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ECONOMIC ASSESSMENT OF GUINEA FOWL (*NUMIDA MELEAGRIS)* FARMING AMONG THE RURAL HOUSEHOLDS IN THE BUFFER ZONE OF THE OBA HILLS FOREST RESERVE, NIGERIA

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Abstract

Guinea fowl (*Numida meleagris*) farming is practiced at subsistence level in Nigeria for supplying animal protein to rural households in spite of its huge commercial potential in terms of income. The economic viability of guinea fowl farming among the rural dwellers in the Oba Hills Forest Reserve, the Osun State, Nigeria, was investigated. A structured interview schedule was used to obtain data from 120 sampled respondents from selected communities in the forest reserve's perimeter zone. Descriptive statistics, frequencies, means, and percentages were used to analyse the data. The results of the descriptive analysis revealed that the vast majority of the respondents were middle-aged, married male Muslims with large household sizes. Furthermore, the findings indicate that the domesticated birds were kept in a free-range system, with small flock sizes, with no supplementary feeding, and veterinary care. The budgetary analysis reveals that guinea fowl farming is a profitable venture in the study area with a benefit-cost ratio of 1.78. The regression analysis results reveal that the costs of feeding and labour significantly influence the gross margin. The study concluded that, despite the fact that guinea fowl farming has an enormous economic returns potential in the study area, the rearing of the birds remains quite low. It is thus recommended that the farming households should receive a livestock extension education in order to improve their gross margin from guinea fowl farming.

Keywords: Guinea fowl farming, Oba Hills Forest Reserve, budgetary analysis, rural households

INTRODUCTION

Guinea fowl farming is referred to as "Meleagriculture," and it is mostly used for the production of meat and eggs. It is more profitable than chicken farming due to guinea fowl resilience to tropical diseases. Furthermore, guinea fowl meat has a higher protein content and less fat than broiler meat and thus has a higher market potential (Musundire et al., 2017). Guinea fowl is a semi-domesticated poultry bird that can be found in isolated locations of Asia and Latin America. However, guinea fowls have been domesticated on a wide scale in Europe, North America, and Australia (Mohan Jag et al., 2017). In recent times, guinea fowls are becoming increasingly popular as "watch animals" around farmsteads (Ebegbulem, 2018). In terms of the quantity of domesticated poultry birds and the protein supply in Nigeria, the bird was second only to the domestic fowl (Panyako, 2018). Guinea fowls have the possibility of increasing meat and egg output at rural levels considering their management systems. They grow, reproduce, and perform well in cold and hot climatic conditions. Guinea fowls are more economically stable in tropical environments than chickens due to illness tolerance and adaptation to traditional breeding techniques (Dzungwe et al., 2018).

Guinea fowls are an underutilized poultry species native to Africa, where wild species can still be found (Vignal Alain et al., 2019). They are domesticated and managed under the same principles used in managing domestic fowls. The species are native to Africa and belong to the order Galliformes and family *Numididae* (Wumbei, 2018). The farming and consumption of the guinea fowl are not constrained by cultural beliefs and practices (Abdul-Rahman and Adu, 2017). In the recent past decades, there has been a spike of interest in the guinea fowl production and raising in Nigeria. However, the unimproved breeding stock, seasonal change effects, high keets death rates, hunger, poor productivity, and the strained reproductive strength are the main production constraints in Ghana and other West African countries, including Nigeria (Kyere et al., 2017). Nonetheless, the reduced growth rate of the local guinea fowl compared to the growth performance displayed by the improved bird in Europe is attributed to inadequate studies for genetically improving the local strain (Houndonougbo et al., 2017).

There are several different kinds of guinea fowls in Africa, but the most prevalent breed is *Numidia Meleagris,* also known as the common guinea fowl. Because they are a domesticated strain that has undergone acclimatization, the common guinea fowl can be found all over the world in both domestic and wild states. *Numidia Meleagris* (helmeted guinea fowl) is the most populous and widely spread of the guinea fowl species (Donaldson, 2017). They are the most prevalent guinea fowl species, native to Africa. The "helmeted guinea fowls" have been integrated into many other countries around the globe including the United State of America (Brown, 2021). According to Wumbei (2018), the helmeted guinea fowls come in three varieties: pearl, lavender, and white. Guinea fowl breeding season in the southern hemisphere occurs between April and October. The guinea fowl chicks (Keets) stay with their mother after hatching until they are old enough to fend for themselves (Mohan et al., 2017).

Various published studies have emphasised the socioeconomic importance of guinea fowl farming among rural households. Baruwa and Sofoluwe (2016) have analysed "the profitability and the resource use efficiency of guinea fowl (*Numida meleagris*) production under tropical conditions". The study concluded that guinea fowl production was a profitable venture in the study area. However, to improve profitability, farmers need to make the input use more efficient by reducing the level of input employment.

Nanette et al. (2021) evaluated the guinea fowl production's economics and resource efficiency in the Savelegu-Nanton District of the Northern Region of Ghana. Their study concluded that guinea fowl farming is highly profitable and is a significant source of financial security among rural households.

Anderson et al. (2022) examined the potential of guinea fowl production in income generation and nutritional security for the rural households in Burkina Faso and emphasised the crucial role of guinea fowl farming in improving the financial standing, the nutrition and health of the low-income households in the study area.

Guinea fowls play a critical role for rural communities' livelihoods. Guinea fowls have the following advantages compared to village chickens: low cost of production, high-quality premium meat, higher capacity to scavenge for grains and insects, resistance to heat stress, high rate of survival against predators, and the strength to tolerate parasites and illnesses that are common in poultry (Microlivestock, 1991; Nwagu and Alawa, 1995; Kusma et al., 2012;).

Guinea fowls are generally accepted and consumed by people of practically all races and faiths around the world, which means there are huge potential markets for live birds and their meat. This gives a great advantage to rural smallholder farming households for improving their incomes and increasing protein supply through guinea fowl farming.

However, according to Ocheja et al. (2011), the guinea fowl farming of rural households is still on the subsistence level in spite of its great potential to improve their food and economic security. The majority of guinea fowls reared by the households are collected from the wild, placed in small-sized flocks, and kept under the free-range system, with little or no attempt to commercialise their production. Taking the aforementioned into consideration, the study looked at the feasibility of guinea fowl farming in the rural households located in the Oba Hills Forest Reserve buffer zone in the Osun State, Nigeria, from an economic standpoint. The study specifically looked at the socioeconomic traits of the respondents, the management techniques used in guinea fowl farming, and its profitability in the research area.

MATERIALS AND METHODS

Study Area

The study was carried out in the boundary settlements of the Oba Hills Forest Reserve in the Osun State, Nigeria. The reserve has a landmass of approximately 52.5km^2. Hilly landscape with steep canyons characterizes the region, with guinea savannah vegetation of tall and short trees characterizing the savannah woodland. There is a high relative humidity and a constant temperature. The reserve is a home to primates, herbivores and wild birds. It is surrounded by heavily populated settlements.

Data collection and sampling method

A pre-study survey was conducted for familiarisation with the forest reserve area and pretesting of the data collection instrument. The data for the study was gathered with a structured interview schedule administered on the sampled 120 rural households' heads respondents from 15 randomly selected settlements located within the reserve's perimeter zone. Data were obtained on the respondents' socioeconomic characteristics, guinea fowl management practices, and costs and returns from guinea fowl farming in the study area.

Analytical Technique

Descriptive statistics such as frequency, means, and percentages were used to analyse the socioeconomic characteristics, and the guinea fowl management practices among the rural households in the study area. A budgetary analysis was used to compute the costs, the returns, and the level of gross margin and profitability of guinea fowl farming. A regression analysis was used to isolate the significant determinants influencing the level of gross margin of guinea fowl farming in the study area.

The implicit regression model utilised in the study is specified as follow;

$Y = f (X_1, X_2, X_3, X_4, X_5, \text{and } E_t)$

Where:

Y is the gross margin from guinea fowl farming

$X_1$is the cost of feeding in Naira

X_2 is the costs of labour in Naira

X_3 is the costs of transportation in Naira

X_4 is the fixed cost in Naira

X_5 is the costs of drugs in Naira

E_t is the random error term.

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

The socioeconomic characteristics of the respondents are presented in Table 1. The table reveals that the majority (62.05%) of the respondents were male, while a lower percentage (37.05%) were female. Virtually all (95.8%) of the respondents were Muslims. Most (73.03%) of the respondents were in the age range of 31–50 years, with a mean of 44 years, indicating that they are still in their economically active age. Similarly, most (89.15%) of the rural households in the study area had between 6-15 persons, with an average of 10 persons per household.

Table 1. Socioeconomic characteristics of the respondents

Characteristics (n=120)	Frequency	Percentage (%)
Gender		
Male	75	62.05
Female	45	37.05
Religion		
Christianity	5	4.02
Islam	115	95.08
Age (years)		
10-20	2	1.07
21-30	19	15.08
31-40	34	28.03
41-50	54	45.00
>50	11	9.02
Mean Age=44 years		
Household Size		
1-5	1	0.08
6-10	52	43.03
11-15	55	45.08
>15	12	10.00
Mean = 10 persons		
Marital Status		
Single	3	2.05
Married	117	97.05
Educational Status		
No formal Education	95	79.02
Primary Education	22	18.03
Secondary Education	3	2.05
Tertiary Education	0	0.00
Primary Occupation		
Farming	111	92.05
Trading	6	5.00
Others	3	2.05
Farm Income (₦)		
Less than 10,000	21	17.05
10,000-20,000	38	31.07
20,000-30,000	29	24.02
30,000-40,000	24	20.00
Above 40,000	08	6.07
Mean = ₦25,000		

Source: Field Survey, 2023.

Likewise, almost all (97.05%) of the rural dwellers were married, while a few (2.05%) were single. The Table further reveals that most (79.02%) of the respondents had no formal education. Furthermore, virtually all (92.05%) of the rural dwellers had farming as their primary occupation. Most (75.09%) of the respondents obtained between ₦10,000 and ₦40,000 monthly from their farming activities, with a mean of ₦25,000 per month.

In summary, the majority of the respondents in the study area were middle-aged, married males, illiterate, coming from large households, with a mean monthly farming income of ₦25,000.

Management system

Table 2 shows the management practices employed in the study area in guinea fowl farming. The results in the Table reveal that almost all (95.00%) of the respondents used the free-range system in the management of their guinea fowls. These results are in line with the findings of Kone et al. (2018) that most smallholder farmers observed a traditional management system practice of raising guinea fowl birds, leading to sub-optimal yield of their guinea fowl flock which may retard future improvement efforts in productivity mainly due to low hatchability, undue keet mortality, and predation losses, making the enterprise less profitable. Virtually all (89.10%) of the respondents had between 10-30 birds as their flock size, with a mean of 10 birds, suggesting that they were small holders guinea fowl farmers. Nutritionally, almost all (95.00%) of the respondents provided supplementary feeding for their scavenging birds. Health wise, all (100.00%) of the respondents did not provide any form of veterinary attention or medication for their birds. This, according to Dahouda et.al. (2017), is responsible for the low productivity and the high keet mortality among the domesticated guinea fowls. Almost all (86.70%) of the respondents' flocks laid their eggs in the bush, while a few (10.80%) that laid their eggs

in the space provided for egg laying. This might make egg collection cumbersome and might impede the hatchability of eggs, and eventually lead to increased keets mortality.

Table 2. Management system in guinea fowl farming

Management System	Frequency	Percentage
Free Range	114	95.00
Deep Litter	1	0.80
Both	5	4.20
Flock Size		
10-20	64	53.30
21-30	43	35.80
31-40	10	8.30
41-50	3	2.50
Mean=10 Birds		
Supplementary Feeding		
Yes	114	95.00
No	6	5.00
Veterinary/ Medication		
Yes	120	100.00
No		0.00
Egg Production		
Bush	104	86.70
Provided Space at Farm	3	2.50
Both	13	10.80

Source: Field Survey, 2023.

Annual cost and returns of guinea fowl farming

The costs and returns of the guinea fowl farming in the study area are shown in Table 3. The costs and revenue were estimated as an average for the 120 respondents. The budgetary analysis results from the Table reveal that the total revenue (TR) generated annually from guinea fowl farming was ₦256,050 ($171.25), while the annual total cost (TC) of production associated with guinea fowl farming is estimated at ₦143,862.10 ($96.22). The bulk of revenue generated from guinea fowl farming comes from sales of eggs, meat from dressed birds, and live birds. The supplementary feeding expenditure accounted for 69.84 % of the total variable cost, followed by cost of labour, transportation expenses, and cost of drugs constituting 27.41%, 1.66%, and 1.09% of the total variable cost respectively. The annual gross margin from guinea fowl farming in the study area is estimated at ₦144, 233.70 ($96.46). The guinea fowl enterprise in the study area realised an annual profit of ₦112,187.90 ($75.03). The results of Benefit-Cost Ratio (BCR) (1.78) reveal that for every naira invested in guinea fowl farming, an annual return of 0.78 naira was returned. This shows that the domestication of guinea fowls was a viable and profitable business venture in the study area.

Regression analysis results

The results of regression analysis showing the significant factors influencing the gross margin from the guinea fowl farming in the study area are presented in Table 4.

The adjusted R-squared is 0.586 and the F-value (13.46) is significant at 1% level, showing that the model has a good fit.

The coefficient of cost of feeding (X_1) is negative and is statistically significant at 1% level, showing that this variable influences the gross margin from guinea fowl farming negatively. However, the cost of labour (X_5) is positive and is statistically significant at 1% level, implying that a positive relationship exists between this variable and the level of the gross margin from the guinea fowl farming in the study area.

Table 3. Annual costs and return in guinea fowl farming

Item	Mean Value (₦)	Scale
Total Revenue	256,050 ($171.25)	
Variable costs		% of total variable cost (TVC)
Feed	78,098.2 ($52.23)	69.84
Labour	30,654.0 ($20.50)	27.41
Transportation	1,859.0 ($1.24)	1.66
Drugs	1,205.1 ($0.81)	1.09
Total Variable cost	111,816.3 ($74.78)	
Gross margin (TR-TVC)	144, 233.7 ($96.46)	
Cost of fixed assets	32,045.8 ($21.43)	
Total cost	143,862.1 ($96.22)	
Profit (TR-TC)	112,187.9 ($75.03)	
Benefit/Cost ratio (BCR)	1.78	

₦1.000 NGN = $0.0006688 USD
Source: Data Analysis, 2023.

Table 4. Regression analysis results

Variable	Coefficient	Standard error	t-value	Probability
Cost of feeding (X_1)	5.320	0.920	5.800	0.000*
Cost of labour (X_2)	20.034	4.652	4.300	0.000*
Cost of transportation (X_3)	-1.100	0.900	-1.210	0.238
Fixed costs (X_4)	0.765	1.900	0.701	0.484
Cost of drugs (X_5)	94.943	1436.191	0.070	0.947
Constant	-18.265	21.243	-0.860	0.392

R-squared = 0.507, Adj R-squared = 0.486, F value = 12.46
*significant at 1% level, **significant at 5% level, ***significant at 10% level
Source: Data Analysis, 2023.

CONCLUSION

Based on the findings, the study came to the conclusion that, even if the farming of guinea fowls has a great deal of economic potential and returns in the study area, the rearing of the birds under an open range system was still relatively poor, with high keet mortality, low hatchability, and a significant egg loss. The cost of labour and feed has a major impact on the gross margin in guinea fowl farming. To increase their gross margin and degree of profitability from guinea fowl farming, the farming households are thus advised to undergo livestock extension education, particularly on housing, nutrition, and health management of the guinea fowl. Additionally, the guinea fowl farmers in the study area should have access to alternate feeding resources at a heavily subsidised rate.

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