}{MFC}$$

Where MVP = Marginal Value Product,

MFC/UFC = Unit Factor Cost (TC of producing one table size broiler) or

$$MFC = \frac{\Delta TFC}{\Delta X_i}$$

Thus,

$$MVP = \frac{b\bar{Y}}{\bar{X}} \cdot P_y$$

Where

b = regression coefficient, \bar{Y} = mean output/profit, and \bar{X} = mean input

The resource use ratio, RUE indicates the following relationship;

RUE = 1, resource is optimally utilized

RUE > 1, resource is under utilized

RUE < 1, resource is over utilized

The Profitability Function on the other hand stated thus was used to establish the relationship of the explanatory variables on the profitability index of broiler enterprise;

$$\Pi = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e_i$$

Π = profit of the Broiler Farmer (₦)

a = constant term

X_1 = Cost of Feed (₦), X_2 = Cost of Day-old Chick (₦), X_3 = Cost of Water supply (₦), X_4 = Labour Cost (₦), X_5 = Cost of Vaccination (₦), X_6 = Cost of other medication (₦), e_i = error term

RESULTS AND DISCUSSION

Profitability analysis: The profitability measures in Table 1, 2 and 3 below highlight the costs, returns and profitability components of raising broiler birds to table size. In computing these indices, the variable costs (ranging from the costs of day old chicks, feed, veterinary, labour and transportation cost) and fixed costs (housing and equipment) were taken into cognizance. The result shows that, the average variable cost of raising 149 birds (respondents' average stock) was ₦94, 131.31 which accounted for about 53.90 percent to the average total cost of production. The average fixed cost on the other hand was ₦80, 494.20 per the same flock size which contributes 46.10 percent to the average total cost, bring the average total cost incurred in rearing 149 table size broiler birds to ₦174, 625.51. On this basis, the average cost of producing a single broiler bird to table size is estimated at ₦ 1,172/bird which was slightly lower than the average selling price (₦1,330.0/bird) of a bird even when it was augmented with the proceeds obtained from the litter materials at the end of the production cycle.

The result also revealed that broiler producers in Dutse Local Government were getting a marginal net profit of ₦ 158/bird from the analysis of the returns on broiler production (Table 2) which indicate low profitability of the enterprise when compared to other parts of the nation. For instance, the study conducted by Onyebimana (2000) revealed that broiler production in Kwara State is highly profitable as percentage return on investment is about 50% of total investment. This low profitability could be attributed to a large extent, harsh weather especially high

temperature (March – September), high cost of feed, and veterinary services, inefficient marketing system, social structure of the study area and the degree of disease breakout.

The analysis further shows that the overall gross margin was ₦104,038.69 while the net return was ₦23,544.49 on the average and ₦2,080.77 and ₦470.89 per farm per cycle respectively. This result indicates that in spite of the low profit margin, broiler production is a viable enterprise because, for each Naira invested in broiler enterprise ₦1.13 is realizable as return. This portends that an investment in this sector is quite promising and viable, offering the investors a good return on their investment.

Table 1: Cost Component analysis of Broiler Production in Dutse Local Government, Jigawa State

| Cost items | Unit | Average unit price (₦) | Average quantity used | Average total cost (₦) | Percentage contribution to average total cost |
|--|----------|------------------------|-----------------------|------------------------|---|
| Variable cost | | | | 94131.31 | 53.90 |
| Cost of Day-old Chick | Number | 188.2 | 149 | 28041.8 | 16.06 |
| Cost of Feed | Kg | 114 | 362.88 | 41368.32 | 20.69 |
| Veterinary cost (Vaccination, medication and other services) | MI | 69.87 | 42.87 | 2995.50 | 1.72 |
| Labour cost | ₦ | 8500 | 1 | 8500 | 4.87 |
| Transportation cost | ₦ | | | 2509 | 1.44 |
| Cost of water supply | Litres | 7.30 | 1468.04 | 10716.69 | 6.12 |
| Total Fixed Cost | | | | 80494.20 | 46.10 |
| Housing cost | ₦ | | | 53662.80 | 30.73 |
| Tools and Equipment | ₦ | | | 26831.40 | 15.37 |
| Total Costs (A + B) | ₦ | | | 174625.51 | |

Source: Field Survey, 2017

Table 2: Returns from Broiler Production Enterprises in Dutse Local Government Area, Jigawa State

| Items | Unit | Average unit price (₦) | Quantity | Total Value (₦) |
|-----------------------------------|------|------------------------|----------|-----------------|
| Live Broiler | No. | 1300 | 149 | 193700.0 |
| Used litter | Kg | 50 | 89.4 | 4470 |
| Average Gross Return (1+2) | | | | 198170.0 |

Source: Field Survey, 2017

Table 3: Cost, Return and Benefit-Cost Ratio of Broiler per Year in Dutse LGA, Jigawa State

| Cost and Returns | Unit | Per cycle |
|---|------|-----------|
| Gross Return | (₦) | 198170.0 |
| Total Variable Cost | (₦) | 94131.31 |
| Total Fixed Cost | (₦) | 80494.20 |
| Total cost (B + C) | (₦) | 174625.51 |
| Gross Margin (A - B) | (₦) | 104038.69 |
| Net Return (D - C) | (₦) | 23544.49 |
| Return per Naira Invested (based on variable cost) A/B | (₦) | 2.12 |
| Return per Naira Invested (Based on Total Fixed Cost) A/C | (₦) | 2.50 |
| Return per Naira invested (based on total cost) | (₦) | 1.13 |

Source: Field Survey, 2017

Regression Estimates

Assessing the performance of the broiler enterprise on the basis of the profit made and the contribution of each independent variable, the Cobb-Douglas Profitability model was used. The results (Table 4) show that the regression coefficients of the costs of feed (X_1) and day-old chicks (X_2) incurred were positive and significant at 10 percent and 1 percent level respectively. This implies that an increase in the costs of these inputs by 1 percent will result in 0.099 and 0.919 percent increase in the profit margin for the broiler enterprises. The result negates the *a priori* expectation which could be explained on account of underutilization of these inputs as shown in Table 5 below. To increase broiler production, more of these inputs are needed, attracting thus, additional costs. This finding is in consonance with the results obtained by Rana *et al.* (2012) who reported that a unit increase of these variables resulted in 0.67 and 0.45 units increase in the gross returns of broiler farms in Mymensingh. On the contrary, regression coefficient of labour was negatively correlated and significant at 5 percent level, implying that a percentage increase in the cost of labour would deplete the profitability of broiler farms by 0.046 percent. Other resources as water and veterinary services had negative coefficients, implying overt overutilization of such resource considering the scale of respondents; production.

The R^2 (coefficient of multiple regression) was 0.912 signifying that 91.2 percent of the profit made from broiler enterprises were jointly accounted for by the independent variables used in this model. The F-value of 32.971 also attests to the fact that the model was a good fit.

Table 4: Estimates of the Profitability Function of Broiler production in Dutse LGA, Jigawa State

| Variable | Description | Coefficient | t-value | Significance |
|---------------------------------|-------------|---------------|---------|-----------------|
| Constant | β_0 | 6.059 | 1.486 | 0.145 |
| Cost of feed (₦) | β_1 | 0.099 | 1.858 | 0.070* |
| Cost of Day-old Chicks (₦) | β_2 | 0.919 | 19.203 | 0.000*** |
| Cost of water supply (₦) | β_3 | -0.001 | -0.064 | 0.949 |
| Labour cost (₦) | β_4 | -0.046 | -2.301 | 0.016** |
| Vaccination/medication cost (₦) | β_5 | -0.014 | -0.940 | 0.353 |
| Transport/marketing cost (₦) | β_6 | 0.024 | 1.460 | 0.152 |
| R^2 | | 0.912 | | |
| \bar{R}^2 | | 0.885 | | |
| F-Statistics | | 32.971 | | 0.000*** |

Source: Field Survey, 2017

NB: *** = Significance at 1%, ** = Significance at 5% and * = Significance at 10%

Resource Use Efficiency

The efficacy of resource use in broiler production in the Local Government was determined using the ratios of their Marginal Value Product (MVPs) to the Marginal Factor Cost (MFC) which expresses the cost of purchasing a unit input of the resource (X_i) as presented in Table 5. The assessment of these ratios for each input factor shows

that, feed and day-old chicks were underutilized. This implies that increasing the stocking density, which by implication entails increased feed and feeding cost, can greatly increase the output and profit levels of the broiler enterprises in the area. This result is in agreement with the regression analysis of these resource that also show positive coefficients. By extension, broiler production has shown to be a profitable venture with increased stocking density (Olumakide, 2010). On the other, labour, veterinary services and water were overtly over utilized in the course of production. Thus, decreasing the rate of the usage of these resources will raise the output and profit margins of the broiler enterprises. The sub-optimal utilization of these inputs could be attributed to the fact that most of the farmers have little or no production experience and the technical know-how and in addition the harsh environmental conditions that increase the excessive use of some factors such as water even to the point of watering the surroundings to maintain an ambient temperature.

Table 5: Resource Use Ratio

| Input | MFC | $\frac{APP}{X_i}$ $\left(\frac{TPP}{X_i}\right)$ | MPP $(APP \cdot \beta_i)$ | MVP $(MPP \cdot P_y)$ | $\frac{RUE}{MFC}$ $\left(\frac{MVP}{MFC}\right)$ | Description of Efficiency Index |
|--------------------|---------------|---|--------------------------------|----------------------------|---|---------------------------------|
| Feed | 140.0/kg | 4.60 | 0.455 | 605.7 | 4.33 | Under utilized |
| Day old chicks | 220.0/chick | 0.93 | 0.85 | 1130.5 | 5.14 | Under utilized |
| Labour | 283.3/Mandays | 95.09 | -4.37 | -5812.1 | -20.5 | Over utilized |
| Veterinary service | 20.1//ml | 1.62 | -0.02 | -26.6 | -1.32 | Over utilized |
| Water | 1.12/litre | 0.09 | -0.00009 | -0.112 | -0.10 | Over utilized |

Source: Computations from Field Survey, 2017.

CONCLUSION

Commercial poultry production that embraces the rearing of broiler birds is generally alien in Dutse LGA, Jigawa State. However, the renewed interest as demonstrated in the recent times has increase the enthusiasm of the producers and intending investors through the enabling environment and opportunities that are created by government and non-governmental organisations such as the Third National Fadama Development project of the World Bank. In conclusion, the study clearly shows that broiler industry in Dutse LGA is a profitable venture by returning at least one Naira per every capital investment. In addition, it is concluded that the quantity and cost of feed, the number and cost of day old chicks, labour and the distance travelled both for procurement of inputs and sales of birds are the most significant factors that determine both the productivity and profitability of the broiler industry in the study area. The use of these resources shows varying degrees of over utilization of labour, veterinary services and water, whereas, feed and day-old chicks were underutilized, making it intrinsically difficult to achieve optimal productivity.

RECOMMENDATIONS

In order to increase the productivity, profitability and the efficiency with which the resources are used for broiler production in Dutse LGA, the study recommended that:

- Broiler producers as a matter of necessity should form cooperative societies and other self-help associations that would promote their business activities and interest, increase their access and affordability of productive inputs, as well as information sharing (marketing, disease control and prevention) among the farming communities.
- The high proportion of the fixed cost components (46.10%) in broiler production could be greatly minimized by embarking mostly on the use of available local materials for the construction of poultry pens. By this, the challenges associated with excessive heat could be minimized since such materials are known to be good insulators, which by implication, can greatly reduce the fixed cost thereby raising the profit margin, and
- Since certain inputs such as feed, day old chicks, labour and transportation affects the broiler enterprise significantly, their efficient usage through farmers' education, on-hand workshops and group farming can reduce the negative impact of these inputs on the profitability and productivity of the enterprise.

REFERENCE

- Agbaeze, E.K, Udeh S.N and I.O Onwuka (2014). Resolving the Nigeria's Dependency on Oil- The Derivation Model, *Journal of African Studies and Development*, 7(1):1-14.
- Ahungwa, G.T; U. Haruna and B.G Muktar (2014). 'Food Security Challenges in Nigeria: A Paradox of rising Domestic Food Production and Food Import'. *International Letters of Natural Sciences*, Vol. 18 (2014) Pp. 38-46.
- Assa, P. A., (2012). Effect of Age, Sex and Management System on Some Haematological Parameters of Intensively and Semi-Intensively Kept Chicken in Mubi, Adamawa State, Nigeria. *Iranian Journal of Applied Animal Science*, 2(3), 277-282.
- CSA (Central Statistical Authority). (2014). Central Agricultural Census Commission, Nigerian agricultural sample enumeration
- Ekunwe, M. K., Nwagu, B. I. And Otchere, E. O. (2006). Socio-economics of free- range poultry production among agro pastoral women in Giwa Local Government Area of Kaduna State, Nigeria. *Nigerian veterinary Journal*, 28(3): 11-18.
- FAO (2011). *Food and Agriculture Organization of the United Nation (FAO)*. Importance of small scale and semi-commercial poultry production in developing countries.
- Gueye, E.F. (1998) Village egg and fowl meat production in Africa. *World's Poultry Science Journal* 54: 73–86.
- Iyangbe, C.O and S.I. Orewa (2009). Determinants of Daily Protein Intake among Rural and Low-Income Urban Households in Nigeria, *American-Eurasian Journal of Scientific Research* 4 (4): 290-301, 2009
- Jigawa CDF (2010). Jigawa State Comprehensive Development Framework Document, 2010-2012, Pp1-107.
- Jigawa State Gender Baseline (2006). Jigawa State Gender Baseline Survey Report, June 2006. www.fidafrique.net/IMG/pdf/jigawa_gender_baseline_survey_part1.pdf. Accessed 8/7/2015.
- MANR-MTSS (2013). Jigawa State Ministry of Agriculture – Medium Term Sector Strategy, 2014-2016, Pp. 1-36, supported by SPARC.
- NBS (2010). The Nigerian poverty profile 2010.
- Oluyemi, J.A. and Roberts, F.A. (2000). Poultry Production in Warm-wet climate. (Low cost edition). Macmillan publishers. Pp.25-28.
- Onyebimana, U.A.U. (2000). "Economics and production management for Agriculture Alphabet Nigeria publisher. Nigeria, pp.: 64-71.
- Rajendra G.F, and Mohanty T.V. (2003). *Guide to the care and use of experimental animals*.
- Rana K.M.A.A; M.S Rahman and M.N Sattar (2012). Profitability of Small Scale Broiler Production in some selected areas of Mensingh, *Progress. Agric.* 23(1 & 2): 101 – 109, 2012
- Sanusi, A; S. Apampa and A. Sotinrin (2013). Socially inclusive Sustainable Development in Climate Stressed Northern Nigeria: A case study of Jigawa State, July 2013, Pp. 1-45.
- Sonaiya, E.B. (1997) Sustainable rural poultry production in Africa. African Network for Rural Poultry Development. ANRPD Workshop, 13-16 June 1995, Addis Ababa, Ethiopia, Pp. 57-65.
- Taru V.B, G.E Nkwi, A.I Medugu and J. Reuben (2010). Economics of Broiler Production in Meme Division of Cameroon, *Journal of Agricultural Science*, 1(2): 83-87 (2010)
- Tijjani H, Tijjani BA, Tijjani AN, Sadiq M.A. (2012). Economic analysis of poultry egg production in Maiduguri and environs of Borno State, Nigeria. *J. Agric. Sci.* 2(12):319-324.
- Vanguard Web Page, (2017). Economic diversification and the entrepreneurial Revolution. <https://www.vanguardngr.com/2017/01/economic-diversification-entrepreneurial-revolution/>. Accessed 8/8/2017
- WHO, FAO and UNU (United Nations University) (2007). Proteins and amino acid requirements in human nutrition. Report of a joint WHO/ FAO/UNU expert consultation. WHO Technical Report Series 935. Geneva, WHO. Pp. 284.