

## **SURVEY OF FARMERS' ADDITIVE AWARENESS OF MORINGA AND GARLIC FOR CHICKEN PRODUCTION IN EKITI STATE, NIGERIA**

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### **Abstract**

*Moringa (Moringa oleifera) and garlic (Allium sativum) are phytogetic plants with great potentials in chicken production. The study aimed to investigate the level of farmers' access to extension services, and their awareness of additive values of Moringa oleifera and garlic for chicken production in Ekiti State. A cross-sectional data of 135 poultry farmers were sampled with 15 questionnaires administered per local government area (LGA) and, (3 LGAs were selected from each senatorial district in Ekiti State). Data were collected using a well-prepared and structured schedule interview from primary source (questionnaire). The objectives were analyzed using descriptive statistical tools such as tables, frequencies, and percentages. The results indicated that the average age of the respondents sampled was about 45 years and the majority (63.7%) of them were men. It was also revealed that "University Education" has the highest percentage (35.6%) of the respondents, followed by "Secondary Education" with 25.9% of the respondents. On average, 68.1% of total sampled respondents were aware of the additive values in Moringa oleifera and garlic, while only 45.8% of the respondents turned out to be using either Moringa oleifera or garlic or both. The minority (35.3%) of the respondents had access to extension services. The main challenges identified were the source of good stock and inadequate knowledge of the usefulness of feed additives. The suggestions to solving the challenges were provision of credit facilities, provision of extension education, access to research institutes and so on. It was therefore recommended that holistic information dissemination approach is needed about the potential additive values of Moringa oleifera and garlic through the intervention of government, and research and learning institutions to boost chicken production in Ekiti State.*

**Keywords:** Antimicrobial, antioxidant, chicken, garlic, Moringa oleifera, sun dried and milling

IJAFS 2022 (2).12:1733 - 1744

### **INTRODUCTION**

Phytogetic plants have various phytochemicals and bioactive constituents such as trace metal ions, vitamins, alkaloids, carotenoids, polyphenols, fats, carbohydrates, and proteins. These are involved in the enhancement of health benefits in human and animal nutrition (Sravanthi and Rao,

2014). The use of Phytogetic plants and plant products has been discovered to play active role in the maintenance of regular digestive function and chicken microbiota (Mountzouris *et al.*, 2011; Agbetuyi and Oloruntola, 2020). Among the common phytogetic plants and plant products with research attention are *Moringa oleifera* plant and garlic plant (Vinus *et al.*, 2018; Agbetuyi *et al.*, 2023) figure 1.



**Figure 1: *Moringa oleifera* plant, Garlic plant**

*Moringa oleifera* commonly known as drumstick tree have nutritional and medicinal values with some useful minerals, vitamins and amino acids. Almost all the plant parts (root, bark, gum, leaf, seed and seed oil) have been used for treating various ailments in the indigenous medicine of South Asia. This treatment includes inflammation and infectious diseases with cardiovascular, gastrointestinal, hematological and hepatorenal disorders (Alnidawi *et al.*, 2016). The relative ease with which *Moringa oleifera* is propagated through both non-clonal and clonal means and its low demand for soil nutrients and water makes its production and management easy (Paliwal *et al.*, 2011). Introduction of this plant into farms with diverse environmental conditions can be beneficial for both the owner of the farm and the surrounding ecosystems (Azeez *et al.*, 2013). The plant absorbs carbon dioxide at a rate as much as 20 times greater than any other vegetative plants (Potadar and Patil, 2017). The great socio-economic importance of *Moringa oleifera* has been demonstrated by some authors (Animashaun and Toye, 2013; Azeez *et al.*, 2013). For instance, in western Nigeria, the analysis of a leaf-based *Moringa oleifera* production indicated an average net profit of 59.81% per hectare per year from the sales of moringa leaves (Animashaun and Toye, 2013). An increased interest in the utilization of *Moringa oleifera* in improving ruminant production and poultry performance has been reported (Abousekken, 2015). *Moringa oleifera* leaf incorporated in maize-soya poultry diet leads to better growth performance with significant increase in the serum level of biochemical minerals compared to the maize-soya diet alone (Donkor *et al.*, 2013). *Moringa oleifera* leaf is a good source of antioxidant compounds such as ascorbic acid, flavonoids, phenolics, and carotenoids (Teixeira *et al.*, 2014). According to a finding by Agbetuyi *et al.* (2024), it was observed that the incorporation of *Moringa oleifera* in laying hens' diet had positive effects on the quantity and quality of egg produced.

Garlic (*Allium sativum*) is one of the most traditionally used spice and medicinal herbs (Puvaca *et al.*, 2013). The chemistry of *Allium* species is dominated by many sulphur-containing compounds. It is a vegetable plant and bulb belonging to the family *Liliaceae* and a widely distributed plant grown globally with China as the leading producer, producing over 81% of world output (Lewis, 2003). It has a slight imperceptible smell until it has been peeled. Once peeled, sliced or crushed, it immediately begins to spread an intense smell that contains sulphur glycosides. Allicin possibly reduces low-density lipoprotein (LDL), triglycerides and total cholesterol in serum and tissues (Stanacev *et al.*, 2012; Puvaca *et al.*, 2014), and it has been used in treating cardiovascular diseases. *Moringa oleifera* leaf and *Allium sativum* bulb has potential usefulness as feed additive that promote broiler chicken production (Agbetuyi *et al.*, 2023). Therefore, this study aimed to carry out the survey of the level of farmers' access to extension services, and their awareness of additive values of *Moringa oleifera* and garlic for chicken production in Ekiti State, Nigeria.

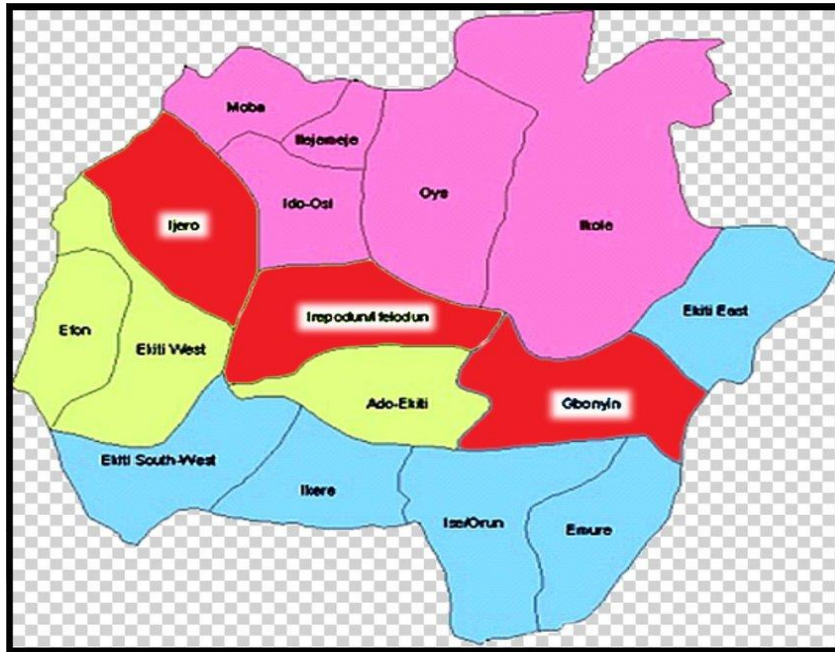
## **MATERIALS AND METHODOLOGY**

### **The Study Area**

The research was carried out in Ekiti State, Nigeria. Ekiti State has a total land area of about 6,353 km<sup>2</sup> (2,453 sq<sup>2</sup>). The State lies within the following: 7°40'N 5°15'E/7.667°N 5.250°E and enjoys a tropical climate with two distinct seasons. These are the rainy season (April–October) and the dry season (November–March). The temperature ranges between 21°C and 28 °C, with high humidity. The people of the State are mainly of the Yoruba ethnic group, although other Nigerians and foreigners co-exist peacefully in the State. The major occupation of the people is farming, which includes rearing of animals and cultivation of crop plants, especially arable crops such as maize, yam, rice, cassava, plantains, vegetables, and pepper.

### **Sampling Technique**

The respondents for this study (135) were selected from three local government areas (LGAs) in each of the three Senatorial districts of the State by random sampling, with 15 copies of the questionnaire administered per LGA. The LGAs which were randomly sampled were: Ado, Irepodun Ifelodun, Ekiti West, Ikere, Ekiti South West, Gbonyin, Ikole, Oye and Ido/osi. The administrative map of Ekiti State showing the local government areas is presented in figure 2:



**Figure 2: Administrative Map of Ekiti State showing the LGAs**

Source: (ekitistategov.com, 2014)

### **Method of Data Collection**

Data was collected using a well-prepared and structured interview schedule for the study. Data were collected from primary source which is in form of questionnaire; the questionnaires sought information on poultry-farmers' socio-economic characteristics, access to extension services, awareness of additive values, challenges confronting poultry farmers and suggestions to solving the challenges.

### **Data Analysis**

Data collected were subjected to statistical analysis using Statistical Packages for Social Sciences (SPSS) to determine the level of farmers' access to extension services, and their awareness of additive values of *Moringa oleifera* and garlic for chicken production in Ekiti State, Nigeria. Descriptive statistical tools such as tables, frequencies, and percentages were used for the analysis.

## **RESULTS**

### **Socio-economic Characteristics of the Respondent Farmers in Ekiti State**

Socio-economic characteristics of the respondents indicated that the majority (35.6%) of the respondents fell within 30-39 years of age, followed by the age interval of 40-49 years. The average age of the respondents sampled was about 45 years. The majority (63.7%) of the respondents were men while 36.3% of them were women. The result also indicated that "University Education" has the highest percentage (35.6%) of the respondents, followed by "Secondary Education" with 25.9% of the respondents. The "Polytechnic Education" was 21.5% of the respondents, while the least was "no formal education" with 2.2% of the respondents. Therefore, about 97.8% of the respondent farmers have at least Primary Education. The majority of the respondents were married,

representing 77.0%, while 20.0% were single, 2.3% were divorced and 0.7% of the respondents were separated. The livelihood activities of the respondents showed that majority (42.2%) were purely “livestock farmer”, followed by (27.4%) with “paid employment”. The respondents that were “trading in manufactured goods” were 17.0%, followed by “artisans” with 12.6% and the “crop farmer” had the least value (0.7%) of the respondents (Table 1).

**Table 1: Socio-economic Characteristics of Respondent Farmers in Ekiti State**

Characteristics	Parameter	Frequency	Percent (%)	Cumulative Percent
<b>Age</b>	20-29	15	11.1	11.1
	30-39	48	35.6	46.7
	40-49	35	25.9	72.6
	50-59	27	20.0	92.6
	60-69	10	7.4	100.0
	<b>Total</b>		<b>135</b>	<b>100.0</b>
<b>Sex</b>	Male	86	63.7	63.7
	Female	49	36.3	100.0
	<b>Total</b>	<b>135</b>	<b>100.0</b>	
<b>Education Attainment</b>	No formal Education	03	2.2	2.2
	Primary	14	10.4	12.6
	Secondary	35	25.9	38.5
	Polytechnic	29	21.5	60.0
	University	48	35.6	95.6
	Others	06	4.4	100.0
	<b>Total</b>	<b>135</b>	<b>100.0</b>	
<b>Marital Status</b>	Married	104	77.0	77.0
	Single	27	20.0	97.0
	Divorced	03	2.3	99.3
	Separated	01	0.7	100.0
	<b>Total</b>	<b>135</b>	<b>100.0</b>	
<b>Livelihood Activities</b>	Artisans	17	12.6	12.6
	Paid employment	37	27.4	40.0
	Trading of manufactured goods	23	17.0	57.0
	Livestock farmers	57	42.2	99.3
	Crop farmers	01	0.7	100.0
	<b>Total</b>	<b>135</b>	<b>100.0</b>	

*Source: Computation from Field Survey Data, 2021*

### **Access to Extension Services by the Farmers in Ekiti State**

The result of access to different extension services by the farmers in Ekiti State on Table 2 revealed that minority (35.3%) of the farmers had access to extension services while the majority that represents (64.7%) had no access to extension services. The frequency of the extension services among the minority that had access to extension services strongly suggested that most (43.9%) of

the respondents had *Fair* access. This was followed by 41.5% of the respondents with good access to extension services and the least frequency were the *Poor* with 14.6% of the respondents.

**Table 2: Access to Extension Services by the Farmers in Ekiti State**

Characteristics	Parameter	Frequency	Percent (%)	Cumulative Percent
<b>Access to Extension Services</b>	Yes	41	35.3	35.3
	No	75	64.7	100.0
	Missing responses	19	0.0	
	<b>Total</b>	<b>135</b>	<b>100.0</b>	
<b>Frequency of Extension Service</b>	Poor	6	14.6	17.0
	Fair	18	43.9	56.6
	Good	17	41.5	100.0
	Missing responses	94	0.0	
	<b>Total</b>	<b>135</b>	<b>100.0</b>	

*Source: Computation from Field Survey Data, 2021*

### **Awareness of additive values of *Moringa oleifera* and garlic in Ekiti State**

The level of awareness of additive values of *Moringa oleifera* and garlic among the chicken farmers in Ekiti State is presented in Table 3. The result strongly suggested that major (34.8%) awareness was about the antimicrobial property followed by the antioxidant 25.0%, antibacterial 21.7%, antiviral 16.3%, antifungal 1.1% and others were 1.1% of the respondents. On average, 68.1% of the total sampled respondents were aware of the additive values in *Moringa oleifera* and garlic. The source of information about the farmer's awareness showed "extension agent" as the major (30.0%) source of information, followed by "farmer to farmer" (28.9%) while the least source was "television" with 2.2% of the respondents. Only 45.8% of the respondents turned out to be using either *Moringa oleifera* or garlic or both, while 54.2% were not using them in their chicken production. The parts of *Moringa oleifera* tree that were mainly (37.7%) use by the respondents was "seed" followed by the "leaf" with 35.8% and "bark" with 22.8% of the respondents. The least part considered in feeding of animals was the root with 3.8% of the respondents. The various methods in use for processing of *Moringa oleifera* or garlic proved that "Sun dried and milling" was the main (74.1%) method being use by the respondents, followed by "Air dried and milling" with 24.1% of the respondents. Other processing methods amount to 1.8% of the respondents.

**Table 3: Awareness of additive values of *Moringa oleifera* and garlic in Ekiti State**

Characteristics	Parameter	Frequency	Percent (%)	Cumulative Percent
<b>Level of awareness</b>	Anti-microbial	32	34.8	34.8
	Antioxidant	23	25.0	59.8
	Antiviral	15	16.3	76.1
	Antibacterial	20	21.7	97.8
	Antifungal	01	1.1	98.9
	Others	01	1.1	100.0
	Missing responses	43	0.0	
	<b>Total</b>	<b>135</b>	<b>100.0</b>	
<b>Source of awareness</b>	Extension agent	27	30.0	30.0
	Institution (such as university)	18	20.0	50.0
	Farmer to farmer	26	28.9	78.9
	Friends and relatives	10	11.1	90.0
	Radio	05	5.6	95.6
	Television	02	2.2	97.8
	Others	02	2.2	100.0
	Missing responses	45	0.0	
	<b>Total</b>	<b>135</b>	<b>100.0</b>	
<b>Usage</b>	Yes	54	45.8	45.8
	No	64	54.2	100.0
	Missing responses	17	0.0	
	<b>Total</b>	<b>135</b>	<b>100.0</b>	
<b>Part of Plant Used</b>	Leaf	19	35.8	35.8
	Seed	20	37.7	73.6
	Bark	12	22.6	96.2
	Root	02	3.8	100.0
	Missing responses	82	0.0	
	<b>Total</b>	<b>135</b>	<b>100.0</b>	
<b>Processing Method</b>	Sun dried and milling	40	74.1	74.1
	Air dried and milling	13	24.1	98.2
	Others	01	1.8	100.0
	Missing responses	81	0.0	
	<b>Total</b>	<b>135</b>	<b>100.0</b>	

*Source: Computation from Field Survey Data, 2021*

### **Suggestions to Solving the Identified Challenges of Poultry Production in Ekiti State**

The major challenge identified by the farmers was the *source of good stock* by 34.7% of the respondents, followed by *inadequate knowledge of the usefulness of feed additives* with 17.3% of the respondents. *Sourcing for quality feed materials* was responded to by 13.3% of the respondents, while 9.3% of the respondents identified *inaccessible research on plant products as feed additive* as their challenge in poultry production (Table 4). The major (72.3%) suggestions to solving challenges facing poultry production in Ekiti State by the respondents was *provision of credit facilities*, while *provision of extension education* were 13.4% of the respondents, *access to*

*research institutes* accounted for 11.8% of the respondents and *establishment of farmers association* were 0.8% of the respondents.

**Table 4: Suggestions to Solving the Identified Challenges of Poultry Production in Ekiti State**

<b>Characteristics</b>	<b>Parameter</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
<b>Challenges facing Livestock Production</b>	Lack of capital	01	1.3	1.3
	Source of good stock	26	34.7	36.0
	Sourcing for quality feed material	10	13.3	49.3
	Vaccine failure	05	6.7	56.0
	Inadequate knowledge of livestock production	05	6.7	62.7
	Mixing ratio of feed additives to feed	06	8.0	70.7
	Inadequate knowledge of the usefulness of feed additives	13	17.3	88.0
	Inaccessible research on plant products as feed additive	07	9.3	97.3
	Other challenges	02	2.7	100.0
	Missing responses	60	0.0	
	<b>Total</b>	<b>135</b>	<b>100.0</b>	
<b>Suggestions to solving challenges</b>	Provision of credit facilities	86	72.3	72.3
	Provision of extension education	16	13.4	85.7
	Establishment of farmers association	01	0.8	86.6
	Access to research institutes	14	11.8	98.3
	Others	02	1.7	100.0
	Missing responses	16	0.0	
		<b>Total</b>	<b>135</b>	<b>100.0</b>

*Source: Computation from Field Survey Data, 2021*

## DISCUSSION

Socio-economic characteristics of the respondents revealed that the average age of the respondents sampled was about 45 years. This implies that majority of these respondents were energetic and still in their productive age, which is good for the labour-intensive type of chicken production we practise in Ekiti State. This finding is in agreement with the study of Mustapha *et al.*, (2012) carried out in Borno State and Adenegan *et al.* (2018a) conducted in Ekiti State. Higher percentage (63.7%) of the chicken farmers which were men could be attributed to their strength and the fact that women were involved in other responsibilities including house chores. This study agreed with the findings of Adenegan *et al.* (2018a, 2018b). The marital status implied that they are responsible and may have dependents; thus, this might have caused the married respondents to be more committed to their production process. The educational attainment of the respondents revealed that



97.8% of the chicken farmers have at least primary school education. This showed that majority of the farmers are fairly educated and can read and write with understanding. There were also indications that people in other businesses or trade were diversifying into chicken production as alternative source of income. Apart from the livestock farmer, *paid employment* (Public Servant, Civil servants, Teacher among others) were the major sets of people that have diversified into chicken production. This strongly suggested that paid employment is no longer satisfying in meeting the needs of government workers. Livestock production and livelihood activities have an intimate relationship, particularly in arid and semi-arid areas (Suleiman and Singh, 2022).

It was discovered in this present study that the level of access to extension services among the poultry farmers in Ekiti State was lower (35.3%). The frequency of their access to extension services showed that the majority (43.9%) of those that had access to extension services were *fair*, while 14.6% of the respondents were *poor*. This reduced access to extension services could be attributed to an insufficient number of extension agents that are available in the State. Thus, invariably reduce the level of innovation among the farmers. Olaniyi and Ogunkunle (2018) reported that the capacity of farmers to accomplish a definitive objective of optimal production depends to a great extent on their effective use of available agricultural information. The agricultural information needs of farmers were to enhance farmer productivity as well as for better yield (Yusuf *et al.*, 2021).

Awareness of additive values of *Moringa oleifera* and garlic in Ekiti State showed that there was fair level of awareness of the additive potential of *Moringa oleifera* and garlic among chicken farmers. The anti-microbial, antioxidants, antibacterial, antiviral, and antifungal are among the known additive values of *Moringa oleifera* and garlic by the farmers. The reason for the lowest source of awareness through television proved the inadequacy of electricity, thereby limiting the farmer's access to information through television. Adio *et al.* (2016) also identified radio, television, extension workers, cooperative societies, friends and colleagues, phones, libraries, and institutions as sources of agricultural information. The result also showed that information that came to farmers about *Moringa oleifera* and garlic did not emphasis on the beneficial values derivable from the use of the plant products. The minimal usage of the plant materials can be attributed to the fact that feeding them to birds is still relatively recent and not yet widely practiced.

The use of *Moringa oleifera* seed in feed production was prominent above leaf and other parts of the plant among the sampled farmers. This can be attributed to the type of information received about the supplementation of *Moringa oleifera* in chickens' diet. According to a study by Hassan *et al.* (2016) who reported that the inclusion of *Moringa oleifera* leaves as a nutritional supplement has not yet been determined and there were only limited reports on its bioactive constituents. The observed positive impact of *Moringa oleifera* and garlic as feed additives by farmers in this study could be attributed to the contributions of its bioactive components. Hajati *et al.* (2014) reported that phytogetic feed additives are now being used among farmers due to their ability to enrich poultry products with natural antioxidants and antimicrobial compounds to combat known infectious diseases that could affect productivity. Sun drying and milling are the most popular methods used by farmers in processing *Moringa oleifera* or garlic probably because sun-drying is the most popular or ancient known method of preservation among farmers. Researchers have also proved the suitability of different phytogetic plants in the nutrition of poultry birds (Abdel-Wareth

and Lohakare, 2014; Abdel-Wareth, 2016; Liu *et al.*, 2020). According to Gandji *et al.* (2018) *Moringa oleifera* leaves contain high protein, minerals,  $\beta$ -carotene and antioxidants which are useful in human and animal nutrition.

Lastly, Sourcing for good stock, inadequate knowledge of the usefulness of feed additives, sourcing for quality feed materials and inaccessible research on plant products as feed additive top the list of challenges identified by the farmers. Therefore, intervention of the government (Federal, State, and Local Government) and research and learning institutions towards provision of credit facilities, provision of extension education and access to research institutes among others are required to solving the challenges facing poultry production for reasonable development in chicken production in Ekiti State. This finding is in agreement with the study of Mohammed (2010) who posited that research and development, extension education, infrastructure, and government programs which undoubtedly increased agricultural production.

## CONCLUSION AND RECOMMENDATIONS

Incorporation of *Moringa oleifera* and garlic in feed formulation is a novel technique that is gaining acceptance and adoption among chicken farmers in Ekiti State. The study area showed that the majority (35.6%) of the respondents are still in their active age, and that men (63.7%) were more involved in chicken production than their female counterpart. The findings also suggested that only a few farmers were aware of the additive values of *Moringa oleifera* and garlic, and are using them to improve the quality of their feed. Although, the farmers had low access to extension services but adopting the use of the plant materials in the poultry industry will definitely be easier, since the majority of the farmers concerned were educated. Hence, this study recommends as follows:

- i. There should be a holistic information approach for dissemination of information about the potential of *Moringa oleifera* and garlic through the intervention of government, and research and learning institutions to boost chicken production in Ekiti State.
- ii. Additional study is needed to unravel the impact of additive values/phytobiotics of *Moringa oleifera* and garlic on chickens' meat and egg, and what influence they can cause on the health status of the birds.

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Survey of Farmers' Additive Awareness of Moringa and Garlic for Chicken Production in Ekiti State, Nigeria. Agbetuyi, O.A., Ekeocha, A.H. Olobatoke, O.O. and Aganga, A.A. JABU International Journal of Agriculture and Food Science (IJAFS) Volume 12.

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