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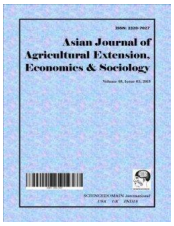

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Analysis of Management Systems and Commercialization of Poultry Broiler Production in Makurdi, Benue State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author FTGA designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors ESU and VMY managed the analyses of the study. Author VMY managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aims: The broad objective of this study is analysis of management systems and commercialization of poultry broiler production. The specific objectives are to determine the socio-economic factors influencing choice of system, compare the level of commercialization at each system and determine the effect of credit on the level of commercialization.
Study Design: Cross-sectional design.
Place and Duration of Study: The study was conducted in Makurdi Area of Benue State, Nigeria, between September and December 2017.
Methodology: The population of the study constitutes all poultry farmers in Makurdi Area of Benue State, Nigeria, operating both at commercial and small scale. A total of 110 poultry farmers were sampled and randomly selected using the snowball sampling technique. The snowball sampling

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technique was adopted because the population was not definite. Data for the study were collected using a well-structured questionnaire administered to the respondents. Logistic regression, multiple regression and Farm commercialization index were used for analysis.

Results: The result of the analysis revealed that farmer's age, household size and marital status significantly influenced choice of broiler management system operated by the farmers. Again, the estimates of the FCI shows that the level of commercialization was very high among the intensive farmers and low among non-intensive farmers. Also, the result of the multiple regression indicated a strong and positive relationship existing between credit and level of commercialization.

Conclusion: The extent to which poultry farmers are oriented towards producing for the market was found to be influenced by the choice of system. The low level of commercialization among the extensive farmers was probably for the reasons for which the bird were reared. Nevertheless, there is need for farmers to increase their commitment at whichever system of management adopted, as well as the essence of credit on productivity upsurge. Also, Government should improve farmer's access to credit as this would help them increase their capital base as well as farm size (number of birds) because this variable was significant in influencing poultry level of commercialization

Keywords: Analysis; management systems; commercialization; poultry; credit.

1. INTRODUCTION

The Nigerian poultry sector is one of the effervescent sub sectors of livestock in the Nigerian economy. The importance of this sector cannot be overhyped considering its place in human diet as well as its contribution to the economic status of the nation at large. The sector has recorded tremendous improvement and milestones in its outputs production. This remarkable improvement has been sustained by availability and use of improved vaccines which curtailed mortality rates of birds, reduction in the tariffs on imported day-old chicks and parent stock and the relative ease of compounding efficient food using easily available local feedstuffs [1]. In Makurdi, poultry production has emerged as a good substitute for beef, chevon and mutton following the premonition and surmise recently held by the people on beef and the continuous escalation in prices of cattle, sheep and goat have possibly shifted consumer preferences now for poultry meat (white meat) given the economic and health advantages it has over the other types of meat (red meat).

The indigenous free range and semi intensive system of managing poultry remains predominant in Makurdi despite effort to revolutionize it through the introduction of exotic breeds, modern poultry equipment, improved feeds quality, drugs and vaccines. This could be attributed to factors such as lack of managerial prowess, ignorance about the latest trend and lack of finance to purchase the trending technology. All these hinder the effective and efficient management of the poultry enterprise and can bring about decline in the supply of poultry products and affect commercialization [2] Commercialization which however requires high capital investment and access to credit has been on a very low key due to the foregoing factors. In view of the above-mentioned, the study sought to determine the effect credit has in boosting the level of commercialization.

A fundamental resource in the business of poultry production is its management. According to [3] the success of broiler production is attributed to the managerial prowess of the farmer in optimizing the use of available resource for better output. Sound management practices are essential to optimize production. In Nigeria, basically three poultry management systems exist; intensive, semi-intensive and extensive/scavenging. These systems are differentiated on the basis of flock sizes and the associated input-output relationship [4] and keeping of big flock size is as a result of research and development in artificial incubation, nutritional requirement and disease control. The extensive poultry management system is the system where the poultry birds in their natural habitat scavenge for their food and seek shelter in the natural surroundings on trees and in bushes. The popularity of the extensive system among farmers in the study area is apparently hinged on the low costs of production and lack of technical know-how. The intensive system which involves total confinement of birds is based on specialized breeds and is found mainly in urban areas, where there are specialized markets for them. The semi-intensive management system which lies between the two extremes (intensive and extensive) has some degree of confinement and restriction. The birds do not have access to

the outdoors as they would in extensive system. They are however, free to move around the chicken house, and are not confined to cages. The intensive system is however very uncommon among the rural populace, as majority of the poultry farmers still operate at the subsistence level, with the free range (extensive system) which is characterized by continuous exposure to disease incidence, inadequate and poor quality feeding, poor housing and health care being preeminent. This thus calls for a shift of focus from subsistence production to a more commercialized system (market oriented system) in order to bridge the demand and supply gap for poultry broilers.

The choice of management system adopted by farmers is often swayed by the socio—economic status of the farmer. The popularity of the extensive system among farmers in the study area is apparently hinged on the low costs of production and lack of technical know-how. According to [5,3] the choice of system is influenced by the, purpose for which the birds are kept, anticipated profit, training received, level of education and farm location. [6] also reported that the size of poultry business was influenced by the amount of capital available, size of market and level of anticipated profit. They stated that the extensive system was cheap in terms of labor, material and other costs.

Commercialization of poultry farming is an indispensable pathway towards sustainable development. The main purpose of extensive system is to produce to maintain household food self-sufficiency by using mainly non-traded and household inputs. The semi-intensive is focus towards generating marketable surplus and maintaining household food security by using both traded and non-traded farm inputs. In commercial (intensive) system, profit maximization is the main motive of the farmer and inputs are largely obtained from the markets [7]. The goal of production at each of these systems accounted for the variations in their levels of commercialization, particularly at the extensive system. [8] defined agricultural commercialization as an agricultural transformation process in which farmers shift from mainly consumption-oriented subsistence production towards market and profit oriented production system. According to [9] commercialization is increasingly gaining recognition in the smallholder agriculture and rural development discourse. However, this recognition has not been tremendously sustained owing to the high capital investment and access to finance (credit) which constitutes its key factors [10]. Farm credit is widely recognized as one of the intermediating factors between adoption of farm technologies and increased farm income among farmers in Nigeria [11]. The supply of credit to farmers is regarded as the most effective strategy for augmenting commercialization index of farmers. Similar studies by [12] showed that, the introduction of easy and cheap credit is the fastest way of boosting agricultural production and eventually the transformation of subsistence to commercial venture. [10] reported that Credit has a vital role in increasing agricultural production; and the timely provision of credit allows farmers to purchase the necessary inputs and machinery for farm operations. Farmers in an effort to commercialize their operation need credit. Most often, these farmers face a lot of challenges and constraints in securing credit thus hindering the prospect of commercialization. This study is necessary because it gives an insight into how credit facilities granted to farmers in the study area will increase the Farm commercialization index irrespective of the management system adopted.

2. METHODOLOGY

This study was carried out in Makurdi local government area of Benue State, Nigeria. It is located at the North Eastern part of Benue State and lies on latitude 7º30'N and longitude 8º35'E with a population of 297,393 people [13]. It is located within the flood plain of lower River Benue valley and lies in the tropical guinea savanna zone of Central Nigeria, experiences a typical climate with two distinct seasons; the rainy and dry season. The dry season lasts from late October to March and the rainy season which begins in April to October. The peak period of the rainy season is between July and September with average rainfall of 94°C. These period mark the period of intensive agricultural activities by the inhabitants mostly Tivs, Idomas, Jukuns and Igedes. The average annual temperature is relatively high being 32.5°C. The hottest periods in the study area is between February and March with temperature range of 35°C to 40°C.

Commonly cultivated crops include beneseed, cassava, maize, melon, rice and vegetables. Livestock production is also practiced but mainly on intensive system of production. Poultry and swine production form the bulk of these livestock

Table 1. Definition of variables in the regression models

Variables	Variable Definition	
	Logistic regression	**Multiple regression**
X_1	Gender(1= male, 0= female)	Cost of construction
X_2	Age (in years)	Cost of vaccines and drugs
X_3	Farming experience (in years)	Labour cost
X_4	Marital status(married= 1, single= 0)	Price per chick
X_5	Annual income (in Naira)	Flock size
X_6	Membership of cooperative (1= member, 0= non-member)	Amount of credit obtained
X_7	Flock size (in number)	Cost of feeds
X_8	Household size (in number)	-
X_9	Level of education (in years)	-

activities. It has one of the most recognized rivers in Africa; River Benue. The presence of the River Benue offers a lot of opportunity for many residents. Amongst which include fishing, brisk laying and most importantly irrigation farming along its banks.

The population of the study constitutes all poultry farmers in Makurdi operating both at commercial and small scale. Primary data were obtained from 110 poultry farmers in the study area who were randomly selected using the snowball sampling technique. The snowball sampling technique was adopted because the population was not definite. In order to determine the socio-economic factors influencing choice of system, the logistic regression was used. Farm Commercialization Index (FCI) was use to ascertain the level of commercialization at the various management system while, multiple regressions was used to determine the effect of credit on the level of commercialization. The estimates were as follows:

Logistic regression: $Z = \log [P/1-P] = \log Y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8 + \beta_9 x_9$

Where Z = probability of choice of management of system; Intensive = 1; Non- intensive = 0
β = regression coefficient explaining changes in Z as explained by the independent variables

Multiple regression: $FCI = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + e$

FCI is Farm Commercialization Index, βo is Intercept, β1 to β_7 are coefficients to be estimated and **e** is error term. The definition of variables for the both regression is presented in the Table 1.

To determine the level of commercialization at the various management systems, the Farm commercialization index was used. According to [2], FCI measures the extent to which production is oriented towards the market and ranges from zero to 100%. A value of zero signifies a totally subsistence oriented producer. The closer the index is to 100 the higher the degree of commercialization. It is computed as below:

$$\textbf{FCI} = \frac{\text{Gross value of all poultry products sold}}{\text{Gross value of all poultry products produced}} \times 100$$

3. RESULTS AND DISCUSSION

Table 2 presents the Socio-economic factors influencing choice of management system.

The result of the logit analysis showed that farmer's age, household size and marital status significantly influenced their choice of broiler management system. Age had a positive coefficient and was significant at 5% level of probability. This implies that, the more the farmer advances in age the more likely it is that he will adopt the intensive management system as he is believed to possess all the wherewithal to acquire the necessaries to undertake such a highly capital intensive system. It can also be attributed to the fact that older people have more legibility to obtain credit than the younger ones [14]. Household size was also found to have a positive and significant influence on the choice of management system. This implies that the larger the household size the more likely it is for the farmer to adopt the intensive management system. This could be attributed to the fact that family might be exploited as cheap source of labour, thus cutting down the cost of production.

Table 2. Logit regression for socio-economic factors influencing choice of management system

Variables	B	S.E	Wald	Df	Sig.	Exp(B)
Gender	0.257	0.451	0.324	1	0.569	1.293
Age	0.058	0.029	4.055	1	0.044**	1.060
Farming experience	-0.193	0.092	4.419	1	0.036**	0.824
Marital status	0.878	0.465	3.370	1	0.059*	2.405
Household size	0.129	0.070	3.361	1	0.067*	1.137
Annual income	0.000	0.000	0.475	1	0.491	1.000
Membership of cooperative	0.448	0.494	0.825	1	0.364	1.566
Flock size	0.002	0.002	0.649	1	0.420	1.002
Level of education	0.008	0.053	0.023	1	0.879	1.008
Constant	-3.488	1.379	6.399	1	0.011	0.031
Nagelkerke R^2	0.213					

*** Significant at 5% level of probability and *significant at 10% level of probability*

Equally, farming experience was significant at 5% probability level but with a negative sign. This implies that increase in farming experience has a negative effect on the choice of system. The reason for this could be that, the longer farmers have engage in the farming profession, the harder it will take for them to adopt new ideas which could bring about improvement in their level of output. The result of this support the study of [4].

The result further showed that marital status was significant at 10% and had a positive influence on the choice of system. The implication of this is that married people are more inclined towards adopting the intensive system as concerted effort by both will increase the efficiency and effectiveness in the management of the poultry business. Flock size by respondents also had a significant (10%) and positive influence on farmer's choice of management system. The corollary of this is that the larger the flock size the more the farmer will be oriented towards adopting a more hazard free system that guarantees security of the birds. From the result, Nagelkerke R^2 is 0.213 implying that the factors in the model accounted for only 21% of the variations in the probability to adopt a system of management and that there are other variables which influences choice of system but which were not included in the model.

Table 3 showed that the level of commercialization is generally high among intensive poultry keepers, moderate among semi-intensive and low among extensive farmers. It can be infer here that intensive poultry keepers are more business oriented than their counterparts. The high commercialization index (> 50%) recorded among intensive keepers could be attributed to the fact that the target of production is profit maximization and this is best achieved when production is oriented towards the market and not for self-subsistence as it is the case with extensive where only excesses are shifted to the market. Majority of the

Table 3. Distribution of commercialization index according management systems in the study area

Commercialization index (%)	Intensive system		Semi-intensive system		Extensive system	
	Freq	%	Freq	%	Freq	%
0 – 10	1	0.91	6	5.45	17	15.45
11 – 20	-	-	1	0.91	-	-
21 – 30	1	0.91	1	0.91	3	2.73
31 – 40	-	-	4	3.64	-	-
41 – 50	-	-	2	1.82	1	0.91
51 – 60	2	1.82	2	1.82	2	1.82
61 – 70	1	0.91	3	2.73	-	-
71 – 80	6	5.45	6	5.45	3	2.73
81 – 90	18	16.36	5	4.55	2	1.82
90 – 100	17	15.45	6	5.45	-	-
Total	46	41.82	36	32.73	28	25.45

Source: Field survey, 2017

Table 4. Effect of credit on the level of commercialization

Variables	Coefficients	S.E	t-value	Sig.
Constant	5.280	4.594	1.149	0.262
Cost of construction	0.205	0000	1.374	0.182^{NS}
Vaccines and drugs	0.132	0.001	0.730	0.472^{NS}
Labour	-0.268	0.005	-2.482	0.020**
Prices of chicks	-0.238	0.004	-2.146	0.042**
Flock size	0.460	0.130	3.055	0.005***
Amount of credit collected	0.246	0.000	2.496	0.020**
Cost of feeds.	-0.024	0.000	-0.276	0.785^{NS}
Durbin-watson = 1.982 R^2 = 0.841 Adjusted R = 0.794				

*** Significant at 5%, *** significant at 10% and NS = not significant*
Log likelihood ratio = 129.000

extensive farmers (15.45%) had an FCI index of 0 -10, implying that more than 90% of the total production is consumed while only 10% is taken to the market for sell.

The indicator of the model (R^2) showed that the explanatory variables contained therein accounted for 79% variation in the dependent variable. Specifically, the result indicated that credit had a significant effect on the level of commercialization at a 5% level of significance. This imply that the amount of credit obtain will upsurge the quantum of poultry broiler produce as well as the proportion taken to the market. The result further showed that cost of labour and price of chicks were both significant at 10% but had a negative coefficient while flock size was found to have a positive coefficient and significant at 1%.

The positive coefficient of flock size implies that as the amount of credit obtained increases by 1%, the population of birds will increase by 46units and the higher the bird population the higher the quantity available for market supply. This was in consonant with [15] findings that the availability of credit to complement farmer's equity would help them to expand their livestock business.

The negative coefficient of prices of chicks implies, that as the population of birds increases consequent to the acquired credit, the unit price will fall by **N** 24 due to trade discount offers that accrues to economies of scale. Similarly, with additional funds to augment already existing capital, better management system which reduces labour cost will be adopted [7].

4. CONCLUSION AND RECOMMENDATIONS

From the study, it is indicated that the choice of management system is greatly influenced by the age, marital status and household size of the farmer. However, the farm commercialization index of farmers at the various management systems revealed that the level of commercialization is a question of which management system is under operation. The FCI of extensive farmers as observed is low probably because production is oriented towards self-subsistence rather than meeting market demand. It is obvious that the potential for commercialization by poultry farmers in the study area is high and can be transcended if their credit access which raises their capital base is improved upon via removing all bottlenecks concomitant with accessing credit.

In view of these result, farmers irrespective of the choice of management system under operation should be sensitized on the benefits that can be got from commercialization. Doing this will act as a partial motivating factor that will intensify their production effort.

Government should improve farmer's access to credit as this would help them increase their capital base as well as farm size (number of birds) because this variable was significant in influencing poultry level of commercialization.

Most of the farmers in the study area complained of the inconsistent prices of inputs such as day old chicks and feeds. It is recommended that Government should develop and implement policies aimed at subsidizing these production

inputs and target such policies at experienced broiler farmers to help increase their managerial prowess.

CONSENT

As per international standard or university standard written participants' consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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