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Assessment of Poultry Farming in Kwaya Kusar Local Government Area of Borno State, Nigeria

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ABSTRACT

The Nigerian poultry industry is essential to the country's economy, as it supports job creation and food security. However, it encounters challenges that significantly hinder its growth. Evaluating poultry farming can provide insights into the factors affecting production levels, the affordability, and accessibility of poultry products, ultimately aiding efforts to enhance food security and nutrition. This study aimed to evaluate poultry farming practices in the Kwaya Kusar Local Government Area of Borno State. Data were gathered from 99 poultry farmers using a multistage sampling technique, primarily through a structured questionnaire. Both descriptive statistics and probit regression analyses were utilized to meet the study's objectives. The socio-economic analysis indicated that the poultry farmers were predominantly in their prime working years, with an average age of 44.4 years. Most of the farmers (75.8%) were male, and their average experience in poultry farming was 7.9 years. The average household size was 8 individuals, and the average poultry flock consisted of 337 birds. Additionally, 57.6% of the farmers had access to credit and received an average of 3 extension visits per month. Regarding improved poultry practices, the study found that a significant majority of respondents adopted convenience/ventilation practices (85.86%), followed by vaccination (82.82%) and bio-security measures (77.78%). Factors influencing the adoption of these practices included poultry size, household size, cooperative society membership, and the number of extension visits. These factors significantly impacted the adoption of improved practices, with probability levels of 1%, 5%, 5%, and 1%, respectively. The study also identified challenges faced by poultry farmers, with the high cost of feed being the predominant issue (88.88%). It is recommended that the government implement funding and policies to enhance extension services in the region.

INTRODUCTION

Poultry farming is vital to the agricultural sector, contributing significantly to food production, job creation, and income generation across various regions, including Nigeria. It provides a major source of protein through eggs and meat, which are crucial elements of the human diet (Phillip *et al.*, 2019). As a key component of the economy, it engages over 60% of the workforce and contributes substantially to agricultural sector in terms of real GDP (Olorunwa, 2018). Within the livestock industry, poultry—which includes chickens, turkeys, ducks, quails, peafowls, and guinea fowls—represents a significant subsector. Notably, chickens account for approximately 95% of global poultry (Olorunwa, 2018).

Investments in poultry production offer quicker returns compared to other livestock enterprises. The growth rate in poultry production surpasses that of ruminants and other monogastric animals, making it the most affordable, widespread, and efficient source of animal protein (Ojo, 2022). Ogundipe and Sanni (2022) noted that returns on investment can be enhanced by managing multiple production cycles per year. Poultry farming is crucial for tackling food security issues by providing a sustainable protein source through eggs and meat. In areas like Borno State, where alternative protein sources may be scarce, poultry products are essential dietary staples, particularly for rural populations (Phillip *et al*., 2019). The contribution of poultry production to total livestock output has risen significantly from 1995 (Central Bank of Nigeria, 2019). In 2000, the Nigerian Federal Government sought to bolster the poultry industry by banning the importation of poultry and its products, aiming to balance demand and supply within the country.

The adoption of advanced poultry practices in Nigeria is transforming the industry, addressing productivity and sustainability issues. Modern housing systems, such as battery cages and deep litter systems, enhance biosecurity by reducing bird contact with waste, thereby mitigating disease outbreaks. These systems also provide improved environmental control, optimizing temperature and ventilation for bird comfort and productivity. Improvements in feed, including balanced diets rich in essential nutrients, are crucial for poultry growth and health, leading to increased meat and egg yields. Vaccination programs targeting prevalent diseases like Newcastle disease and avian influenza are essential for maintaining flock health and reducing mortality rates. Additionally, genetic advancements through high-performing breeds contribute to better growth rates, higher feed conversion efficiency, and improved disease resistance (Kazi, 2023).

Despite the potential of poultry farming to enhance food security, income generation, and economic development, there remains a lack of comprehensive understanding regarding the current status, challenges, and opportunities within the poultry sector in KwayaKusar Local Government Area (LGA) of Borno State, Nigeria. This gap in knowledge impedes the development of targeted policies, interventions, and support mechanisms necessary for the sustainable growth and advancement of poultry farming in the region. Therefore, an urgent assessment and analysis of the key issues faced by poultry farmers in KwayaKusar LGA is needed to identify constraints, enhance productivity, and improve profitability.

The ongoing insurgency in Borno State has created an environment of insecurity that directly affects poultry farming in KwayaKusar. Frequent attacks, thefts, and vandalism jeopardize the safety and livelihoods of poultry farmers, discouraging investment and restricting the expansion of poultry operations. The pervasive insecurity undermines farmer confidence and disrupts the stability of the poultry sector.

Limited market access further exacerbates the challenges for poultry farmers in KwayaKusar. Remote rural locations and inadequate market infrastructure impede farmers' ability to reach profitable markets and secure fair prices for their products. The lack of processing facilities restricts value-addition opportunities, forcing farmers to sell their products at lower prices and miss out on potential profits. Consequently, many poultry farmers struggle with profitability and sustaining their operations amidst stiff market competition and logistical obstacles.

Although improved poultry practices have been introduced, production levels and financial returns remain disappointing. This backdrop underscores the need for this study, assessing poultry production in KwayaKusar Local Government Area of Borno State.

The specific objectives were to:

i. describe the socio-economic and institutional characteristics of poultry farmers in the study area;

ii. identify the various improved poultry practices adopted by the farmers in the study area,

iii. determine the factors influencing the adoption of improved poultry practices by farmers in the study area, and

iv. identify the challenges faced by poultry farmers in the study area.

METHODOLOGY

The research project was conducted in the KwayaKusar Local Government Area (LGA) of Borno State, Nigeria. KwayaKusar is one of the 27 LGAs in Borno State and is situated between latitudes 10°N and 14°N and longitudes 11°E and 13°E (Neuman, 2014). It borders Hawul LGA to the east, Shani LGA to the south, Biu LGA to the northeast, and Bayo LGA to the northwest, within the Guinea savannah region. The study concentrated on four districts: Gusi, Yimirdlalang, Wandali, and Kwaya.

KwayaKusar, with its headquarters in the town of KwayaKusar, covers an area of 732 km² and has a projected population of 83,100 (NPC, 2023). The predominant language spoken by its inhabitants is Bura, and the local economy is primarily based on subsistence farming. This LGA is part of the Biu Emirate, a traditional state within Borno State (Neuman, 2014). The climate is characterized by two distinct seasons: a hot, oppressive rainy season and a scorching, windy, and partly cloudy dry season, with temperatures ranging from 61°F to 103°F (Trochim and Donnelly, 2008). According to Amir (2022), the region is primarily inhabited by the Bura, Tera, Margi (Marghi), Hina (Hinna), and Fulani Kitaku (Kitije Filane) peoples.

This study employed a multi-stage sampling approach. Initially, the KwayaKusar Local Government Area in Borno State was deliberately chosen due to its significant poultry farming population. In the second stage, all four districts within this area were specifically selected because they each have a substantial number of poultry farmers. To ensure unbiased results, a sample size of 99 was drawn from a total sample frame of 132, using the Taro Yamane formula for sample size determination as used by Onwuaroh et al. (2017).

$$n = \frac{N}{1+N(e)^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

n, = Sample Size (Total Sample Size)

N = Population Size (Total Sample Frame)

e = Level of Significance (Set as 0.05 for this study)

Table 1: Sample size distribution

Districts	*Sample Frame	Sample Size
KwayaKusar	32	24
Wandali	23	17
Gusi/Bila	40	30
Yirmidhalang	37	28
Total	132	99

*Source: Reconnaissance Survey

Descriptive statistics, including frequency counts, percentages, and means, were employed to address objectives i, ii, and iv. To identify the factors affecting the adoption of improved poultry practices, a probit regression model was utilized. Probit analysis relies on the cumulative normal probability distribution. In this model, the binary dependent variable (y) can assume values of zero or one (Aldrich and Nelson, 1984). The Probit model is a commonly employed statistical tool for analyzing data with binomial distributions. This model is suitable because it addresses heteroscedasticity issues and adheres to the assumption of a cumulative normal probability distribution (Gujarati, 2004).

Specifically, the model takes the implicit form as follows (Osuagwu, Oparajiaku, Ajaero, Okwara, & Osugiri, 2022):

$Pr = (Y = 1/x) = \phi (x'\beta)$ …….(2)

Here, Pr represents probability, and ϕ refers to the Probability Density Function (PDF) of the standard normal distribution. The parameters β are generally estimated using the Maximum Likelihood (ML) method. When modeling the Probit model as a latent variable model, equation (2) can be expressed as follows:

$Y = \beta_0 + \beta_1 \sum_{1}^{n} X_i + e$ …….. (3)

Where; e~ N (0, 1). Therefore Y_i becomes

Y = 1 if Y* >0 (-e < x'β)

0 otherwise ……(4)

Where Y* is unobserved or latent variable and Y is the observed variable

Thus, by applying the normal cumulative distribution function (CDF), equation (3) can be explicitly expressed as follows:

$$\mathbf{Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_5 X_5 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8}$$

Where:

Y = This refers to the adoption of improved poultry practices (farmers who adopted any practice were scored 1 while those who did not adopt were scored 0)

B_0 = Intercept
X_1 =Age (years)
X_2 = Level of Education
X_3 = Farming Experience (years)
X_4 = Credit (naira)
X_5 =Flock Size
X_6 = Household size
X_7 = Membership of Cooperative
X_8 = Access to extension contact (No. of contact)

RESULTS AND DISCUSSIONS

Socio-economic Characteristics of the Respondents

The data presented in Table 2 indicates that the average age of the farmers is 44.4 years. This suggests that the poultry farmers are in their prime working years and likely to seize opportunities to enhance their poultry operations. This finding aligns with Adeoye *et al.* (2018), who observed that most poultry farmers are in their productive years and are capable of embracing new farming techniques. Additionally, Table 2 shows that a significant majority (75.8%) of the respondents were male, which supports Olabode *et al.* (2019), who reported a predominance of male poultry farmers in Ogun State, highlighting a gender imbalance in the industry. Furthermore, the results reveal that nearly half (49.5%) of the respondents had household sizes ranging from 6 to 10 people, with an average of 8 individuals per household. This suggests that poultry farmers in the study area have relatively large households, which could provide family labor and help reduce labor costs in their poultry farming operations. This is consistent with the findings of Makinta *et al.* (2019), who reported that broiler producers in Maiduguri Metropolis also benefited from large household sizes, which contributed to their available labor force for broiler production.

Table 2 reveals that 51.5% of the respondents have attended university, indicating that a significant portion of poultry farmers in the study area possesses a higher level of education. This educational attainment likely aids their understanding and adoption of new innovations. These results are consistent with Adene and Oguntade (2016), who found that higher education among farmers is associated with improved management practices and increased productivity. Additionally, the data shows that 48.5% of respondents have 1 to 10 years of poultry farming experience, with an average of 7.9 years. This level of experience suggests that many farmers have a substantial background in poultry farming, potentially giving them a competitive edge in adopting new innovations. This finding aligns with Sheikh *et al.* (2022), who noted the long-standing presence of poultry production in Maiduguri.

According to Table 2, 57.5% of respondents consider farming their primary livelihood. This reflects a resurgence in the importance of farming for food security in Nigeria, as more individuals are engaging in agriculture, leading to increased production and food availability. Sheikh *et al.* (2022) also reported a high level of involvement in poultry farming in Borno State. Furthermore, the table shows that 48.5% of respondents manage poultry flocks of 701 birds or more, with an average of 337 birds per farm. This suggests that a significant number of respondents maintain large flocks, which likely encourages them to adopt best practices in poultry management. This observation is consistent with Getso and Hassan (2020), who found that most respondents were involved in medium-scale production levels of 2,000 to 10,000 birds.

Institutional Characteristics of the Respondents

Table 3 provides insights into the institutional characteristics of the respondents. It shows that a significant majority (57.6%) had access to credit, indicating that many farmers had the opportunity to secure loans from banks to enhance their poultry production. This access to financing could enable them to expand their poultry operations substantially. This finding is consistent with Afolayan *et al.* (2021), who reported that access to credit is a critical factor in supporting poultry farmers' activities. The table also highlights that 51.5% of the respondents were members of cooperative societies. Among these, 30.2% noted that their primary benefit from these societies was access to credit. This suggests that cooperative societies offer valuable advantages, such as low- or no-interest loans, as they are non-profit organizations focused on member welfare.

Additionally, Table 3 indicates that 71.7% of the respondents regularly engaged with extension agents, with an average of three visits per month. This frequent interaction implies that most poultry farmers receive essential and practical information that aids them in adopting optimal poultry farming practices. This observation aligns with Akintunde *et al.* (2020), who found that poultry egg farmers in Southwestern Nigeria had significant access to livestock extension services.

Table2: Distribution of Respondents According to Their Socio-Economic Characteristics (n=99)

Variables	Frequency	Percentage	Mean
Age			
15-25	5	5.1	
26-35	20	20.2	
36-45	33	33.3	44.4
46 and above	41	41.4	
Sex			
Male	75	75.8	
Female	24	24.2	
Marital status			
Married	77	77.8	
Single	13	13.1	
Divorced	4	4.0	
Widow	2	2.0	
Separated	3	3.0	
Household size			
1-5	36	36.4	
6-10	49	49.5	8
11-15	14	14.1	
16 and above	-	-	
Levelof education			
Non-formal	3	3.0	
Adult	7	7.1	
Primary	3	3.0	
Secondary	18	18.2	
NCE/OND	17	17.2	
University	51	51.5	
Farming experience			
1-10	48	48.5	
11-20	40	40.4	7.9
21 and above	11	11.1	
Major Livelihood			
Farming	57	57.5	
Trading	25	25.3	
Civil servant	17	17.2	
Poultry size			
50-300	30	30.3	
301-500	5	5.1	337
501-700	16	16.2	
701 and above	48	48.5	

Source: Field survey, 2024

Table3: Distribution of the respondents according to their institutional characteristics (n=99)

Variables	Frequency	Percentage	Mean
Access to credit			
Yes	57	57.6	
No	42	42.4	
Membership of cooperative			
Yes	51	51.5	
No	48	48.5	
Benefits derived from membership			
Inputs	54	19.6	
Credits	83	30.2	
Irrigation machine	60	24	
Training	72	26.2	
Access to extension contact			
Yes	71	71.7	
No	28	28.3	
Number of extension visits			
1-3	65	65.7	3
4-6	24	24.2	
7 and above	10	10.1	

Source: Field Survey, 2024

Adoption of Various Improved Poultry Practices

Table 4 indicates that the majority of respondents adopted various poultry management practices. Specifically, 85.86% implemented convenience/ventilation practices, 82.82% adopted vaccination procedures, and 77.78% incorporated bio-security measures. Additionally, 67.68% of respondents engaged in water management practices, 64.65% employed feed management strategies, 60.61% used deep litter systems, and 56.57% applied feed strategies. This suggests that over half of the respondents adopted each of the improved poultry practices identified in the study area. These findings align with Makinta *et al.* (2019), who observed similar adoption patterns among poultry farmers in Maiduguri Metropolis, including the use of vaccination, hygiene practices, proper housing, and sourcing from trusted suppliers.

Table 4: Distribution of the respondents on the various improved poultry practices adopted

Variables	*Frequency	Percentage
Vaccination	82	82.82
Deep litre system	60	60.61
Feed management	64	64.65
Water management	67	67.68
Feed strategy	56	56.57
Convenience/ventilation	85	85.86
Bio-security	77	77.78

Source: Field Survey, 2024 **Multiple response*

Factors Influencing the Adoption of Improved Poultry Practice

Table 5 presents the probit regression results for the factors affecting the adoption of improved poultry practices. The model's Pseudo R-square was 0.803, indicating that approximately 80.3% of the variation in poultry farmers' decisions to adopt improved practices can be explained by the model. To interpret the analysis, both P-values and marginal effects were utilized. The findings show that poultry size, household size, cooperative membership, and the number of extension visits significantly impact the adoption of improved poultry practices. Specifically, the marginal effect

of poultry size was 0.001, which is statistically significant at the 1% level. This suggests that each additional unit increase in poultry size is associated with a 0.001-point higher probability of farmers adopting improved poultry production practices.

Household size negatively impacts the adoption of improved poultry practices, with this effect being statistically significant at the 5% level. The negative marginal effect of -0.109 suggests that larger household sizes are associated with a reduced likelihood of adopting improved practices. This reduction in adoption probability, by 0.109 points for each additional household member, may be due to resource constraints or other socio-economic factors. This finding contrasts with Makinta *et al.* (2019), who reported that household size positively affects broiler production.

In contrast, membership in a cooperative significantly and positively affects the adoption of improved poultry practices at the 5% level. The positive marginal effect of 0.106 indicates that cooperative members are more likely to adopt these practices. This is likely because cooperative membership provides benefits such as access to credit, training, and inputs, which increase the probability of adopting improved practices by 0.106 points. This finding aligns with Chiekezie *et al.* (2022), who found that cooperative membership positively influences small-scale broiler poultry production in South East Nigeria.

The frequency of extension visits also significantly and positively influences the adoption of improved poultry practices, with a 1% level of probability. The positive marginal effect of 0.173 indicates that each additional extension visit increases the likelihood of adopting improved practices by 0.173 points. This reflects the crucial role of extension services in offering essential knowledge, support, and technical assistance, which enhance poultry farmers' productivity. This result is consistent with Oladipo *et al.* (2020), who found that access to veterinary services positively impacts poultry egg production in Kwara State, Nigeria.

Table 5: Probit Regression on Factors Influencing the Adoption of Improved Poultry Practice

Variables	Coefficient	Standard error	T-value	Marginal effect
Age	-0.003	0.002	0.540	-0.013
Level of education	-0.090	0.020	0.885	0.003
Poultry farming experience	-0.017	0.006	0.386	-0.006
Flock size	0.001	0.000	0.004***	0.001
Household size	-0.034	0.004	0.019**	-0.109
Membership of cooperative	0.329	0.049	0.034**	0.106
Access to credit	0.116	0.049	0.435	0.037
Number of extension visits	0.568	0.053	0.001***	0.173
Constant	0.768	0.545	0.049	
Number of obs=99				
LR $Chi^2(8)$ = 36.96				
Prob>chi^2 = 0.000				
Log likelihood= -211.7375				
Pseudo R^2 = 0.8030				

Source: Field Survey, 2024 ***= *Significant at 1%*, **= *significant at 5% levels of probability.*

Challenges Faced by Poultry Farmers

Table 6 outlines the challenges encountered by poultry farmers. It shows that a significant majority (88.88%) of respondents struggle with the high cost of feed, followed by the high cost of drugs and vaccinations (77.78%), insufficient capital (76.77%), and the expense of purchasing healthy day-old chicks (74.75%). Additionally, some farmers experience difficulties related to inadequate

extension services (69.70%), insufficient water supply (46.47%), and a lack of technical knowledge (43.43%). These findings indicate that financial issues predominantly affect poultry farmers in the study area, potentially limiting their production capabilities. This is consistent with the research by Oladipo *et al.* (2020), which highlighted that poultry farmers in Kwara State face challenges related to high initial start-up costs.

Table 6: Distribution of the Respondents on the Challenges Faced by Poultry Farmers

Variables	*Frequency	Percentage
High cost of feed	88	88.88
Purchasing healthy day-old chicks	74	74.75
Inadequate capital	76	76.77
Inadequate water supply	46	46.47
High cost of drug/vaccination	77	77.78
Lack of technical knowledge	43	43.43
Inadequate extension services	69	69.70

Source: Field Survey, 2024 **Multiple response*

CONCLUSION AND RECOMMENDATIONS

Based on these findings, it can be concluded that the majority of poultry farmers have adopted improved poultry practices, likely due to their access to extension services. Factors such as poultry size, household size, membership in cooperative societies, and the frequency of extension visits significantly influence farmers' decisions to adopt these practices. For poultry farming to remain sustainable in the study area, it is crucial to address challenges such as the high cost of feed, the high cost of drugs and vaccinations, and inadequate capital. Addressing these issues will help enhance the overall productivity and sustainability of poultry farming in the region.

It is recommended that the government implement policies and allocate funds to enhance extension services in the study area. Additionally, financial policies should be developed to support resource allocation for larger households, thereby alleviating economic pressures and enabling them to diversify into other forms of farming beyond poultry. Since many respondents cited the high cost of feed and drugs/vaccinations as significant challenges, it is also advised that the government consider providing subsidies for these inputs to ease the financial burden on poultry farmers.

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