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Exploring Small-Scale Broiler Farming Practices and Vaccine Adherence: A Study in Aguata, Nigeria

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Abstract

The study ascertained the production practices of small-scale broiler farmers in Aguata Local Government Area of Anambra State, Nigeria. A multistage sampling procedure was adopted for the random selection of 80 farmers using a structured interview schedule. The data were analysed using descriptive statistics. The result reveals that 87.5% of the farmers adopted a deep litter housing system, and 98.75% ensured their poultry houses were sited in well-drained soil and properly ventilated pens. About 93% and 98% of the farmers had brooding and finishing houses separately on their farms and ensured adequate lighting and heat in their brooding houses, respectively. The result shows that 100% and 93.75% of the respondents administered antibiotics and multivitamins at the early stage of day-old chicks and adhered to the Gumboro and Lasota vaccine schedules, respectively, while only 1.25% of the farmers provided a footbath at the entry of their poultry house. All the farmers used broiler starters and finishers in feeding their birds, and the mean weekly duration of broiler starter and finisher feeding was 4.09 and 4.28 weeks, respectively, while 98.75% ensured to always provide water for their birds. The study concluded that the use of recommended production practices was high to some extent among farmers. Hence, the level of information on broiler production practices should be increased by the government extension service unit to enable farmers to keep abreast of current and necessary information on broiler production.

Keywords: Poultry Production Practices; Small-scale Broiler Farming; Bio-Security Measures and Vaccination in Poultry; Poultry Production in Nigeria.

1. Introduction

In Nigeria, the agricultural sector is crucial to the nation's economy, providing employment opportunities and contributing significantly to food security [1]. Among the various agricultural sub-sectors, poultry farming, including layers, broilers, turkeys, and ducks, plays a vital role in the country's food security and economic development. Poultry meat and eggs are the most consumed animal protein sources, making them an integral part of the daily diet for millions of Nigerians. Unlike in some other cultures, poultry consumption in Nigeria is not constrained by cultural or religious restrictions, leading to a high demand for these products [2]. Among the poultry species, small-scale broiler farming has emerged as a vital component, meeting the rising demand for poultry products in the country [3]. Broiler production, characterized by its intensive and rapid growth approach, has become an attractive venture for farmers seeking sustainable livelihoods and economic growth [4, 5]. Therefore, understanding the production techniques adopted by small-scale broiler farmers is paramount to enhancing productivity, product quality, and the overall sustainability of the sector in Nigeria.

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Nigeria, as a populous and rapidly growing country, witnesses increasing urbanization, changing dietary preferences, and a burgeoning middle class. These factors have led to a surge in demand for affordable and high-quality poultry products, particularly broiler meat [6]. Estimates reveal that the annual consumption of poultry meat in Nigeria stands at an astonishing 1.2 million metric tonnes, reflecting the nation's insatiable appetite for poultry products [7]. Furthermore, according to the 2018 African Sustainable Livestock Report, Nigeria's poultry production yields a staggering 454 billion tonnes of meat and 3.8 million eggs each year, supported by an impressive population of 180 million birds. With such substantial numbers, Nigeria holds the enviable position of the second-largest chicken population in Africa, trailing only South Africa [2]. The significance of poultry production in Nigeria is further underscored by the staggering number of poultry products imported into the neighbouring Benin Republic and subsequently channelled into the Nigerian market. Between 2009 and 2011, over 3 million metric tonnes of poultry products were imported into the Benin Republic, with the majority flowing into Nigeria (Eurostat). This influx of imports indicates the country's reliance on poultry as a staple source of animal protein. In response to these demands, small-scale broiler farming has seen substantial growth, both in rural and peri-urban areas, making it an essential component of the nation's agricultural landscape [6].

The dynamics of poultry production systems in Nigeria are diverse and multifaceted. Approximately 80 million chickens are raised in extensive systems, where they enjoy ample space and freedom to forage, while another 60 million are managed under semi-intensive systems, striking a balance between free-range and confined conditions. Additionally, 40 million chickens are reared in intensive systems, where every aspect of their environment is carefully controlled to optimize productivity [7]. Despite being a significant player in the African poultry industry, Nigeria faces challenges in broiler production. It ranks fourth in broiler meat production on the continent, a notable discrepancy compared to its top-ranking status in egg production [7]. This disparity signifies the need for focused efforts to enhance broiler production practices in the country.

The management of broiler production is a complex endeavour that requires careful attention to various factors. The term "management" encompasses all husbandry practices involved in raising birds from day-old chicks to the point of achieving the primary goal of production, which is meat production. Optimal management practices are crucial to achieving efficient and sustainable broiler meat production [8]. By delving into crucial aspects of management such as housing systems, brooding practices, sanitary and bio-security, feeding and watering practices, the study will uncover small-scale farmers' production activities. Vaccine adherence which is a vital component of the poultry management practices will be also be established. Vaccine adherence is the consistent and proper administration of vaccines according to recommended schedules and procedures. It is crucial for maintaining the health and productivity of birds, as well as preventing the spread of diseases within the flock. Proper vaccine adherence helps build immunity and ensures that poultry enterprise remains sustainable and profitable among small-scale broiler farmers.

The socio-economic impact of small-scale broiler farming cannot be understated, as it provides employment opportunities for a significant number of rural households, particularly women and youth [9]. Small-scale farmers constitute a significant proportion of the poultry industry in Nigeria, with approximately 80% of farmers falling into this category [10, 11]. These farmers play a crucial role in the sector by utilizing basic production resources to contribute to the nation's gross domestic product (GDP) and food security [12–14], making it imperative to optimize its productivity and efficiency.

Given the importance of small-scale broiler farmers in Nigeria's poultry industry, it is imperative to examine and understand their production practices thoroughly. This study aims to delve into the intricacies of their farming techniques. By doing so, the research aims to identify areas for improvement and recommend strategies to optimize broiler production on a small scale. Furthermore, the findings have the potential to contribute significantly to the broader poultry industry in Nigeria. They can inform policymakers, researchers, and stakeholders about the current state of small-scale broiler farming and suggest practical interventions to enhance productivity. Considering the report by Suwarta & Hanafie (2018) [15], which emphasizes the importance of broiler meat in supporting national meat production and increasing farmers' income, this study aims to contribute to the ongoing discussions regarding poultry production's role in boosting the nation's GDP. By addressing potential weaknesses in management and production practices, this research endeavours to provide valuable insights that can strengthen the overall broiler production sector in Nigeria.

2. Materials and Methods

The study was carried out in the Aguata Local Government Area of Anambra State, Nigeria. Aguata Local Government Area is located between latitudes 5º 08' N, 5º 05' N and longitudes 7 º 01' E, 7 º 15' E. The people are into agriculture. Notable crops grown are cassava, yam, sweet potato, maize, oil palm, and vegetable crops, while common livestock in the area is poultry, piggery, sheep, and goat production. The population of the study comprised small-scale broiler farmers with a flock size of 50 to 500 birds. A simple multistage random sampling technique was used to select 80 respondents for the study. Data on the production practices of the farmers was collected using a structured interview schedule and analysed using descriptive statistics.

The general flowchart of the research method is presented in Figure 1.

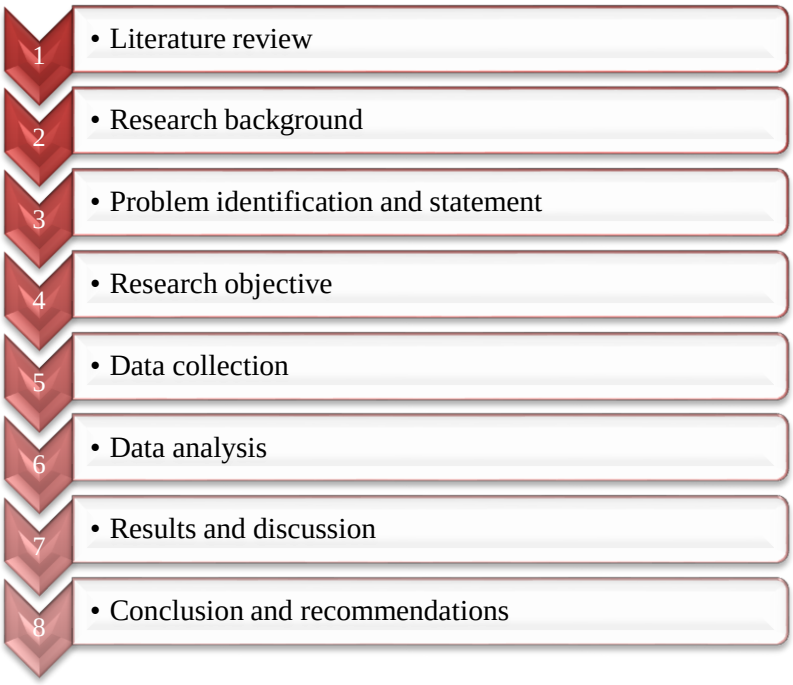

Figure 1. Flowchart of workflow

3. Results and Discussion

3.1. Production Practices of Small-Scale Broiler Farmers

3.1.1. Housing Management Practices of Farmers

Results from Table 1 show that a greater percentage (87.5%) of the respondents use a deep litter system of housing, which is the most suitable for broiler production as it allows for better litter management, a higher level of bird supervision, and prevents leg problems. This aligns with the assertion of Bello (2016) [8]. Findings show that 98.75% of the respondents sited their poultry house in a well-drained soil area with proper ventilation. This implies that farmers were well aware of the pathological implications of poorly drained soil on poultry health and performance. The majority (98.75%) of the farmers had their poultry farm sited where it offered protection to their birds against harsh weather conditions and predators. The finding agrees with Egwuma et al. (2019) [16], who reported that 78% of farmers in Kaduna State adopted adequate lighting, heat, and humidity in their poultry houses. The implication of the above is that heat stress and its associated respiratory diseases that might affect birds are curtailed, and the build-up of pathogens in a poorly drained area is prevented. The majority (98.75%) of the farmers had their farms located near water sources and closer to the market. This could be linked to the essentiality of water in poultry production. Water is essential for both the poultry houses and the birds. Through evaporative cooling and fogging devices, water is sometimes used in pens to lower the ambient temperature. Although birds may cool themselves by panting, doing so requires them to drink more water [17]. Sitting farms close to the market could be connected to several reasons, ranging from the perishability of poultry, reduced cost of transportation, reduced environmental impact, better response to demand fluctuations, and compliance with food safety regulations. According to Bello (2016) [8], farms should be sited in a relatively cool but easily accessible area, not too far from sources of inputs and market outlets.

Results from Table 1 show that 100.0% of the respondents procured their day-old chicks from reliable hatcheries. This finding is in concordance with Egwuma et al. (2019) [16], who revealed that 69.5% of women broiler farmers in Kaduna State procured their day-old chicks from reliable hatcheries. This implies that farmers will rear chicks that are well-hatched and healthy, which will subsequently save them the additional cost of production they would have incurred in ameliorating any health defect the day-old chicks might have had. This also goes a long way in reducing the rate of mortality, as the mode of hatching is known to affect the survival rate of birds. The mean week of broiler rearing before they are sold in the market was 8.53 weeks. This implies that the majority of farmers stick to the appropriate standard interval for broiler production, which is a minimum of 8 weeks. Concerning record-keeping, half of the respondents (50%) keep a record of their production activities. This suggests that half of the population of small-scale farmers could suffer the problem of impaired decision-making, a lack of accountability, and difficulty communicating their productive enterprise. The average mortality rate was 12.19%. This agrees with the report of Samkange et al. (2020) [18], which revealed 18.7% average mortality in Namibia. Ideally, according to literature and expert opinions, the mortality rate of poultry farmers should not exceed 10%. The result implies that there are factors that have heightened the mortality rate of broiler birds owned by smallholder farmers that should be arrested.

Table 1. Housing, and brooding management practices of the respondents

Features	Frequency	Percentage	Mean
Housing management practices			
Cage	10	12.5	
Deep litter	70	87.5	
Poultry house sited in well-drained soil and properly ventilated	79	98.75	
House with protection against harsh weather and predators	79	98.75	
Farm located at a nearby water source	79	98.75	
The farm is closely located to a nearby market	79	98.75	
Procured day-old chicks from reliable hatcheries	80	100	
The interval of rearing birds till they are ready for sale (weeks)			
6	1	1.25	
7	15	18.75	
8	32	40.0	8.53
9	19	23.75	
>9	13	16.25	
Keep farm record	40	50	
Percentage mortality rate			
0—10	47	58.75	
11-21	26	32.5	12.19
>21	7	8.75	
Brooding management practices			
Have brooding and finishing house separately	74	92.5	
Adequate lighting and heat in the brooding house	79	98.75	
*Source of heat used during brooding**			
Electric power supply	23	28.75	
Kerosene lamps	19	23.75	
Charcoal	44	55.0	
Rechargeable lantern	24	30.0	
Gas	1	1.24	
Stove	5	6.25	
Duration in the brooding house (Weeks)			
2	35	43.75	
3	39	48.75	2.62
4	6	7.5	
Observed cluster rule during brooding	79	98.75	
Disinfect and clean brooding houses from pests and diseases	80	100.0	

* Multiple responses.

3.1.2. Brooding Management Practices of Farmers

Findings from Table 1 show that the majority (92.5%) of the farmers have brooding and finishing houses separately on their farms. This shows that the risk of disease transmission from the day-old chick stage to the maturity stage when chickens are housed in the same area for both brooding and finishing will be curtailed or eliminated. The Table also shows that a great proportion (98.75%) of the respondents ensured adequate lighting, heat, and humidity in their brooding houses. This finding is in agreement with those of Egwuma et al. (2019) [16]. Temperature and humidity are very important environmental parameters for poultry farming, and if not controlled, they weaken the immune system and bring heat stress to chickens [19]. The result implies that the majority of the farmers are using the correct production practices for the brooding house.

Concerning the source of heat during brooding, a greater proportion (55.0%) of the respondents used charcoal. This could be because charcoal is available and affordable when compared with others. The result shows that 48.75%

of the respondents allowed their birds to stay up to 3 weeks in the brooding house, while 43.75% of respondents allowed up to 2 weeks. On average, birds lasted 2.62 weeks in brooding houses. This deviates from the report of Hamilton et al. (2016) [20] that the brooding period should continue up to a period of 11 days. The majority (98.75%) of the respondents observed the cluster rule during brooding. This reveals that enough heat is required to keep the birds warm at the brooding stage is ensured. All the respondents disinfected and cleaned their brooding house from pests and diseases, which is an ideal broiler production practice. The result agrees with Egwuma et al. (2019) [16], who found out that the majority (67.8%) of the women farmers in Kaduna State clean their brooding houses free from rodents.

3.1.3. Sanitary, Bio-Security Measures, and Vaccination Practiced by Farmers

Results from Table 2 show that only 1.25% of the respondents have foot dip available at the entry of their poultry house. This agrees with Ajewole & Akinwumi (2014) [21], who revealed that only a few poultry farmers in Ekiti State dip their feet in a mat soaked with disinfectant before entering poultry pens. This implies that the risk of workers and visitors introducing germs and diseases into the poultry house is likely to be heightened. All the farmers clean, disinfect and fumigate housing and equipment before the arrival of chicks. The finding corroborates the report of Egwuma et al. (2019) [16] that 63.5% of farmers in Kaduna State clean, disinfect, and fumigate their housing and poultry equipment. All the farmers in the study area administer vaccines and drugs for disease prevention. Findings from Table 2 show that 71.25% of the respondents administered vaccines and drugs always on their farm, while 26.25% administered them often. About 2.5% of the farmers rarely administer vaccines and drugs. The finding is in high agreement with Hassan et al. (2017) [22], who found that all the poultry farmers in Kano State were carrying out vaccinations. About 45.0% of the respondents administer medicines (drugs or vaccines) to their broilers in the morning hours, while 30.0% administer them at random hours of the day. About 21.25% used the evenings, while only 3.75% used the afternoons. According to expert opinions, it is ideal that drugs or vaccines be administered to birds in the morning hours because the efficacy of drugs is heightened due to the friendliness of the temperature and a higher number of birds can be gotten to feed or drink medicated water during that period of the day.

Results from Table 2 show that 100.0% of the farmers administered multivitamins/antibiotics to their day-old chicks at an early stage, as well as ensuring timely treatment of sick birds and removal of their dead birds. This finding is in harmony with the study of Egwuma et al. (2019) [16], who reported that about 78% of broiler farmers adopted the practice of administering multivitamins/antibiotics at an early stage. This implies that the farmers are following the ideal broiler production practice concerning administering multivitamins and antibiotics to their day-old chicks. Findings show that 93.75% of the respondents adhered to the Gumboro/Lasota vaccine and drug schedule, while 6.25% of the respondents used local herbs (squeezed bitter leaf, Utazi, and Nchuanwu). This implies that the majority use vaccines and drugs to prevent diseases on their farm, which is the recommended practice in broiler production. The possible reasons for the use of local herbs could be attributed to the high cost of foreign drugs as well as the availability and relative cost of the materials for the local drugs. The majority of the respondents ensured the timely treatment of sick birds and the removal of dead birds from their poultry houses. Egwuma et al. (2019) [16] revealed that the majority (67.8%) of women farmers in Kaduna State ensured the timely treatment of sick birds and the removal of dead birds. The implication is that cross-infestation of diseases from sick birds to healthy birds is prevented and reduced.

About 22.5% of the respondents give vaccines and drugs to their chicks on the same day, while 77.5% of the respondents do not give drugs and vaccines on the same day to their chicks. According to Artib Farm Veterinary Medication (2018) [23], drugs can be given to birds after the day of vaccination, but not on the day of vaccination because the drug will ruin the efficacy of the vaccine. Therefore, it implies that the majority of the respondents, following the findings of the results, are carrying out proper production practices concerning vaccine and drug administration.

About 48.75% of the respondents had a separate farm suit and farm boots they put on before entering their poultry house. This shows that the majority of the respondents do not have separate farm suits and boots on their farms, and this could expose the birds to the risk of infections, thereby increasing the chances of a higher mortality rate.

The majority (68.75%) of the farmers do not allow visitors inside their farms, and this finding is in harmony with those of Ajewole and Akinwumi (2014) [21], who revealed that 90% of the farmers in Ekiti State restricted visitors from entering their poultry houses. This implies that the rate of disease transmission from visitors to the broiler birds could be reduced. Just 2.5% of the respondents disposed of their poultry residues closer to their farm surroundings, while a greater proportion (97.5%) of the respondents indicated that they sell or use as manure in their crop farm. This implies that the risk of disease spread could be reduced when poultry dung is not disposed of close to pens.

Table 2. Sanitary, bio-security, vaccination, feeding, and watering practices of the respondents

Features	Frequency	Percentage	Mean
Sanitary, bio-security measures and vaccination practiced			
Foot dips are available at the entry of poultry houses	1	1.25	
Clean and disinfect pens and equipment before the arrival of chicks	80	100.0	
Administered vaccines and drugs whether local or foreign	80	100.0	
Used multivitamins/antibiotics at an early stage of day-old chicks	80	100.0	
Ensure timely treatment of sick birds and removal of dead birds	80	100.0	
Give vaccines and drugs to chicks on the same day	18	22.5	
Have a separate farm suit and farm boots	39	48.75	
Dispose of poultry residues closer to farm surroundings	2	2.5	
Vaccination: How often vaccines and drugs are administered			
Always	57	71.25	
Often	21	26.25	
Rarely	2	2.5	
Vaccination: Time of the day vaccines and drugs are administered			
Morning	36	45.0	
Afternoon	3	3.75	
Evening	17	21.25	
Random	24	30	
Sanitary and bio-security: How often farm equipment are cleaned and disinfected			
Always	76	950	
Often	4	5.0	
Vaccination: Adherence to vaccines and drug schedules			
Gumboro/Lasota	75	93.75	
Local herbs	5	6.25	
Sanitary and bio-security: How often visitors are allowed inside a farm			
Often	9	11.25	
Rarely	16	20.00	
Never	55	68.75	
Feeding and watering practices			
Used broiler starter and finisher feed	80	100.0	
Used other sources of feed	13	16.25	
Booster	1	1.25	
Growers	10	12.5	
Growers and PKC (Palm Kernel Cake)	2	2.5	
Duration of feeding broiler starter (weeks)			
2	2	2.5	
3	10	12.5	
4	53	66.25	4.09
5	9	11.25	
6	6	7.5	
Duration of feeding broiler finisher (weeks)			
3	13	16.25	
4	44	55	
5	18	22.5	4.28
6	4	5.0	
>6	1	1.25	

3.1.4. Feeding and Watering Practices of Farmers

Results from Table 2 show that 100.0% of the respondents used broiler starters and finishers in feeding their birds, which is an ideal practice, and the implication is that the birds will not be lacking any nutrient requirements as they have all been provided for in their feed. About 16.25% of the farmers indicated that they use other sources of feed on their farms. About 12.5% of the respondents used growers to feed their broilers. Just 2.5% of the respondents used growers and palm kernel cake (PKC), while 1.25% used booster feed. This is not an ideal practice in broiler production, according to experts' opinions, the reason being that feeding growers to broilers decrease the body weight gain of the broiler bird at maturity. Findings from Table 2 show that 66.25% of the respondents feed their birds broiler starter for 4 weeks, while a great proportion (55.0%) of the respondents feed their birds broiler finisher for a period of 4 weeks, which is the recommended feeding practice used in broiler production. The majority (96.25%) of the respondents feed their birds ad-libitum. This shows that the ideal practice of ensuring that feed is not lacking in the feeding trough was maintained. The majority (100.0%) of the farmers provide their birds with clean water devoid of contamination, and 98.75% of the farmers always provide water to their birds. This supports the result of Ajewole and Akinwumi (2014) [21] in Ekiti State, where adequate clean water was always provided to birds.

4. Conclusion

Based on the study, it can be concluded that small-scale farmers, to some extent, use a good housing system and practice good brooding to some degree. Sanitary and bio-security practices were the areas where farmers' capacity building was most needed, as deadly poultry acts are treated with kid gloves. Matters relating to feeding and watering were not so far from standard practice, as farmers scored high on most variables measured. The study concluded that the majority of the farmers adhered to the use of recommended broiler production practices but not strictly, which is evident in the sanitary practices, which may have elevated their mortality rate beyond the ideal rate. The study recommended that the level of access to information on broiler production practices should be increased by extension service units to enable farmers to keep abreast of current and necessary information on broiler production. Agricultural extension agents should also reveal to farmers the negative implications of not following ideal practice in its totality. A standard code of conduct in poultry production should be published by the federal, state, and local governments, and sanctions should be introduced to guard against deviant behaviours. The code of conduct should contain the minimum acceptable practices in any poultry endeavour and their corresponding sanctions. This should be manned by a special and well-trained taskforce office in the Ministry of Agriculture, from where clearance will be obtained by farmers for any poultry production exercise. Agricultural extension agents within the ministry should be saddled with the responsibility of training and equipping intended farmers with the necessary skills and training required to undertake poultry production.

5. Declarations

5.1. Author Contributions

Conceptualization, C.O.A. and U.C.E.; methodology, C.O.A. and U.C.E.; validation, C.O.A. and D.J.O.; formal analysis, U.C.E. and D.J.O.; investigation, U.C.E. and C.O.A.; resources, C.O.A. and U.C.E.; data curation, U.C.E.; writing—original draft preparation, C.O.A. and U.C.E.; writing—review and editing C.O.A. and D.J.O.; visualization, C.O.A., U.C.E., and D.J.O.; supervision, C.O.A.; project administration, U.C.E.; funding acquisition, U.C.E. and C.O.A. All authors have read and agreed to the published version of the manuscript.

5.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

5.3. Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

5.4. Institutional Review Board Statement

Not applicable.

5.5. Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

5.6. Declaration of Competing Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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