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ASSESSMENT OF FACTORS INFLUENCING POULTRY PRODUCTION AMONG RURAL FARMERS IN KATCHA AND LAPAI LOCAL GOVERNMENT AREAS OF NIGER STATE, NIGERIA

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ABSTRACT

The study assessed factors influencing poultry production among small-scale farmers in Katcha and Lapai Local Government Areas of Niger State. A three-stage sampling procedure was used to select 132 small-scale poultry farmers, to whom structured questionnaires were administered to collect primary data. The data collected were analyzed using descriptive statistics (frequency count, percentages, and means), inferential statistics (multiple regressions), and farm budgeting techniques. The socio-economic characteristics of the farmers showed that most (45.5%) were between 30-40 years of age with a mean age of 36 years, 70.1% of the farmers were male, and 57.5% were married. The mean household size was six persons, while the mean farming experience was 5.2 years. Over half (53.0%) of the farmers had primary and secondary school education. The costs and returns evaluation result revealed that the farmers incurred more expenses in purchasing feeds (₦68,616.34). In contrast, returns on poultry production were ₦357,103.54 with a profitability and efficiency ratio of 1.28 and 2.28, respectively, per 100 birds. The multiple regression results revealed that feeds (0.0561), drugs/vaccines (0.0577), credit (0.0520), age (-0.0192), education (0.0122), household size (0.0425) and farming experience (0.1617) significantly influence poultry output at 1% and 5% level of probability. Meanwhile, the high cost of feed (ẋ=2.45) and high temperature (ẋ= 2.29) were the most severe constraints faced by the poultry farmers. These findings showed that the poultry

farmers were making reasonable returns from poultry farming. The government and other relevant stakeholders should encourage the farmers to adopt climate-smart agricultural practices to mitigate the effects of temperature on poultry birds. Also, extension services should be intensified, for increased poultry production in the study area.

Keywords: Assessment, Factors influencing, Poultry production, Small-scale farmers

INTRODUCTION

The poultry industry, a prominent sub-sector of animal husbandry, plays a crucial economic and nutritional role in the livelihood of urban and rural poor households in many developing nations, including Nigeria. It occupies a significant position by providing high-quality animal protein, minerals, and vitamins to balance the human diet (Adeniran *et al.,*2018). Poultry production, the raising of domestic birds for food, either meat or eggs, includes birds such as chickens, ducks, turkeys, geese, quail, and guinea fowl (Osuji, 2019).

Poultry products such as meat and eggs are highly nutritious and give farmers good economic returns. According to Okunola and Olofinsawe (2007), poultry meat is a good source of animal protein, which is always preferred to beef and pork, owing to its adaptability, taste, ease of processing, health consideration, nutrient composition, and contribution to food security. On the other hand, the Food and Agriculture Organization (FAO) (2013) reported poultry eggs contain the highest Net Protein Utilization (NPU) of about 87%, which doubles the 40% NPU value of grains, except rice, which contains slightly higher NPU of about 60%. Inyang and Eko (2015) posit that poultry provides ready income and development to many households in Nigeria in addition to having the fastest and highest rate of returns to investment, ease of management, and small space requirement.

The poultry industry is one of the most dynamic and fastest-growing segments of the livestock sub-sector. It constitutes about 58.7% of the total livestock resources of the nation (National Bureau of Statistics (NBS), 2023). In Nigeria, poultry contributes about 15% of the total annual protein intake, with approximately 1.3kg of poultry products consumed per head per annum (Osuji, 2019). Besides, the poultry industry also serves as a source of employment and poverty alleviation. It is worth noting that approximately 80% of rural households in Nigeria are engaged in small-scale to medium-scale poultry production (Heinke *et al.*, 2015; NBS, 2023).

It is, however, unfortunate that in recent times, the poultry industry has experienced a steep decline in output attributed to some factors such as poor market access, high cost of feeds and chicks, untimely delivery of inputs, inadequate capital, and poor extension services and these factors bring a lot of uncertainties in poultry production (Ebukiba and Anthony, 2019). Owing to these underlying factors, the poultry industry now lags behind the other livestock sub-sectors, and the gap between demand and supply of poultry products has grown wider. In 2022, there was an estimated supply gap of 529,000 metric tonnes of poultry meat in Nigeria (NBS, 2023). In this respect, there is a need to assess the factors that influence poultry production in the study area and suggest ways to narrow the demand and supply gap. Thus, the specific objectives of the study were to:

- Describe the socio-economic characteristics of small-scale poultry farmers.
- Analyze the costs and returns in small-scale poultry production.
- Determine the factors that influence small-scale poultry production and examine the constraints associated with small-scale poultry production.

METHODOLOGY

Study Area

The study was carried out in Katcha, and Lapai Local Government Areas of Niger State Agricultural Zone I. Niger State lies between Latitude 8o – 10o North and Longitude 3o – 8oEast with an estimated total land area of 74,244 square kilometres (Muhammad *et al.,* 2011). As of the 2006 census, the human population stood at 3,950,249 (NPC, 2006). However, as of the end of 2022, the projected population with a 3.4% growth rate was 6,744,655 (NBS, 2023). Niger State experiences two distinct seasons, wet and dry, with mean annual rainfall ranging from 1000mm-1500mm. The basic pattern of land ownership is a communal system, while crop and livestock production form the primary occupation of the people.

Sampling Procedure and Sample Size

The study used a three-stage sampling procedure to select the respondents. The first stage was a purposive selection of two Local Government Areas (LGAs) due to the preponderance of poultry-rearing activities. The second stage randomly selected eight communities from Katcha LGA and ten from Lapai LGA to get eighteen communities. The third stage involved selecting eight poultry farmers from each community selected in Katcha LGA and seven from each

community selected in Lapai LGA to get a total sample size of 134 poultry farmers used as respondents for the study.

Method of Data Collection and Analysis

Primary data were obtained through a semi-structured questionnaire complemented with an interview schedule. The data were subjected to descriptive statistics (frequency count, percentage, and mean) and inferential statistics (farm budgeting technique and multiple regression analysis). Meanwhile, a three-point Likert-type rating scale of very severe (VS) = 3, Severe (S) = 2, and Not Severe (NS) = 1, was used to measure the constraints faced by the farmers. The decision rule was determined by adding the scores together (3 + 2 + 1) and dividing by 3 to get a mean score of 2.0 was used as a benchmark. Therefore, a calculated mean score greater than or equal to 2.0 implies a severe constraint, while a mean value less than 2.0 implies no severe constraint.

Model Specifications

Farm Budgeting Technique

The farm budgetary technique was used for costs and returns analysis. The analysis comprises Fixed Costs (FC), Variable Costs (VC), Total Costs (TC), Total Revenue (TR), Gross Margin (GM), and profit.

$$TC = TVC + TFC \quad (1)$$

$$TR = P*Q \text{ (P = Price and Q =Total output (kg))} \quad (2)$$

$$GM = TR - TVC \quad (3)$$

$$\text{Profit} = GM - TFC \text{ or } TR - TC \quad (4)$$

Multiple Regression Model

The multiple regression analysis was used to determine the factors that influence the output of poultry farmers. The model as applied by Muhammad *et al.* (2020) is implicitly expressed as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9) \quad (5)$$

The explicit functional forms of the multiple regression model are:

Linear:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \ldots\ldots\ldots\ldots\ldots\ldots\ldots + \beta_9 X_9 + u \quad (6)$$

Cobb-Douglas:

$$\ln Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \ldots\ldots\ldots\ldots\ldots + \beta_9 \ln X_9 + u \quad (7)$$

Semi-log:

$$Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \ldots\ldots\ldots\ldots\ldots\ldots + \beta_9 \ln X_9 + u \quad (8)$$

Exponential:

$$\ln Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \ldots\ldots\ldots\ldots\ldots\ldots + \beta_9 X_9 + u \quad (9)$$

Where;

Y = Output of poultry farmers (kg)

X_1 = Feeds (kg)

X_2 = Drugs (kg)

X_3 = Labour (man-days)

X_4 = Amount of credit (Naira)

X_5 = Age (years)ducation (years)

X_7 = Household size (number)

X_8 = Farming experience (years)

X_9 = Extension contacts (number)

u = error term

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

Results in Table 1 reveal that 45.5% of poultry farmers were in the age bracket of 30-40 years, with a mean of 35.6 years, implying that the farmers were in their active age, which was likely to impact positively on their output. This finding agrees with the study of Ebukiba and Anthony (2019), who found that the poultry farmers in their study area had a mean age of 36 years. The majority (70.1%) of the farmers were male and 29.9% were female. These revealed that poultry production in the study area was mainly dominated by the male gender, which is often related to specific factors such as biological, cultural, and economic considerations. This finding conforms with that of Muhammad *et al.* (2020), who reported that poultry production was mostly by male gender. Table 1 also shows that more than half (57.5%) of the farmers were married, while 43.3% had household sizes of 5-10 people with a mean of 6 persons. These results imply that most respondents had relatively large households and could be a source of family labour in poultry production. Most (69.4%) of the farmers had formal education, while 30.4% had no formal education. Thus, a high proportion of the respondents were educated, which positively influenced their poultry production decision-making. More so, 45.5% of the farmers had less than ten years of poultry-rearing experience. A considerable proportion of the farmers were new to poultry production in the study area. This finding agrees with the study of Adeniran *et al.* (2018), who reported that several poultry farmers in their study area had formal education and experience in the enterprise. Furthermore, the majority (85.1%) of the farmers were members of cooperatives. This high membership of cooperatives was likely to enable them to access government assistance and other interventions geared toward enhancing poultry production

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Table 1: Socio-economic Characteristic of Small-Scale Poultry Farmers

Variable	Frequency	Percentage (%)	Mean
Age (years)			
<30	35	26.1	
30-40	61	45.5	35.6
41-50	15	11.2	
>50	23	17.2	
Sex			
Male	94	70.1	
Female	40	29.9	
Marital Status			
Single	42	31.3	
Married	77	57.5	
Divorce	5	3.7	
Widow	10	7.5	
Household size (number)			
<5	54	40.3	
5-10	58	43.3	6
>10	22	16.4	
Educational level			
Non formal	41	30.6	
Primary	38	28.4	
Secondary	33	24.6	
Tertiary	22	16.4	
Farming experience (years)			
< 10	61	45.5	
10-20	54	40.3	
>20	19	14.2	5.2
Cooperative membership			
Yes	114	85.1	
No	20	14.9	
Extension contacts			
Yes	68	50.7	
No	66	49.3	

Source: Field Survey, 2021

Costs and Returns of Poultry Production

The farm budgeting technique was used to analyse the costs and returns of the poultry farmers in the study area, as presented in Table 2. This comprises the gross margin, net farm income,

revenue, and total cost (variable and fixed costs). The result revealed that the average variable costs per 100 birds of the poultry farmers was ₦119,683.51 representing 76.4% of the total cost, while the fixed costs per 100 birds were ₦37,011.12, representing 23.6% of the total costs. Among the variable costs of poultry production includes the cost of feed (₦68,611.34) representing 43.8% and the highest cost incurred by the farmers. This is followed by the cost of purchasing day-old chicks (₦21,478.36), representing 13.7% of the total production costs. Other costs incurred include the cost of vaccines (₦3,552.24), cost of drugs (₦6,695.5), cost of water (₦3,202.99), cost of litter materials (₦5,343.28) and cost of labor (₦10,850.75) representing 2.3%, 4.2%, 2.0%, 3.4%, and 6.9%, respectively. This implies that feed usage recorded the highest variable cost incurred in poultry production by the respondents in the study area. The total revenue realized by the poultry farmers in the study area was ₦357,103.54 per 100 birds, while the gross margin and net farm income were ₦237,402.03 and ₦200,403.91 per 100 birds, respectively. The profitability and efficiency ratios were 1.28 and 2.28, respectively, per 100 birds, implying the profitability of poultry production in the study area. This finding corroborates the study of Heinke *et al*. (2015) and Osuji (2019), who reported that poultry production in their study area is profitable.

Factors Influencing the Output of Poultry Farmers

Table 3 presents the results of multiple regression analysis, which estimates the factors that significantly influence the output of poultry farmers in the study area. We chose the double-log functional form of the multiple regression as the lead equation, which yielded a high coefficient of determination (R2) value of 0.9321. This means that approximately 93% of the variation in the output of the poultry farmers can be explained by the independent variables included in the model. Notably, seven out of the nine independent variables specified in the model (feed, cost of drug, labour, amount of credit, household size, extension contact, and farming experience) were found to be significant at a 1% level of probability based on the t-value from the regression estimates.

Drugs/vaccines (-0.0577) and age (-0.0192) had negative coefficients and significant at 1% level of probability, respectively. This implies that a high drug/vaccine administration dosage could reduce the farmers` output level, while the increase in age affects performance, leading to low output. Thus, a unit increase in drug/vaccine application and age of the farmers could lead to a decrease of about 5% and 2% in the poultry output respondents in the study area. This finding is

in line with the study of Ebukiba and Anthony (2019), who reported that poultry farmers' medication and age negatively influenced poultry production in their study area.

Furthermore, feed, credit access, education, household size, and farming experience all had positive coefficients and were significant at a 1% probability level. The observation means that these factors positively influenced the output of poultry farmers in the study area. A unit increase in any of these variables could lead to a rise of about 6%, 5%, 1%, 4%, and 16%, respectively, in the poultry output of respondents in the study area. This is a promising finding and agrees with the study of Osuji (2019), who reported that feeds, education, and credit positively influenced the output of poultry production in their study area.

Table 2: Costs and Returns Analysis of Small-Scale Poultry Production per 100 Birds

Cost of items/Revenue	Average cost (₦)	% of total cost	Revenue (₦)
Returns			**357,103.54**
Variable cost			
Cost of feed	68616.34	43.79	
Cost of chicks	21478.36	13.71	
Cost of vaccine	3552.24	2.27	
Cost of drugs	6639.55	4.24	
Cost of water	3202.99	2.04	
Cost of litter material	5343.28	3.41	
Cost of labour	10,850.75	6.92	
Total variable cost (TVC)	**119,685.51**	**76.38**	
Fixed cost			
Depreciation of farm assets	37,011.12	23.62	
Total fixed cost (TFC)	**37,011.12**	**23.62**	
Total cost (TC)	**156,694.63**		
Gross Margin (GM)=GI-TVC			**237,420.03**
Net Farm Income (NFI)=GM-TFC			**200,408.91**
Profitable Ratio=NFI/TC			**1.28**
Efficiency Ratio TR/TC			**2.28**

Source: Field Survey, 2021

Constraints Faced by the Respondents

The results of the constraints associated with poultry production in the study area, as presented in Table 4, align with previous studies. The high cost of feed (X = 2.45) ranked 1st among the severe constraints indicated by the respondent, a finding consistent with other research that shows feed is a key component of poultry production (Adeniran *et al.,* 2018). This is followed

by poor extension service (X = 2.32), high-temperature effect (X = 2.29), high cost of medication (X = 2.20), and unstable price of chicks (X = 2.01), ranked 2nd, 3rd, 4th, and 5th, respectively, among the severe constraints faced by the poultry farmers in the study area. This finding is in line with the study of Adeniran *et al.* (2018) and Osuji (2019), who reported similar constraints associated with poultry production in their study areas.

Table 3: Regression Estimates of Factors Influencing Poultry Production

	Linear		**Semi-log**		**Double-log**		**Exponential**	
Variables	**Coeff.**	**t-value**	**Coeff.**	**t-value**	**Coeff.**	**t-value**	**Coeff.**	**t-value**
Constant term	5441.57	24.43***	5610.58	18.76***	8.6591	15.27***	8.5827	22.63***
Feed	-0.2008	-4.69***	317.65	8.36***	0.0561	7.98***	-0.0003	-4.31***
Drugs/Vaccines	0.0586	3.99***	-336.61	-3.79***	-0.0577	-3.14***	-0.0001	-3.31***
Labour	-0.0641	-2.82***	197.21	1.67	0.0118	1.22	0.0001	3.20***
Credit	-0.0378	7.48***	27.54	8.16***	0.0502	8.25***	6.91e-06	8.05***
Age	-1.7971	-0.57	-100.19	-1.90*	-0.0192	-3.00***	-0.0003	-0.57
Education	4.3349	0.53	64.21	3.06***	0.0122	3.14***	0.0008	0.60
Household size	197.44	10.92***	216.09	10.38***	0.0425	11.03***	0.0359	11.67***
Farming experience	56.61	1.68	876.44	31.11***	0.1617	31.01***	0.0123	1.15
Extension contacts	522.53	6.54***	7.54	0.27	0.0016	0.31	0.0901	6.63***
R^2	**0.9210**		**0.9100**		**0.9321**		**0.9293**	
R^2-Adjusted	**0.9153**		**0.8931**		**0.9289**		**0.9241**	
F-statistic	**16.59*** **		**19.55*** **		**21.03*** **		**19.76*** **	

Source: Field Survey, 2021

CONCLUSION AND RECOMMENDATIONS

Poultry production in the study area is a profitable enterprise, despite the challenges faced by farmers such as the high cost of feed, poor extension service, and high-temperature effects. In light of these challenges, the study recommends that the government and relevant stakeholders take immediate action. By encouraging the adoption of climate-smart agricultural practices, they can help mitigate the effects of temperature on poultry birds and ensure an efficient feed

conversion ratio at reduced costs. Equally important is the need to intensify the delivery of extension services, as this will be a key factor in boosting poultry production.

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Table 4: Constraints Associated with Small-Scale Poultry Production

Constraints	VS (3)	S (2)	NS (1)	WS	WM ($\bar{X}$)	Rank	Remark
High cost of feeds	73	48	13	328	2.45	1st	Severe
Poor extension service	70	37	27	311	2.32	2nd	Severe
High temperature effect	49	85	-	307	2.29	3rd	Severe
High cost of medication	27	107	-	295	2.20	4th	Severe
Unstable price of day-old chicks	13	12	-	281	2.01	5th	Severe
Inadequate capital	37	51	46	259	1.93	6th	Not severe
Lack of quality vaccine	40	48	46	262	1.96	7th	Not severe
Problem of bio-security	13	121	-	255	1.90	8th	Not severe
Lack of fast-growing birds	40	-	94	214	1.59	9th	Not severe

Source: Field Survey, 2021

Note: Very Severe = VS (3), Severe = S (2), Not Severe = NS (1), Weighted Sum = WS, Weighted Mean = WM and $\bar{X}$ = Bench Mean Score of 2.0

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