Agr. Foo. Nat. Res. J. Volume 3, Issue 1, Page 107 - 112

ISSN: 3043-5420

Agriculture, Food and Natural Resources Journal

The Official Journal of the Faculty of Agriculture, Nnamdi Azikkiwe University, Nigeria

Journal homepage: https://journals.unizik.edu.ng/afnrj

Original Article

Profitability analysis of backyard poultry egg production among households in Dutse, Jigawa State, Nigeria

OPEN ACCESS

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DOI: https://www.doi.org/10.5281/zenodo.13932098

Editor: *Dr Onyekachi Chukwu, Nnamdi Azikiwe University, NIGERIA*

Received: *February 9, 2024*
Accepted: *March 22, 2024*
Available online: *March 31, 2024*

Peer-review: *Externally peer-reviewed*

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Conflict of Interest: The authors have no conflicts of interest to declare

Financial Disclosure: *The authors declared that this study has received no financial support*

ABSTRACT

Backyard poultry production has been widely practiced as an alternative income source. Past researchers on its economics mainly focused on large-scale egg production. Thus, this study aims to analyses Backyard Poultry Egg Production (BPEP) among households in Dutse, Jigawa State of Nigeria for sustainable management A random sampling procedure was used to select and collect data from ninety (90) households in the study area using a structured questionnaire. The data collected was analyzed using descriptive statistics and net farm income (NFI). Approximately, 60% of the respondents were female. Each household typically consists of an average of 8 members. The respondents have an average age of 32 years and possess an average of 5 years' experience in BPEP. Over 80% of the respondents were formally educated. Small-scale production of less than 50 birds (65.6%). Most of the eggs produced (86.7%) were consumed within their locality and they expressed a strong willingness to expand their activities (86.7%). The NFI analysis result shows that an average cost of ₦16,261.54 per bird was incurred during the production cycle; most (76.01%) constituted the cost of feed. Revenue of ₦21,996.06 was generated, most (84%) from egg sales with ₦5,734.52 net income (profit) per egg production cycle. Conversely, BPEP was constrained by market fluctuations, high cost of production and lack of innovative training in the study area. Hence, BPEP was concluded to be a profitable household enterprise. It is recommended that household income diversification programmes should target the aspect of backyard poultry production in the study area.

K E Y W O R D S : *Backyard, Egg, Household, Poultry, Production and Profitability*

INTRODUCTION

The Nigerian poultry industry has a net worth of 1.875 trillion naira and produces a significant amount of meat and eggs annually. The poultry industry also contributes a 25% share of agricultural contribution to Nigeria's GDP ((Federal Ministry of Agriculture and Rural Development [FMARD], 2019). Also, it constitutes about 58.72 per cent of the total livestock resources in Nigeria and many people have gone into poultry production either producing eggs or meat or both (Adeniran *et al*, 2018). Eggs and poultry meat have emerged next to milk as a contributor to the output from the livestock sector in recent years (Nwarieji *et al*, 2017). According to Coorey *et al* (2015), poultry egg nearly approaches a perfect balance of all food nutrients. The egg yolk and albumen contain 17.5% and

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10% protein by weight respectively. The poultry industry has remained the most dynamic and fastest-growing segment in the animal husbandry subsector. Poultry production is important as it provides an affordable and high-quality source of animal protein, which is essential for human nutrition, offers job opportunities, serves as a source of income for smallholders, contributes to poverty alleviation, and plays a significant role in meeting the increasing demand for food due to the rapidly growing human population (FAO, 2017).

Poultry farming has turned out to be notable among the supplementary occupations of farmers to complement their incomes because of its guaranteed swift returns; minimum space and investment requisite; easy to practice ordinary and possession of greater feed conversion efficiency than other livestock enterprises (FAO, 2012). Despite these obvious benefits, almost 80% of poultry production in Nigeria 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 mostly in the household backyard (Omandi, 2018). Backyard poultry production refers to keeping poultry by household using family labour and locally available feed resources; the poultry are allowed to range freely in the household compound and find much of their food, getting supplementary amounts of feed from the household, (Omandi, 2018). The poultry chickens are selected and bred to produce either a large number of high-quality eggs or vigorous growing offspring, they are referred to as either egg type or meat type and also dual purpose. Jigawa as a state in Nigeria is blessed with a large expanse of agricultural land, rivers and flood plains, suitable for crops, livestock and fish production (Sanusi *et al.*, 2014). The households in the state like in other developing countries households practice backyard small-poultry egg production as an alternative income source (Taru, *et al.*, 2010).

Although economic analysis of poultry operations has been conducted by past researchers, existing analyses have been mainly focused on large-scale egg production. (Emokaro *et al*, 2014; Akinyemi et al, 2015; Hassan *et al*, 2016). There is limited research on the profitability of small-scale egg production especially backyard poultry egg production (Ahungwa *et al*, 2018) despite its importance in providing alternative economic opportunities and food security for rural households. In the realm of food insecurity and low-level of income among households in Jigawa state (Wudil *et al*, 2023). It is important to present alternative enterprise options as well as necessitation of the adoption of improve practices given today's production challenges (Nwibo *et al*, 2016). Thus, it is in this regard that this study examined the profitability of backyard poultry egg production among households in Dutse, Jigawa state, Nigeria with emphasis on the following:

i. describe the socioeconomic characteristics of the backyard poultry producers in the households
ii. describe the typology of backyard poultry egg production in the study area,
iii. estimate the cost and returns of the poultry egg production in the study area, and
iv. describe constraints to backyard poultry egg production in the study area.

METHODOLOGY

Study Area

Dutse Local Government Area is the capital city of Jigawa State. Located at latitude and longitude of 11.00ºN to 13.00ºN and 8.00ºE to 10.15ºE respectively. It is bordered by Takai, Gaya, Birnin Kudu, and Kiyawa L.G.As from the North, West, South, and East respectively. Dutse has a projected population of 431,800 people with an annual population change of 3.5% (NPC, 2022). The average annual temperature is 30ºC. April is the hottest month of the year with temperatures of about 30.90°C while the lowest temperature in the year occurs in January which is around 22^0 C. It has about 743mm of precipitation falls annually between the driest and wettest months, the difference in precipitation is 262mm. Different forms of rocks spread widely across the town, mostly igneous, the rocky town got its name from this naturally endowed resource. Dutse is currently the largest city in Jigawa State and its environment is well known for Date Palm trees (Dabino) of different varieties. Dutse covers an area of 7,382sq km. The area is characterized by undulating topography and hilly walls peculiar to the North-Western states, and the population of Dutse is predominantly Hausa and Fulani. The majority of the population are farmers, other occupations typical to rural areas are also available among the populace. There are 12 Wards in Dutse which are: Abaya, Chamo, Dundubus, Duru, Jigawar Tsada, Kachi, Karnaya, Kudai. Limawa. Madobi, Sakwaya.

Sampling Procedure and Sample Size

A two-stage sampling procedure was used for this study. The first stage was the purposive selection of five (5) out of twelve (12) wards due to the intensity of backyard egg production in their households. The five wards selected were: Chamo, Dundubus, Kachi, Limawa and Madobi. The second stage was a random selection of thirty per cent (29%) of the households from the sample frame, thereby making a total of Ninety (90) households for the study. The summary of the sampling procedure is shown in Table 1.

Table 1: Summary of Sampling Frame and Sample Size

S/N	Wards	Sample frame	Sample Size
1	Chamo	61	18
2	Dundubus	63	18
3	Kachi	54	15
4	Limawa	70	21
5	Madobi	60	18
Total	4	308	90

Data Collection

Primary data was collected from the households using a structured questionnaire. Primary data was collected to compare the socio-economic variables of the small-scale farmers to estimate the cost and returns as well as to find out the constraints faced in small-scale layer production in the study area. These data was collected through observational and oral interviews.

Tools of Analysis

The tools of analysis used in achieving the objectives of the study were descriptive statistics and Net farm income.

Descriptive Statistics

The descriptive statistics tools used includes percentage, frequency distribution, mean and standard deviation to achieve objectives i, ii, and iv.

Net Farm Income (NFI)

Net Farm Income was represented by the following equation:

NFI = GM- TFC..... (1)

Where:, NFL= Net Farm Income, GM = Gross margin, TFC = Total Fixed Cost, TVC = Total variable cost (naira)

RESULTS AND DISCUSSION

Socio-economic Characteristics of Backyard Poultry Egg Production among Households

The result for the socioeconomic characteristics of the households is presented in Table 2. The result shows that sixty per cent (60%) of the respondents were females while forty per cent (40%) were males, implying that females dominated backyard poultry production in the study area. This agrees with Abdullahi *et al* (2019) who reported poultry as an attractive enterprise especially among women and youth, since it does not require a large area of land, can also generate returns quickly and provides full employment and is not dependent on seasonal production. The result further shows that the mean age of the poultry producers in the household was 32 years while the minimum and maximum ages were 19 and 48 years, respectively. This reflects that the age category between 31-35 years was more engaged in backyard poultry production in the study area. It is believed that people within this age category have family members who depend on them to provide or take care of certain responsibilities. The result agrees with the findings of Rahji et al (2015); Abdullahi *et al* (2019); and Suleiman *et al* (2023) that reported women and youths are involved in poultry production and have been in the process for some years. The study revealed that backyard poultry farmers in the area had an average experience of 5 years. Table 2 indicates that the majority of respondents (52.2%) had household sizes of 6-10 persons, followed by 26.7% with 0-5 persons, 14.4% with 11-15 persons, 3.3% with 16-20 persons, and 3.3% with 21-25 persons. Most of the poultry producers (59.9%) in the study area were found to have less than 6 years' experience, this was followed by 31.1% of the respondents who had 6-10 years of experience in poultry farming. In addition, the average household size in the study area was 8 persons. Furthermore, the results reveal that a significant majority (80.1%) of the respondents have undergone formal education. In line with suggestion of Eduvie (2012) that skills for better productivity in poultry is acquired through better education. Result on occupation, shows that 38.9% of the respondents are self-employed, 28.9% have farming as their main occupation, 16.7% are artisans, 11.1% are civil servants, and only 4.4% are traders.

Poultry Egg Production Typology among the Households

This result presented in Table 3 shows that the majority (65.6%) of the respondents managed less than 50 birds whereas only (25.6%) had between 51 and 100 birds, and few (8.8%) managed 101-150 birds. This implies that most of the households managed a small-scale poultry enterprise. Concerning where they manage the poultry. Most (93.3%) produce the poultry egg in their home backyard, with only (6.7%) producing at the designated farm. The findings further showed that the majority (65.6%) of the producers practiced an intensive system of management while only 21.1% and 13.3% engaged in an extensive and semi-intensive system of management respectively. Also, the majority (86.7%) of the households sell directly to consumers within their local communities with only (13.3%) selling directly to wholesalers and retailers. With regards to keeping farm records, the result shows that the majority (85.6%) do not keep records of their production activities. Conversely, the majority (86.7%) of the households have an interest in scaling up their operations and producing more while 13.3% are satisfied with the level of their operations.

Table 2: Distribution of the Respondents by Socio-economic Characteristics

Variable	Frequency	%	Mean
Gender			
Male	36	40	
Female	54	60	
Age			
< 25	5	5.6	
25-30	29	32.2	
31-35	30	33.3	
36-40	19	21.1	32 years
41-45	6	6.7	
46-50	1	1.1	
Experience			
< 6	53	59.9	
6-10	28	31.1	5 years
11-15	7	7.8	
16-20	2	2.2	
Marital Status			
Single	19	21.1	
Married	59	65.6	
Widowed	4	4.4	
Divorced	8	8.9	
Household Size			
0-5	24	26.7	
6-10	47	52.2	8 persons
11-15	13	14.4	
16-20	3	3.3	
21-25	3	3.3	
Level of Education			
Quran	14	15.6	
Primary	24	26.7	
Secondary	37	41.1	
Tertiary	15	16.7	
Main Occupation			
Civil Servant	10	11.1	
Self Employed	35	38.9	
Artisan	15	16.7	
Trader	4	4.4	
Farmer	26	28.9	

Table 3: Poultry Egg Production Typology among the Households

Variable	Frequency	%
Flock Size		
< 50	59	65.6
51-100	23	25.6
101-150	8	8.8
Where do you produce		
Home	84	93.3
Farm	6	6.7
Management System		
Intensive	59	65.6
Semi-Intensive	12	13.3
Extensive	19	21.1
To whom do you sell		
Consumers	78	86.7
Retailers	3	3.3
Wholesalers	9	10
Do you keep a record?		
Yes	13	14.4
No	77	85.6
Do you consider expanding		
Yes	78	86.7
No	13	13.3

Costs and Returns of Backyard Egg Production

The result presented in Table 4 shows the various costs and returns attributed to backyard egg production. The average cost incurred by the household is ₦16,261.54, this consists of the average cost of the stock at ₦1,050.00 (6.46% of the total cost of production); an average feeding cost of ₦12, 367.35 (76.05% of the total cost of production); average cost of labour at ₦820.26 (5.04% of the total cost of production); cost incurred during vaccination covered an average of ₦900.16 (5.54% of the total cost of production); meanwhile the estimated utility (miscellaneous) used during the production cycle was an average of ₦500.00 (3.07% of the total cost of production). The result further shows a total revenue from the sales of output(s) to be ₦21,996.06; egg sales averages ₦18,515.56 per bird which covers most (84.18%) of the total revenue. An additional revenue was generated from the sales of spent layers, on an average of ₦2,800.00 (12.73% of the total revenue). Sales of poultry manure amount to ₦680.50 (3.09% of the total revenue). The net farm income was found to be ₦5,734.52 per bird; this implies that the enterprise is profitable. This finding is in line with the earlier works of Okpachu & Madu (2017) and Ahungwa et al (2018) among poultry egg producers in the Northern and Southern parts of Nigeria respectively.

Table 4: Cost and return analysis of egg production per bird

Items	Unit	Value	Average Cost(₦)	Percentage contribution (%)
a) Variable Costs				
Stock			1,050	6.46
Feeding	Kg		12,367.35	76.05
Labour	Man-day	How many	820.26	5.04
Vaccination			900.16	5.54
Utility and others	₦		500	3.07
Total variable Cost			15,637.77	
b) Total Fixed Costs			623.77	3.84
Total Cost	₦		16,261.54	100
c) Revenue	₦			
Egg	Crates	How many	18,515.56	84.18
Poultry manure	Kg		680.5	3.09
Spent layer			2,800	12.73
Total Revenue	₦		21,996.06	100
Net Farm Income	₦		5,734.52	

Constraints Faced in Backyard Egg Production by the Households

The result presented in Table 5 shows the constraints faced in backyard egg production by the households. The result shows that the majority (91.11%) of the respondents faced market fluctuation as the most pressing challenge, followed by the high cost of production as reported by significant number (90% of the respondents); Lack of training on improved management skills to improve their operations as reported by significant majority (82.2%) of the households. Other notable challenges faced by the majority of the respondents were theft, disease incidence and mortality, and lack of biosecurity. The least experienced challenge was medication cost. The challenges are similar to what was reported by Okpachu & Madu (2017) among poultry producers in Yobe State, Nigeria. The result implies that there are challenges affecting the performance of backyard egg production by the households. Therefore, checkmating the challenges will enhance the profitability of the enterprise among the households.

Table 5: Constraints Faced in Backyard Egg Production by Households

Constraint	Freq.	%	Ranking
Market Fluctuation	82	91.11	1st
Cost of Feed	81	90.00	2nd
Lack of Training	74	82.22	3rd
Theft	69	76.67	4rd
Disease	68	75.56	5th
Mortality	65	72.22	6th
Lack of Biosecurity	49	54.44	7th
Cost of Drugs	34	37.78	8th

CONCLUSION AND RECOMMENDATION

The backyard egg production among the households in the study area was female-dominated and operated a small-scale enterprise of less than 50 birds. Most of the eggs produced were sold and consumed within the local environment, and the producers expressed a strong willingness to upscale their operations. The findings of the study further revealed egg production enterprise by the households as profitable, thereby giving additional alternative income sources, despite the benefits derived, the enterprise was constrained by market fluctuation, high cost of production, and lack of training to help them improve on their whole operations. The study recommends the following to improve the overall performance of the household backyard egg production: The households should be trained on innovative poultry egg production given their willingness to upscale their poultry enterprise; Ease access to credit and input subsidies should be provided to ameliorate the high cost of feed-constrained backyard egg production; Government policies and programmes targeting food security should continue encouraging women and youth participation, particularly in the aspect of backyard poultry production.

Acknowledgment

The authors appreciated the respondent's (households) in Jigawa state, for their maximum cooperation during the conduct of data collection.

Authors' contribution

Authors MAA & BN managed data collection, interpretation of data, writing of the manuscript, material support, and review of manuscripts and wrote the first draft of the manuscript. SS & UBM managed the

literature searches. MKY, SM &AI managed the development of methodology, data analysis, and the development of the model. All authors read and approved the final manuscript.

Ethics Committee Approval: Not applicable.

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